The educational revolution: new perspectives and innovative practices

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Prologue

In a time of profound and rapid transformations, where educational certainties are fading and change is the only constant, we are confronted with an inescapable challenge: to reinvent education in order to prepare future generations for a constantly evolving world. Classrooms are no longer merely physical spaces, nor are books the sole vessels of knowledge; today, education unfolds across screens, networks, and immersive realities.

The Educational Revolution: New Perspectives and Innovative Practices is the book now in the reader's hands—a collective testimony to these transformations, serving as a compass on this journey. Through experiences, projects, and critical reflections, it offers a travel log that not only addresses the challenges but also illuminates the hopes that educational innovation brings to diverse contexts, guiding us towards a future that, although uncertain, holds the promise of being both inspiring and profound. This book is not simply a collection of essays; it constitutes a dialogue among expert voices who explore the foundational pillars of educational innovation. From the integration of technology into the classroom to the redefinition of the teacher's role, each chapter invites us to reflect on how we can construct a more relevant, inclusive, and transformative educational future.

This work challenges us to rethink our practices from unconventional yet necessary perspectives. The journey begins at the *Benemérita Universidad Autónoma de Puebla* (BUAP) with the *DigiTools* project, which reveals the power of digital tools in empowering both students and professionals. This initiative not only focuses on enhancing technological competencies but also cultivates a culture of digital learning that extends beyond the confines of the classroom. From teacher training in digital skills to the use of transmedia narratives and digital games as dynamic strategies for learning, the book outlines a pedagogical map that spans generations, disciplines, and geographies. What do all these experiences have in common? A steadfast conviction: that education is not merely the transmission of knowledge, but—above all—the transformation of individuals and their environments.

We now turn our attention to the challenges of police training—an area in which pedagogical innovation is essential for preparing officers to face the complexities of the 21st century. The integration of simulations, the development of soft skills, and an emphasis on professional ethics are key elements in building a more effective and humane police force. These initiatives aim not only to enhance technical competencies, but also to foster a culture of respect and empathy within professional practice. In this way, the reader will come to appreciate how education serves as a fundamental pillar in confronting contemporary challenges, promoting a model of training that transcends conventional boundaries and responds to the evolving needs of today's society.

Throughout this volume, various perspectives and innovative approaches to contemporary education are explored. Intergenerational programmes are examined as a vital tool for

narrowing the digital divide between young people and older adults. Through collaborative models involving universities and enterprises, the exchange of knowledge and technological skills is encouraged. This approach not only enables younger individuals to share their understanding of digital tools but also allows older adults to contribute their professional experience, thereby promoting a culture of intergenerational learning and supporting the social inclusion of older individuals within an increasingly digitalised environment.

Artificial intelligence is transforming higher education by enabling personalised learning and improving administrative efficiency. However, it also presents significant challenges, such as the need for continuous professional development for educators and the ethical management of data. This chapter highlights that, while AI offers substantial opportunities, its integration must be approached with caution to avoid negative repercussions within the educational sphere.

Within this transformative context, disruptive approaches are presented to broaden and modernise the higher education curriculum. Emphasis is placed on the critical need for interdisciplinarity and the intrinsic connection between academic knowledge and practical skills. The argument is made for a curriculum that is inherently flexible and adaptable, designed to prepare students effectively for the multifaceted challenges of a globalised and technologically advanced world.

Inclusive and adaptive education, as exemplified by the Universidad para Adultos of the Benemérita Universidad Autónoma de Puebla (BUAP), demonstrates an approach that addresses population ageing and the necessity of tailoring education to the realities of older adults. It promotes intergenerational learning that fosters collaboration and the development of soft skills.

Digital literacy is identified as an essential component for educators to effectively integrate emerging technologies into their pedagogical practices. The necessity for teachers to develop digital and AI-related competencies is underscored, along with an analysis of the critical role of teacher training and the adaptation of professional development programmes to encompass the required skills, including the use of technological tools and the understanding of ethical risks associated with their implementation. Moreover, the importance of ongoing education in the digital revolution is emphasised, highlighting how universities must implement training initiatives that address both technical skills and the ethical and pedagogical dimensions of AI. While AI holds great potential for personalising instruction and enabling autonomous learning, an ethical framework is imperative to ensure equity.

Active methodologies offer a counterpoint to passive pedagogical approaches by promoting student-centred learning and the development of critical thinking and collaboration skills. Strategies such as project-based learning and the flipped classroom encourage active participation and are responsive to the diverse needs of students, thereby underlining the importance of flexibility and adaptability for successful implementation.

Emotional education is addressed as a key factor in preventing early school leaving. It is argued that the development of emotional competencies can positively influence motivation and academic performance, supporting a holistic approach to education that encompasses both academic knowledge and the comprehensive development of the learner.

This work explores how transmedia storytelling can enrich university teaching in the digital age. This approach enables students to engage with content across multiple platforms, encouraging active participation and autonomous learning, thereby resulting in a richer and more meaningful educational experience. Finally, the use of game-based learning is addressed as an effective strategy to enhance online education in teacher training programmes. The platform Edu.cerebriti is presented as an innovative tool that boosts student motivation and engagement, incorporating playful methodologies that support the development of key pedagogical competencies.

The proposals presented in this volume collectively respond to a profound question: how must education transform to remain relevant and equitable in the twenty-first century? It is not merely a matter of incorporating technology, but of reimagining the very meaning of teaching and learning in an interconnected, unequal, and constantly changing world. Educational innovation, as portrayed here, is not a contemporary whim but an ethical and social imperative.

In a world marked by uncertainty, where knowledge expands at a dizzying pace, this book does not seek to offer closed prescriptions but rather pathways for imagining new forms of teaching and learning. Each chapter is an invitation to action—an invitation to rethink our institutions through the lenses of inclusion, adaptability, and critical thinking. Education, as understood herein, is not a solitary act but a collective endeavour in which generations, academic knowledge, and experiential wisdom converge.

As a university lecturer, I have witnessed how these initiatives not only transform pedagogical practice but also the lives of those involved. For behind each technological tool, each active methodology, each innovation, lies an ethical and political commitment: to shape individuals capable of inhabiting the present—and building the future—with dignity, awareness, and creativity.

May this book serve, then, as a starting point for new conversations, new connections, and new transformative actions. For innovation, when born of a commitment to a more just, humane, and relevant education, becomes the driving force behind a pedagogy unafraid to dream of other possible worlds.

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Chapter 1. The "DigiTools" project for training in technological tools and digital competencies at Benemérita Universidad Autónoma de Puebla (México)

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I. Introduction and background

The training of university educators continues to pose a significant challenge, requiring the achievement of high competency standards in contemporary contexts. The development of a training model that prioritises an inclusive approach, positions students at the centre of the learning process, fosters interdisciplinarity, and promotes autonomous and cooperative learning, alongside critical thinking and values-based education, remains one of the most pressing demands (Benet-Gil, 2020; Ribera, 2021; Guamán & Espinoza, 2022).

Learning and Knowledge Technologies (LKT) encompass a broad spectrum of technologies, tools, and resources designed to optimise teaching and learning processes. These range from online tools and educational software to mobile applications and collaborative online platforms that enhance educational engagement at all levels (Maldonado et al., 2023; Cáceres, 2023). In an increasingly digitalised environment, the integration of LKT has proven to be essential, as it facilitates access to online educational resources, encourages collaborative and active learning across diverse settings, and strengthens the development of essential digital skills for the 21st century (Valarezo, 2021). Moreover, LKT enhances opportunities for distance education, supports flexible learning, enables personalisation, and prepares students to face current and future challenges with greater autonomy and responsibility (Cea et al., 2023).

Information and Communication Technologies (ICT) play a pivotal role in the educational process, significantly impacting both teaching and learning practices while offering broad potential for comprehensive educational development (Lozano, 2011; Cabero, 2015). However, the effective determination and integration of LKT, specifically focused on applying technological tools within educational processes, enhance and strengthen their potential and practical applicability (Gómez et al., 2022). Although an in-depth theoretical analysis is not intended, it is evident that ICT provides the digital infrastructure and tools, while LKT represents the pedagogical and strategic application of these technologies within educational contexts. The connection between the two lies in how ICT can be effectively harnessed through LKT to enrich educational practices, promote collaboration, encourage interactivity, and adapt to various learning styles. In essence, LKT relies on competencies developed through ICT to optimise the learning experience.

LKT plays a crucial role in virtual education by enhancing strategies such as learning based on virtual platforms, including Learning Management Systems (LMS) that facilitate the distribution of educational materials and enable real-time communication. Moreover, the use of interactive educational content, the promotion of online collaborative learning, and the implementation of formative online assessments with feedback enrich the educational

experience. These approaches support diverse learning styles, promote student collaboration, and enable more effective and motivating evaluations. Beyond purely virtual environments, LKT also adds significant value in face-to-face and blended learning settings. These technologies foster dynamic and participatory learning environments, ensure access to online educational resources, and promote student collaboration. In blended learning contexts, LKT offers flexibility, allowing students to continue learning beyond the physical classroom, accessing materials and activities according to their schedules, learning styles, and levels. Furthermore, it encourages diversity in learning materials, promotes individualised learning, and supports student autonomy during preparation and self-study.

Across all educational contexts—face-to-face, blended, hybrid, and virtual—LKT enhances the personalisation of education, fosters the development of 21st-century skills such as critical thinking, problem-solving, and collaboration, and promotes student engagement as active participants in their learning process. The integration of teacher training and LKT is not a novel concept; however, the demand for specialised programmes that address the complexity of this integration has grown significantly. Previous experiences have demonstrated the effectiveness of incorporating technological training within professional development initiatives, highlighting the importance of a comprehensive and contextualised approach (Padrón et al., 2022).

Nevertheless, it remains crucial to continue advancing teacher preparation to enhance educational quality and eliminate remnants of traditional and cognitive pedagogical models, which are often centred on teaching and focused on content acquisition. The aim is to transition towards a model that encourages autonomous learning, placing the student at the core of the educational process. This model should promote adaptability, creativity, engagement, and integrality, while also positioning educators as facilitators who design learning experiences that foster holistic development, equipping students to confront contemporary challenges (Correa & Pérez, 2022; Padrón et al., 2022).

Both past efforts and current initiatives aimed at enhancing higher education and developing digital competencies among university educators underscore the urgency of adopting innovative approaches to address these challenges. In this regard, there is a clear necessity for preparing educators through a model that integrates disciplinary, pedagogical, and technological knowledge while considering specific contextual factors (Morales, 2020; Cabero & Palacios, 2020).

In addition to the aforementioned, numerous studies have addressed the importance of technopedagogical training for university faculty. Among these, several are particularly noteworthy. Firstly, the study conducted by Patiño (2019) involved a training process at the *Institución Universitaria Minuto de Dios*, located in Cundinamarca (Colombia). This initiative was developed through a short-term virtual course focused on the use of the Moodle platform and was directed towards over one thousand educators. This training successfully strengthened the basic digital competencies of the teaching staff, generating a positive impact on the academic performance of the students. However, it was recognised that this formative process must be maintained as a continuous and innovative initiative, capable of addressing current challenges in digital competency development.

Similarly, Girón (2021) conducted a study at the *Universidad de San Carlos de Guatemala*, examining the utilisation and application of Learning and Knowledge Technologies (LKT)

within the university context. The research focused on how these technologies were integrated into the didactic processes conducted by professors in the Master's Degree Programme in University Teaching. The primary objective of the study was to determine how these technologies, characterised by their methodological approach aimed at fostering meaningful learning, were incorporated into teaching to enhance educational quality. The study adopted a mixed-method approach, combining quantitative and qualitative data, and was based on a purposive, non-probabilistic sampling method. This included the selection of three professors and sixty postgraduate students from three courses within the Faculty of Humanities. Data collection techniques included observation, questionnaires, focus groups, and analysis of course programmes. The findings revealed how professors utilised LKTs in their teaching practices, offering guidance, orientation, advice, and support to students in order to overcome limitations and disadvantages in academic activities. Furthermore, the study highlighted the use of various devices, digital tools, social networks, software, and platforms in both face-to-face and distance learning environments, thereby promoting meaningful and autonomous learning.

Baquero (2023) conducted research at the *Eloy Alfaro School* in Guabal, Bolívar Canton, Manabí, with the aim of assessing the level of digital competencies among the institution's educators. The research adopted a non-experimental design and was quantitative in nature, as it evaluated the results obtained through the administration of a survey to all six faculty members across various academic disciplines. The results indicated that the teachers were positioned at the exploratory level, meaning that their engagement with educational technology was limited, and they had not developed specific strategies for integrating ICTs into classroom practices. Consequently, a training proposal based on the *DigCompEdu* framework was suggested, aiming to progressively develop digital competencies and establish instructional policies for use across the various academic subjects taught within the school.

Finally, Pérez (2024) conducted a study focusing on the significance of digital competencies among university faculty within the context of workforce digitalisation. The research highlighted how technological advancements, driven by Industry 4.0, have transformed both labour and educational processes, thereby demanding new digital skills at all levels. The study emphasised the need to rethink training systems, particularly in higher education, through the adoption of new learning methodologies and greater investment in digital resources. It was underscored that digital educational competencies were essential for enabling institutions, faculty, and students to adapt to emerging social and professional demands. These competencies encompassed abilities such as the safe and critical use of technologies, information management, content creation, digital security, and problem-solving. Moreover, it was noted that the integration of ICTs in higher education not only modernised teaching practices but also facilitated the acquisition of transversal competencies.

Taking into consideration the critical importance of technopedagogical training for university faculty and acknowledging the ongoing process of change and improvement, this project for the development and training in technopedagogical competencies was initiated, specifically targeting faculty members at the *Universidad Autónoma de Puebla* (Mexico).

II. Curriculum of the "DigiTools: training in technological tools and digital competencies" Course

The **"DigiTools: training in technological tools and digital competencies"** course was a **50-hour virtual teaching experience** designed to strengthen participants' digital competencies in a technopedagogical environment. This program combined **virtual face-to-face sessions (9 hours)**, **independent asynchronous work sessions (35 hours)**, and **peer-review sessions (6 hours)**, offering comprehensive training that covered key areas of technological tool usage in education.

The course was attended by **45 university lecturers and professors** from various fields of knowledge at the Benemérita Universidad Autónoma de Puebla (BUAP), each possessing differing levels of digital competence, ranging from very basic to intermediate and advanced levels. This diversity within the group was clearly evident and served to establish the framework and guidelines for the design and implementation of learning activities and tasks.

Regarding the **Virtual Learning Environment (VLE),** the Moodle platform of the Ibero-American Network of Educational Research (RIBIE) was used, incorporating Moodle and Zoom to facilitate live interaction between the instructor and participants in the training program. Additionally, synchronous sessions featured complementary tools such as Google Jamboard, Mentimeter, Wooclap, among others, to enhance and energize the teaching-learning processes.

In Figure 1, the access to the Virtual Learning Environment (VLE) can be observed, from which all the teaching and learning processes of the diploma programme were managed.

Figure 1.
Virtual Learning Environment of the course.

Source: own elaboration.

2.1. Course structure

The course was structured into six theoretical-practical sessions, the characteristics of which are explained below.

Session 1, dedicated to *Area 1: Professional Engagement*, aimed to introduce university teaching staff to reflect on their role and responsibility in the use of digital technologies. The session included the completion of a digital competence pre-test, designed to help each participant identify their starting point. Furthermore, a practical activity was proposed, consisting of creating an infographic outlining a personal digital professional development plan. In this plan, participants were required to define two short-term and two long-term goals, propose training activities, and identify digital resources they would use for ongoing professional development. The activity was carried out individually or in small groups, promoting strategic planning and self-directed learning.

Session 2, focused on *Area 2: Digital Resources*, addressed the knowledge and appropriate selection of digital tools applied to the educational environment. During this session, participants were introduced to resources and digital applications that facilitate teaching, with particular attention given to their usability, accessibility, and potential for integration into various teaching contexts. Interactive materials and practical examples were presented to encourage autonomy in the search for and use of innovative digital resources.

In **Session 3**, dedicated to *Area 3: Teaching and Learning*, active methodologies and teaching strategies supported by digital technologies were explored. The session placed particular emphasis on designing educational experiences that foster active student participation, collaborative work, and adaptation to different learning styles and paces. In addition, materials and examples were provided to assist teachers in reflecting on the importance of innovation in their pedagogical practices.

Session 4, corresponding to *Area 4: Assessment*, focused on the integration of digital tools in student evaluation processes. The session offered guidance on how to design formative and summative assessments using digital resources. Furthermore, it encouraged reflection on how technology-supported assessment can provide immediate and personalised feedback, contribute to student self-assessment, and serve as a motivating factor in the learning process.

Session 5, centred on *Area 5: Empowering Learners*, proposed a practical activity in which participants were required to select two tools from the Periodic Table of AI Applications. The task involved describing each tool and designing an educational activity in which they could be integrated. These contributions were shared in a forum so that other participants could read and comment on them. This dynamic aimed to foster critical thinking in the selection of technological tools and promote the exchange of ideas and experiences among educators.

Finally, **Session 6**, related to *Area 6: Facilitating Students' Digital Competence*, involved designing a practical case study in which an AI tool was applied to develop one of the five sub-competences of this area. Participants were required to contextualise the activity, provide a title, select the sub-competence to be addressed, and describe the phases of the activity. This work was also shared in a forum, with the requirement to provide feedback on at least one

other participant's contribution. The main objective was for teaching staff to exercise their ability to design innovative and collaborative learning situations that promote the development of students' digital competence.

2.2. Course Objectives and Competencies

The **objectives of the course** were as follows:

- To develop both basic and advanced digital competencies for the effective integration of technological tools in education.
- To foster professional engagement and critical reflection on the use of digital technologies within educational settings.
- To optimise the use of appropriate digital resources for different educational contexts.
- To enhance teaching and learning strategies through the integration of digital tools.
- To develop skills for effective assessment using digital tools.
- To promote continuous professional development through the use of digital platforms.

The **specific competencies of the course** were defined as follows:

- Mastery of technological and digital tools for efficient implementation in educational practice.
- The ability to reflect critically on professional practice and adopt digital technologies that enhance communication and educational engagement.
- The skill to select and use digital resources effectively and appropriately in various educational contexts.
- The capacity to design and implement pedagogical strategies that incorporate digital tools to promote active and collaborative learning.
- The ability to apply digital tools in the assessment of educational processes and outcomes with precision and efficiency.
- Competence in seeking, selecting, and participating in continuous professional development opportunities within the digital domain.

The competencies established in the training programme played a fundamental role in the planning of learning and assessment processes. They provided a clear and coherent framework that enabled participants to progress effectively towards achieving the objectives of the diploma course, encouraging responsibility, creativity, and collaboration in the development of innovative, learner-centred teaching practices.

2.3. Teaching and learning methodology of the course

Throughout the development of the course, a wide range of teaching and learning strategies were employed, carefully designed to facilitate not only the acquisition of theoretical knowledge but also its critical analysis, practical application, and adaptation to real-world contexts. The teaching team made use of explanatory and demonstrative methods, whereby key concepts and content were presented and supported through the use of visual aids, such as instructional videos, interactive presentations, and additional learning materials. These

resources were selected to enrich the understanding of the subject matter and promote deeper cognitive engagement. Furthermore, the analysis of carefully selected real-life case studies was integrated into the course, enabling participants to establish connections between theory and practice and to develop problem-solving skills in authentic scenarios.

In addition, the course incorporated innovative and active methodologies aimed at fostering student participation, motivation, and collaborative learning. Among these approaches, gamification techniques were used to make the learning process more dynamic and engaging. Project-Based Learning (PBL) allowed students to develop complex tasks by applying knowledge to the design and execution of projects, while the Flipped Classroom model encouraged independent study and reflection before class sessions, reserving synchronous meetings for discussion, problem-solving, and the exchange of ideas. These methodologies aimed to place students at the centre of the learning process, promoting autonomy, critical thinking, and a sense of ownership in their educational journey.

With regard to academic monitoring, six specific follow-up activities were proposed, each addressing different conceptual and procedural aspects presented throughout the course. These tasks were strategically distributed across the various modules and played a fundamental role in assessing participants' progress. They were designed not only to evaluate the degree of understanding but also to provide ongoing, personalised feedback to support continuous improvement. Furthermore, these activities contributed directly to the continuous assessment process, forming a key part of the overall evaluation framework. Through this systematic and structured follow-up, the course encouraged the development of self-directed learning skills, responsibility, and reflective practice, ensuring that each participant was actively engaged in achieving the learning outcomes and developing professional competencies applicable to their educational and professional contexts.

2.4. Evaluation of the Teaching and Learning Processes of the Course

The evaluation of the teaching and learning processes followed a three-phase approach: initial, ongoing, and final.

In the **initial phase (pre-assessment),** a diagnostic assessment was carried out to determine the students' baseline level in each module. This stage enabled the identification of each learner's starting point, which in turn facilitated the adaptation of content and the personalisation of the learning process. It provided students with a clear understanding of their strengths and areas for improvement in relation to digital competencies.

During the **procedural stage (continuous assessment)**, various activities were proposed both inside and outside the classroom, requiring autonomous work from the students. These activities fostered the practical application of the knowledge acquired. By working independently and collaboratively, participants were able to actively explore digital tools, solve problems, and apply active learning strategies. This consistent practice helped consolidate their understanding and skills in the effective use of technology in educational contexts.

Activity 1: Personal Digital Professional Development Plan. In this activity, participants developed an infographic outlining their personal digital professional development plan. This

plan included short- and long-term goals, training activities, and digital resources that enabled them to stay updated on their digital competencies. The activity promoted self-directed learning and professional planning, allowing participants to design a structured approach to their personal growth. The work was carried out individually or in teams of up to three people, with an estimated duration of 2-3 hours. Many participants opted to use specialized tools such as Canva to facilitate the design of the infographic.

Activity 2: Training experiences forum. In this session, participants explored different websites offering training and development courses, preferably for educators. They selected two platforms and provided key information: the name of the site, its link, a brief description, and an analysis of a specific course. This exercise aimed to identify and share resources that promote continuous professional development, encouraging the exploration of new learning opportunities. The activity was conducted individually and took approximately 2-3 hours.

Activity 3: Creating activities with Wordwall. In this activity, participants created two interactive resources using the Wordwall tool. These activities were designed to address specific topics and were shared in a forum where other participants could explore, test, and provide feedback. This exercise fostered creativity, active learning, and collaboration, as well as the development of practical skills in creating interactive educational activities adapted to different learning styles. The activity was carried out individually and lasted 2-3 hours.

Activity 4: Designing an evaluation rubric with Additio. In this activity, participants designed an evaluation rubric using Additio, including a detailed description of the activity being assessed, its title, intended audience, subject, and curriculum plan. The rubrics included at least four columns (evaluation levels) and four rows (evaluation indicators) to ensure their relevance and applicability. This exercise trained participants in designing evaluation tools tailored to real educational contexts. The activity was individual and had a duration of 2-3 hours.

Activity 5: Selection of tools for classroom integration. During this session, participants explored the AI Tools Periodic Table and selected two tools to design educational activities that incorporated them. In addition to describing each tool, they outlined how these tools could be applied in specific classroom contexts. This exercise aimed to develop the ability to integrate technological tools into the educational field, encouraging the exchange of ideas and critical evaluation among participants. The activity was individual and required 2-3 hours.

Activity 6: Designing practical cases for competencies in Area 6. In this final activity, participants designed a practical case that integrated an artificial intelligence tool and developed a sub-competency from Area 6 of digital competencies. The cases included a detailed description of the context, title, selected sub-competency, and phases of implementation. This exercise allowed participants to apply artificial intelligence in educational activities that fostered the development of digital competencies, as well as critically evaluate the proposals of their peers. The activity was individual and lasted approximately 2-3 hours.

Lastly, in the **final phase (final assessment)**, a questionnaire was implemented to validate the knowledge acquired in each module. This test allowed students to demonstrate the competencies they had developed throughout the training programme.

Regarding the **items** that comprised the evaluation of the teaching-learning processes of each module of the course, they were as follows:

Table 1.
Evaluation criteria for the theoretical-practical sessions.

Ítem	Score	Percentage
Pre-test of digital competences	10 points	10%
Activity 1: Personal Digital Professional Development Plan	10 points	10%
Activity 2: Training experiences forum	10 points	10%
Activity 3: Creating activities with Wordwall	10 points	10%
Activity 4: Designing an evaluation rubric with Additio	10 points	10%
Activity 5: Selection of tools for classroom integration	10 points	10%
Activity 6: Designing practical cases for competencies in Area 6	10 points	10%
Post-test of digital competences	10 points	10%
End-of-course questionnaire	20 points	20%

Source: own elaboration.

It is important to highlight that **in order to pass the course**, it was required **to obtain at least 50 points out of the 100 possible points** as reflected in the table above. In this way, students were able to design alternative learning paths by combining attendance at sessions with the submission of assignments and the assessment of their competencies and knowledge in the final course exam.

III. Learning outcomes of the participants

Out of a total of 45 individuals who participated in the course, 24 (53.33%) successfully completed it, while 21 (46.67%) did not meet the previously explained requirements to obtain the course certification. These are very high dropout rates, mainly due to neglect of the course and the fact that a virtual training program requires daily monitoring to avoid later work overload and content exposure.

During the first week of the course, participants were asked to complete the Digital Competence Pre-Test to assess their starting level of competence. The results obtained from this pre-test indicated that the average level of the participants was B1 (an average of 49 points out of 88), which corresponds to the following profile: **Integrator (B1)**., which means: You experiment with digital technologies in a variety of contexts and for different purposes, integrating them into many of your teaching practices. You use them creatively to enhance various aspects of your professional commitment. You are eager to expand your repertoire of practices. You will benefit from increasing your understanding of which tools work best in which situations and how to adapt digital technologies to pedagogical strategies and methods. Try to give yourself more time for reflection and adaptation, complemented by collaborative knowledge sharing, to reach the next step, "Expert" (B2).

The rest of the levels can be consulted below in table 2:

Table 2.
DigCompEdu levels of digital competences.

Score & Level	Description
If your score is below 20, you are a **Beginner" (A1)**	You have the opportunity to start improving your digital technology skills. The feedback you receive from this survey has identified a series of actions you can try. Select one or two to begin during the next learning period, focusing on significantly improving your teaching strategies. As you do this, you will find yourself progressing to the next step in digital competence, the "Explorer" level.
If your score is between 20 and 33, you are an **"Explorer" (A2)**	You are aware of the potential of digital technologies and are interested in exploring them to improve your pedagogical and professional practice. You have started using digital technologies in some areas and will benefit from more consistent practice. You can increase your competence by collaborating and exchanging with colleagues and expanding your repertoire of practices and digital skills. This will take you to the next step in digital competence, the "Integrator" level.
If your score is between 34 and 49, you are an **"Integrator" (B1)**	You experiment with digital technologies in a variety of contexts and for different purposes, integrating them into many of your teaching practices. You use them creatively to enhance various aspects of your professional commitment. You are eager to expand your repertoire of practices. You will benefit from increasing your understanding of which tools work best in which situations and how to adapt digital technologies to pedagogical strategies and methods. Try to give yourself more time for reflection and adaptation, complemented by collaborative knowledge sharing, to reach the next step, "Expert" (B2).
If your score is between 50 and 65, you are an **"Expert" (B2)**	This means: You confidently, creatively, and critically use various digital technologies to improve your professional activities. You purposefully select digital technologies for specific situations and strive to understand the benefits and drawbacks of different digital strategies. You are curious and open to new ideas, knowing there are many options you have yet to try. You use experimentation as a means to expand, structure, and consolidate your repertoire of strategies. Share your experiences with other teachers and continue critically developing your digital strategies to reach the "Leader" (C1) level.
If your score is between 66 and 80, you are a **"Leader" (C1)**	You have a consistent and comprehensive approach to applying digital technologies to improve pedagogical and professional practices. You are confident that you have a broad repertoire of digital strategies and know how to choose the most appropriate one for each situation. You continuously reflect on and develop your practices. By exchanging experiences with colleagues, you stay up to date on new developments and ideas and help other teachers leverage the potential of digital technologies to improve teaching and learning. If you are ready to experiment a little more, you will reach the final stage of competence, as a "Pioneer."
If your score is above 80, you are a **"Pioneer" (C2)**	You question the adequacy of contemporary digital and pedagogical practices, in which you are a leader. You are concerned with the limitations or shortcomings of these practices and are motivated by the drive to further innovate education. You experiment with highly innovative and complex digital technologies and/or develop novel pedagogical approaches. You lead innovation and serve as a role model for other teachers.

Source: own elaboration based on DigCompEdu.

Below, in Table 3, the detailed results by participant and area of the administered pre-test are shown.

Table 3.
Results of the Pre-test of digital competences.

Areas	Participants																								Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Area 1: Professional Commitment	8	14	4	6	9	7	9	10	8	10	15	4	6	10	15	9	11	6	10	9	8	10	15	9	13,875
Area 2: Digital Resources	7	10	7	6	5	5	4	9	7	6	10	7	6	6	10	4	7	6	7	5	7	6	10	5	13,5
Area 3: Teaching and Learning	2	15	6	10	12	7	8	13	7	11	15	6	10	11	15	8	8	10	12	10	7	11	15	10	14,9375
Area 4: Assessment	5	11	6	6	6	5	6	7	5	6	9	6	6	6	9	6	6	6	8	5	5	6	9	5	12,9166667
Area 5: Empowering Students	7	10	8	8	5	5	7	9	9	6	11	8	8	6	11	7	6	8	8	5	9	6	11	5	15,25
Area 6: Facilitating Students' Digital Competence	6	17	7	8	9	9	15	11	8	11	16	7	8	11	16	15	10	8	14	11	8	11	16	11	13,15
Score	35	77	38	44	46	38	49	59	44	50	76	38	44	50	76	49	48	44	59	45	44	50	76	45	49,125
Level	B1	C1	B1	B1	B1	B1	B1	B2	B1	B2	C1	B1	B1	B2	C1	B1	B1	B1	B2	B1	B1	B2	C1	B1	B1

Source: own elaboration.

After this first digital competence pre-test, the participants completed the six proposed activities, and the results can be seen below, along with examples of the technopedagogical products presented. In figure 2, an example of the technopedagogical product associated with activity 1 can be observed:

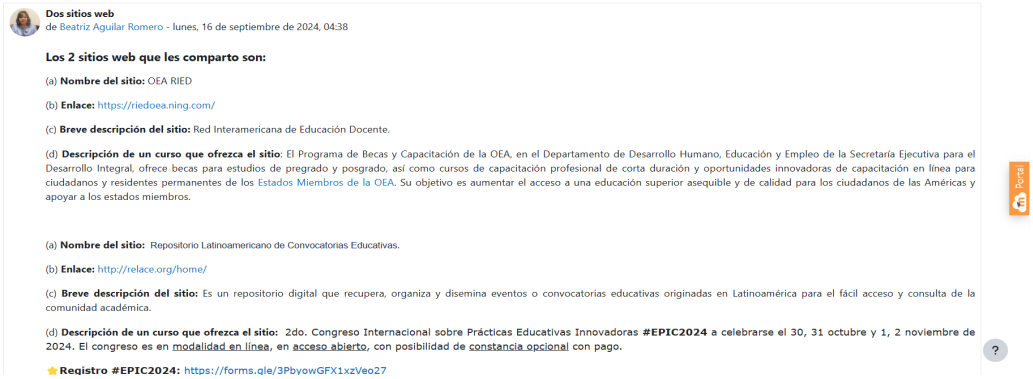
Figure 2.
Example of Activity 1: Personal Digital Professional Development Plan.

Source: own elaboration based on the task developed by José Andrés Chavarría González.

The previous figure presents a Personal Digital Professional Development Plan by José Andrés Chavarría González, which outlines key steps for professional and personal growth. The central figure of a person ascending a staircase symbolizes progress, with goals such as integrating Web 4.0 in teaching, obtaining a PhD, incorporating Artificial Intelligence (AI) strategies into work activities, and gaining AI training. At the bottom, a periodic table of free AI apps is displayed as a resource to support these objectives, surrounded by digital icons representing various technological tools, emphasizing a focus on digital skills and modern educational practices.

Figure 3 reflects an example of the technopedagogical product associated with activity 2 (Training experiences forum). It illustrated a forum activity in which participants explored two educational websites offering professional development courses for educators. The first site, OEA RIED, provides scholarships and training opportunities, including short-term online courses, to improve access to quality higher education in the Americas. The second site, Repositorio Latinoamericano de Convocatorias Educativas, serves as a digital repository for educational events and opportunities in Latin America, highlighting the #EPIC2024 conference on innovative educational practices.

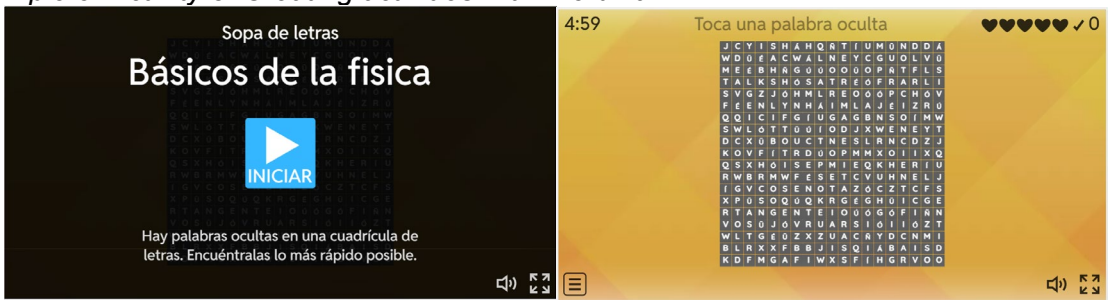
Figure 3.
Example of Activity 2: Training experiences forum.



Source: own elaboration based on the task developed by Beatriz Aguilar Romero.

Figure 4 shows an example of the technopedagogical product associated with activity 3 (Creating activities with Wordwall). In this case, the task was a “Word search” activity to learn the basic concepts of physics.

Figure 4.
Example of Activity 3: Creating activities with Wordwall.



Source: own elaboration based on the task developed by Lorena Cruz León.

Figure 5 presents an example of the technopedagogical product associated with activity 4 (Designing an evaluation rubric with Additio). In this case, the activity was designed to target evaluators, reviewers, and participants of the Educational Innovation Award in higher education institutions (IES) in Mexico. The activity was part of the Educational Innovation Award organized by the Network of Educational Innovation in Higher Education in Mexico. The purpose of this activity was to provide evaluators and reviewers with a reference for determining whether the submitted experiences meet the criteria outlined in the Call for Submissions, as well as to establish the appropriate scoring for each experience based on these criteria.

Figure 5.
Example of Activity 4: Designing an evaluation rubric with Additio.

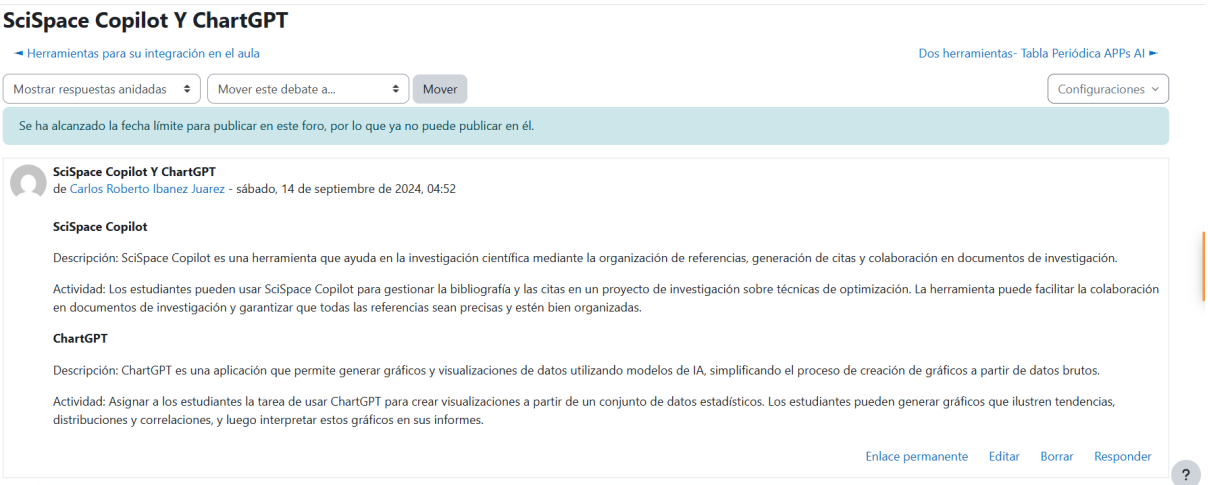
Descripción
Permite dictaminar las experiencias concursantes en el Premio de Innovación Educativa en las IES de México

	Destacado	Adecuado	Oportunidad de mejora	No cumple
Originalidad La experiencia de innovación educativa es original.	La experiencia demuestra o describe las razones por las cuáles es inédita en el contexto descrito.	La experiencia es inédita dentro del contexto descrito en la postulación.	La experiencia tiene elementos inéditos dentro del contexto descrito en la postulación.	La experiencia carece de elementos que puedan distinguirse como inéditos dentro del contexto descrito.
Objetivo Descripción del logro o resultados esperados.	El objetivo es realista, pertinente y factible, es decir, es completamente realizable en el tiempo previsto, con los recursos disponibles y responde a las necesidades de la institución educativa de adscripción.	El objetivo es realista, pertinente y factible, es decir, demuestra algunos elementos de ser realizable en el tiempo previsto, con los recursos disponibles y responde a las necesidades de la institución educativa de adscripción.	El objetivo es poco factible, es decir, no demuestra todos los elementos para que éste se realice en el tiempo previsto, con los recursos disponibles y de responder a las necesidades de la institución educativa de adscripción.	El objetivo no es realista, ni pertinente, ni factible.

Source: own elaboration based on the task developed by Elsa María Fueyo Hernández.

Figure 6 presents an example of the technopedagogical product associated with activity 5 (Selection of tools for classroom integration). In this activity participants had to explore the AI Tools Periodic Table and select two tools to design educational activities that incorporated them.

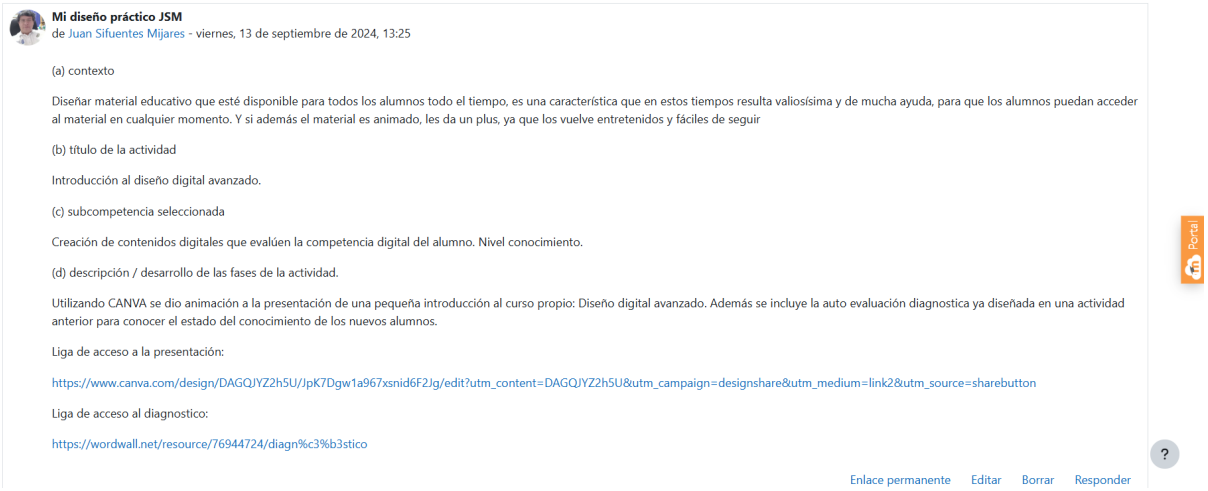
Figure 6.
Example of Activity 5: Selection of tools for classroom integration.



Source: own elaboration based on the task developed by Carlos Roberto Ibáñez Juárez.

Finally, in figure 7 the technopedagogical product associated with activity 6 (Designing practical cases for competencies in Area 6) is reflected. In this case, participants had to design a practical case that integrated an artificial intelligence tool and developed a sub-competency from Area 6 of digital competencies.

Figure 7.
Example of Activity 6: Designing practical cases for competencies in Area 6.



Source: own elaboration based on the task developed by Juan Sifuentes Mijares.

The activities in this course provided a comprehensive approach to developing digital competence. Participants engaged in tasks like creating a Personal Digital Professional Development Plan and exploring educational resources in the Training Experiences Forum, which helped them integrate Web 4.0 and AI strategies into their professional growth. Tasks such as designing activities with Wordwall and evaluation rubrics with Additio allowed participants to apply digital tools for teaching and assessment. Additionally, activities like selecting AI tools for classroom integration and designing practical cases reinforced their ability to use technology in real-world teaching. Overall, the course fostered continuous learning and the practical application of digital technologies in education.

After completing the course, participants were asked to complete the Digital Competence Post-Test to determine if there had been any progress or regression in their level of digital competencies.

Upon analyzing the data from the pre-test and post-test, it is clear that there has been a significant improvement in the overall performance of the participants. The average score in the pre-test was 49.125, while in the post-test, it rose to 60.041667. This increase of approximately 11 points suggests that the participants demonstrated a notable improvement in their competencies and skills over the course of the training. This improvement could be attributed to factors such as increased familiarity with the digital tools, enhanced teaching strategies, or a more focused approach to the content.

Looking at the distribution of scores, the pre-test shows a wider range of values, with scores ranging from as low as 35 to as high as 77. This indicates that the initial performance was quite varied, with some participants struggling significantly more than others. In contrast, the

post-test results exhibit a more balanced distribution, with scores ranging from 42 to 79. This more evenly distributed range in the post-test suggests that the training had a more consistent impact on all participants, helping to elevate the lower scores and bring them closer to the higher-performing individuals.

When examining the competency levels, it is evident that in the pre-test, the majority of participants were at the B1 level, with some achieving B2 in certain areas such as professional competencies and digital resources. By the post-test, however, more participants had reached the B2 level, and several had even progressed to C1. This shift indicates that the training was effective in pushing participants beyond the B1 level, particularly in the areas of digital resources, teaching strategies, and facilitating students' digital competence.

Furthermore, the pre-test showed that the lower scores were mainly associated with the B1 level, while in the post-test, the majority of participants were able to move up to B2, with a few reaching C1. This upward movement in levels highlights the effectiveness of the training in enhancing participants' skills and competencies, resulting in more participants achieving higher proficiency levels across the board.

The results of the post-test can be found in Table 3, which is presented below.

Table 4.
Results of the Post-test of digital competences.

Areas	Participants																								Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Area 1: Professional Commitment	10	9	11	11	11	16	9	10	13	12	15	9	12	13	9	14	12	9	10	14	10	15	10	15	17,4375
Area 2: Digital Resources	7	7	10	8	9	9	4	9	9	9	10	9	8	8	6	7	9	7	6	10	6	10	6	10	16,0833333
Area 3: Teaching and Learning	14	14	14	12	11	15	8	13	15	14	15	11	14	16	9	16	12	14	11	15	11	15	11	15	19,6875
Area 4: Assessment	9	9	8	8	9	10	6	7	11	8	9	8	10	8	5	11	8	9	6	11	6	9	6	9	16,6666667
Area 5: Empowering Students	11	11	10	5	9	11	5	9	11	6	11	9	6	8	5	12	9	11	6	10	6	11	6	11	17,4166667
Area 6: Facilitating Students' Digital Competence	12	13	14	9	15	15	12	11	17	13	16	14	10	13	8	19	15	13	11	17	11	16	11	16	16,05
Score	63	63	67	53	64	76	44	59	76	62	76	60	60	66	42	79	65	63	50	77	50	76	50	76	60,0416667
Level	B2	B2	C1	B2	B2	C1	B1	B2	C1	B2	C1	B2	B2	C1	B1	C1	B2	B2	B2	C1	B2	C1	B2	C1	B2

Source: own elaboration.

Overall, the data suggests that the training program had a positive impact on participants' digital competencies, teaching practices, and overall performance. The improvement in scores and competency levels between the pre-test and post-test reflects the participants' growth and development, indicating that the strategies and tools provided during the course were successfully integrated into their skill set. This progress can be attributed to various factors, including better access to resources, more focused training, and a more structured approach to addressing the challenges faced by participants in the realm of digital education.

IV. Conclusions

The rapid and relentless progression of information and communication technologies (ICT) represents a pressing challenge for the educational community in the current decade. In this rapidly evolving technological landscape, the integration of educational technologies into the continuous professional development of educators is not only an indispensable requirement but also serves as the foundational pillar for fostering ongoing growth and adaptation in

contemporary educational settings. The strategic alignment of accelerated technological advancement with continuous teacher development is pivotal, as it not only propels educational innovation but also fortifies the pedagogical competencies required to address the multifaceted and dynamic challenges inherent in 21st-century education.

Consequently, the widespread recognition of the profound benefits of educational technologies is becoming increasingly evident for both educators and students. In this regard, continuous teacher training, when combined with the practical application of the skills and knowledge acquired, serves to empower educators in managing the daily complexities of the classroom environment. Moreover, it facilitates enhanced student engagement and cultivates a greater sense of interest and involvement in the learning process. This harmonious integration of teacher development and the effective deployment of technological skills significantly enriches the educational experience, fostering a learning environment that is not only dynamic but also intellectually stimulating, ultimately supporting the comprehensive development of students.

Furthermore, it is of paramount importance to underscore the critical role that educators play in the broader context of social transformation, as well as the strategies that must be employed to achieve this transformation. In this context, continuous professional development transcends the mere acquisition of essential competencies and skills; it becomes an ethical and professional responsibility for every educator who seeks to make a meaningful impact on the holistic development of their students within the classroom. The improvement of the teaching and learning process will ultimately rely on the unwavering commitment of educators to remain up to date with the latest developments in their field, as well as their dedication to pedagogical innovation and their ability to adapt to the ever-changing demands of modern education.

Finally, in order to further elevate the teaching and learning process, it is imperative to incorporate methodologies and tools that actively promote the cultivation of critical thinking and knowledge generation in students. This undertaking necessitates an approach that is both transdisciplinary and multidisciplinary, one that encourages collaboration across various domains of knowledge. As such, the design and implementation of technology-enhanced educational projects must give due consideration to the necessity of interdisciplinary cooperation, which, in turn, serves to stimulate innovation, foster creativity, and nurture critical thinking within the educational sphere. The integration of diverse pedagogical approaches and the collaboration between academic disciplines not only enrich the educational experience but also prepare students to tackle the complex, multifaceted challenges of a rapidly evolving global society. In doing so, it ensures that students are equipped with the intellectual tools and adaptive skills needed to thrive in an increasingly interconnected and technologically driven world.

V. Acknowledgements

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Chapter 2. Challenges in Police Force training

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This chapter examines the evolution and challenges of education and training within police forces, emphasizing the need for strategies that enhance security in a context of technological and social change. It analyzes how police officer training has progressed since the second half of the 20th century, although disparities in educational requirements persist globally, affecting the inclusion of diverse groups. In Spain, the fragmentation of police forces complicates the analysis of their training systems. The text also highlights the importance of innovation in police training and the challenges officers face in adapting to a rapidly changing environment, including stress management, emotional resilience, and decision-making in high-risk situations. These aspects are critical for equipping officers to effectively fulfill their roles in public security.

I. Education in Police Forces

Police forces face challenges related to their training, functions, and influence, necessitating strategies that improve security while mitigating the consequences of technological and social changes impacting society (Hadlington et al., 2021; Javdani, 2019). Regarding the education and training of these professionals, these challenges also present organizational difficulties, particularly in the promotion and access to positions of responsibility.

The average educational level of police officers has increased significantly since the second half of the 20th century (Roberg & Bonn, 2004). While only a small proportion of police departments worldwide formally require a university degree for employment or promotion, most have policies supporting higher education and informal university-based criteria for selection and promotion (Hilal et al., 2013). This trend toward higher educational attainment has been a topic of debate since the 1970s, generating extensive scholarly literature on the effects of education on performance (Smith & Aamodt, 1997), behavior (Bruns & Magnan, 2014; Rydberg & Terrill, 2010), stress management (Darius et al., 2014), and biases or discrimination exhibited by officers (Linetsky, 2018). However, there is no consensus on the minimum education levels required for police candidates. Moreover, it has been argued that in some cases, establishing such minimum requirements might negatively impact the inclusion of women and certain minorities in these forces (Decker & Huckabee, 2002).

Police training, in many instances, remains rudimentary and fragmented, echoing the traditional military model (Vodde, 2009). Nonetheless, significant advancements have occurred, many derived from the application of constructivist educational methodologies in response to the community policing philosophy that emerged in the 1980s. This approach, influenced by the idea that effective policing requires problem identification and resolution

(Goldstein, 1990), adapted police training to fieldwork tasks. However, it has yet to fully address the new demands faced by officers and police organizations today.

One of the main challenges in studying the impact of education and training within security forces is the variability of entry requirements, both in educational terms and in other aspects such as age or admission tests. This diversity results in notable differences in outcomes depending on the region of the world being analyzed (Paterson, 2011), and even within the same country, as is the case in the United States (e.g., Vespucci & Vespucci, 2020).

In addition to this diversity of requirements, there is naturally a wide variety of programs and projects that complete recruits' training until their graduation as police officers, a topic that will be explored in greater detail in subsequent sections.

II. Police education in Spain

In Spain, the presence of various professional security organizations within the State Security Forces and Corps complicates the possibility of analyzing police training from a unified perspective. The primary division lies between the forces under the General State Administration, which include the Civil Guard, subordinate to both the Ministry of the Interior and the Ministry of Defense, and the National Police, which falls exclusively under the Ministry of the Interior.

Additionally, Organic Law 2/1986, of March 13, on Security Forces and Corps, grants Autonomous Communities with the relevant statutory provisions the authority to establish their own police forces. For those that do not exercise this competence, the law allows for the assignment of a unit of the National Police Force. This divides the Autonomous Communities into two groups: those with their own autonomous police forces (Navarre, Catalonia, the Basque Country, and the Canary Islands) and those with police units assigned to the National Police. Each of these communities implements unique initiatives for the training and professional development of their personnel, complicating the synthesis of their actions. Furthermore, there are security forces under the jurisdiction of local police in municipalities with populations exceeding 5,000 inhabitants (Law 7/1985, of April 2).

2.1. Civil Guard

Officer training in the Civil Guard is conducted through two pathways. Civilians may complete three years of education at the General Military Academy, followed by two years at the Civil Guard Officers Academy (AOGC) in Aranjuez (Madrid). Alternatively, non-commissioned officers with at least two years of experience may access a two-year training program at the AOGC. Upon completing either pathway, students obtain the rank of Lieutenant and a university degree in Security Engineering.

This university recognition stems from Law 39/2007 on the military career, which led to the establishment of defense university centers in 2008. Since 2009, the Civil Guard University Center (CUGC) in Aranjuez, affiliated with the Carlos III University of Madrid, has managed undergraduate programs, as well as postgraduate and other specialized courses.

For entry into the Corporals and Guards Scale, training lasts one academic year at the Civil Guard Guards Academy in Baeza (Jaén), followed by a 40-week practical period in Territorial

Units of the Civil Guard. Upon completion, students receive the rank of Civil Guard and a qualification equivalent to that of a Technician in the General Education System.

The Civil Guard offers further training through various institutions. The Academy for Non-Commissioned Officers in San Lorenzo de El Escorial has been training candidates for non-commissioned officer positions since 2018, accepting only those with at least two years of service in the Corporals and Guards Scale. The "Duque de Ahumada" Young Guards College in Valdemoro prepares the children of Civil Guard personnel for entry into the force, including selective testing in the first year and practical training in the second, followed by 40 weeks of placement in Territorial Units.

The Civil Guard also provides specialized training through institutions like the Training Center for Judicial Police, Environmental Protection, and other specific fields. The Training Center for Explosive Ordnance Disposal and CBRN Defense (CADEX-NRBQ) in Valdemoro specializes in internal training for Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE) terrorism.

The Special Training Center in Logroño focuses on advanced techniques, particularly counter-terrorism, while the Mountain Training Center in Jaca specializes in operations in mountainous areas and speleology. The Canine Training School in El Pardo trains dogs for security, explosives, and drug detection, while the Traffic School in Mérida provides training in traffic, transportation, and road safety.

2.2. National Police

The National Police Academy, established in Ávila in 1986, trains candidates who pass the entrance examinations for the Basic Scale (Police rank) and the Executive Scale (Inspector rank). The Academy also offers promotion courses and complementary training for other ranks.

Candidates for the Basic Scale must hold a high school diploma or equivalent. They undergo nine months of training, followed by 12 months of practical placement in police stations across Spain, amounting to a total of 120 ECTS credits.

Individuals with a university degree or equivalent, as well as National Police officers with the rank of Sub-Inspector, may enroll in the Executive Scale course. This includes an initial nine-month phase (in-person for new recruits and remote for internal promotions), followed by a second phase equivalent to a Master's degree in Security and Police Functions. Similar to the Civil Guard, this university equivalence results from the creation of the National Police Training University Center, affiliated with the University of Salamanca.

In addition to the Academy, the National Police Training and Development Division operates various specialized centers. The Center for Updates and Specialization in Madrid focuses on continuous professional development. The High Police Studies Center, also in Madrid, provides training for officers seeking promotion to higher ranks. Lastly, the Operational Practices Center in Linares (Jaén) specializes in tactical training and preparation for specialized groups, such as the Police Intervention Units (UIP), the TEDAX-NRBQ, the Special Operations Group (GEO), the Operational Support Groups (GOES), the Prevention and Reaction Units (UPR), and negotiators for kidnapping and extortion cases.

III. Innovation in Police training

The assurance of high-quality training, tailored to technological and social changes, and fostering lifelong educational and professional development, is defined as the fourth goal of the United Nations' 2030 Agenda for Sustainable Development (2016). This initiative, alongside proposals from the European Higher Education Area and other international organizations, has driven the development of projects aimed at transforming the content and methodological strategies of training programs delivered by both public and private educational entities.

In this context, police forces worldwide have experienced an increase in such initiatives (Weisburd & Braga, 2019), leading to the creation or transformation of infrastructures dedicated to developing new training techniques (Okhrimenko et al., 2020). Generally, the implementation of innovative initiatives has demonstrated positive results in improving general knowledge and the professional competencies of police officers (Hongru, 2012; Matusiak & King, 2020). This success has fueled a recent surge in the promotion and development of similar initiatives.

Educational innovation objectives are closely linked to police innovation. Moore et al. (1997) identify four distinct categories of police innovation: programmatic, administrative, technological, and strategic. These categories are not rigidly defined, and a single innovation initiative can be assigned to different categories depending on the evaluator's perspective. The educational strategies and methodologies for developing these innovations vary according to the context and the agents' prior knowledge. The categories of innovation are as follows:

- **Programmatic innovations**. These establish new operational methods to utilize an organization's resources to achieve specific outcomes. Examples include arresting intermediaries to discourage theft, using police officers to provide drug education in schools, and offering resistance training for female victims.

- **Administrative innovations**. These involve changes in how police organizations prepare for operations or account for their achievements. Examples include new methods for measuring individual or departmental performance and changes in personnel policies and practices, such as innovative recruitment techniques, training approaches, and supervisory relationships.

- **Technological innovations**. These rely on the acquisition or use of new capital equipment, such as non-lethal weapons, DNA profiling, or crime-mapping software.

- **Strategic innovations**. These represent fundamental changes in the organization's philosophy and general orientation. They involve shifts in the basic understanding of the purposes or means of policing and in the key structures of accountability that shaped police efforts under the standard policing model.

To achieve these innovation objectives, educational strategies have been implemented, particularly those aimed at learning outcomes related to administrative and technological innovations. Kennedy et al. (2020) utilized an outcome-based education (OBE) methodology to propose a teaching and learning system rooted in deontological principles, applicable to human services degrees, such as those in police training. This approach enables a critical

analysis of outcome-based systems, contributing to improved educational quality and professional practice.

Kardoyo et al. (2021) developed an e-learning management model for police academies, based on the Technology Acceptance Model (TAM) and an Educational Management Information System (EMIS), effectively facilitating learning in these environments. McLean et al. (2020) conducted a randomized controlled trial of a social interaction training program to evaluate its effectiveness in improving police attitudes and behaviors while analyzing its impact on force usage reporting. Other studies have examined the impact of social transformation on professional police competencies (Muharemi et al., 2019), highlighting its connection to public order. Additionally, Korablev et al. (2019) explored methods to develop assertive skills in police officers, emphasizing the importance of applying active learning techniques.

Further research has explored innovation in police training through technologies such as flipped classrooms and big data utilization to optimize officer competencies. This aspect of innovation has garnered significant interest in recent years. According to Zhang (2021), big data technology can significantly enhance the efficiency of police tactics training, increasing learning effectiveness by 15.1%. It also optimizes the teaching of both fundamental theory and tactical movements, resulting in more effective police training. There is a broad consensus that these technological tools currently represent, and will continue to represent, a cornerstone for the development of police work (Brayne, 2017; Feng et al., 2019; Neiva et al., 2023).

Public security universities and colleges play a pivotal role in police training, adapting teaching methods to the demands of contemporary policing and developing innovative strategies that equip officers with high-level professional capabilities (Jeong, 2020). However, some institutions face challenges in implementing professional police competencies training due to an imprecise understanding of its scope and significance. This has led to discrepancies in the implementation methods and the importance attributed to training (Bebetsos, 2020; Ki, 2018).

The central goal is to cultivate a strong professional ethic and outstanding political qualities. Higher education has long been demonstrated to contribute to police training by enhancing learning and development in areas such as leadership, communication, and community-oriented professional service in various countries (Paterson, 2011).

IV. Challenges in Police education and training

Police education and training face significant challenges in today's context, where security forces must adapt quickly to an increasingly complex and ever-changing environment. The evolution of social demands, the development of new technologies, and the need for a more inclusive and problem-solving-oriented police force require a continuous renewal of training programs (Rajakaruna et al., 2017). This adaptation process not only involves updating content but also revising teaching and assessment methodologies to ensure officers are adequately prepared to address contemporary public security challenges.

Police training requires significant improvements in preparing officers for real-time, unpredictable interactions and the inclusion of alternative content addressing bias and discrimination. However, potential obstacles must be considered, such as political climates and resistance from some officers, which may hinder the implementation of these changes

(Houter & Brooks, 2022). Additionally, greater attention is needed on developing complex motor skills, memory, and perception, addressing practical, organizational, and systemic challenges. These improvements are essential for enhancing training effectiveness and ensuring officer safety during duty (Nota & Huhta, 2019).

This approach not only enhances professional performance but also helps combat corruption, misconduct, and diversity-related challenges, thereby strengthening public trust and credibility. Communities, in turn, perceive law enforcement as fair and accountable in their actions (Fielding, 2018; Sumina et al., 2022). This section focuses on examining key obstacles, such as the integration of emotional competencies, which are essential for effectively responding to contemporary policing challenges.

4.1. Stress management and high-risk situations

Although extensive research has been conducted on physiological stress responses—such as heart rate, blood pressure, and cortisol levels (Driskell & Salas, 1996; Hancock & Desmond, 2001; Hockey, 1997; Lazarus & Folkman, 1984)—significant limitations exist in studies addressing the impact of intense, short-term emotional stress (acute stress) on job-specific functions and decision-making abilities. Much of the literature on training has theorized these effects but lacks a practical focus on how acute emotional stress directly affects police work.

Stress management programs for police trainees can improve performance in simulated high-pressure activities if they target specific situations likely encountered in daily duties. Such programs, developed since the mid-20th century (Sarason et al., 1978), enhance officers' ability to act with greater accuracy and control in real-life contexts, contributing to operational effectiveness and safety for both officers and the public. However, some studies question the actual capacity of these programs to improve stress management, though they have proven effective in preventing affective disorders (Lu & Petersen, 2023), particularly for officers in leadership positions (Chapin et al., 2008).

In recent years, innovative techniques have been developed to train officers for handling high-risk situations. According to Zechner et al. (2023), virtual reality (VR) training provides advantages by allowing safe practice in high-risk scenarios and challenging environments, though it requires a strong alignment between pedagogy and technical capabilities (Nguyen et al., 2021). VR training for police can elicit perceived stress, mental effort, and heart rate responses comparable to or exceeding those of real-life training scenarios (Kleygrewe et al., 2023). The potential of VR makes it a key tool for improving performance and the well-being of police officers in the future (Giessing, 2021).

Another innovative technique proven effective for stress reduction is the Pythagorean Self-Awareness Intervention (PSAI). This method has been shown to significantly reduce police stress, enhance cognitive speed, and facilitate the management of negative emotions and anger compared to a control group (Liakopoulou et al., 2020). Another approach to reducing stress in high-risk situations is stress-free training, which significantly decreases the use of lethal force by police officers (Li et al., 2021). However, it has minimal impact on the number of injured officers or the prevalence of discretionary arrests, which could present more disadvantages than benefits.

4.2. Emotional resilience and mental health

One often overlooked aspect of training is mental health and the development of emotional competencies, as the focus tends to lean more towards intervention than prevention. Training and education in this regard are essential to ensuring officers' well-being, particularly in potentially traumatic situations. In this context, psychological protection training, such as resilience development (Arnetz et al., 2009), has shown significant improvements in well-being, stress resistance, and job performance during critical incident simulations.

Resilience training programs have demonstrated promising results in preventing occupational stress injuries among first responders in dangerous situations. However, further research is needed before general implementation (Antony et al., 2020). Mindfulness has also emerged as a leading tool to promote officers' mental health. Mindfulness training has been shown to improve distress and sleep quality (Grupe et al., 2021), with these benefits persisting for up to three months after the intervention. Additionally, mindfulness-based resilience training appears to reduce violence and improve mental health among police officers (Christopher et al., 2020), which, in turn, benefits communities and residents.

Incorporating psychological skills into police training programs can also enhance officers' well-being and foster more positive relationships with community members (Blumberg et al., 2019). However, these programs are recommended only for officers with stable mental health as a preventive measure, while those experiencing mental health issues require individualized and tailored interventions based on their specific circumstances (Syed et al., 2020).

Improving officers' knowledge of mental health and psychological disorders not only impacts their well-being but also enhances interactions with individuals with mental illnesses, who are often perceived by some officers as difficult and anxious (Wittmann et al., 2020). This perception, in turn, can increase anxiety among the officers themselves. Police training in this area must be sufficient, effective, and tailored to officers' specific needs and expectations.

Consequently, developing these training programs is essential, particularly given that the prevalence of mental health issues among police personnel is double that of other emergency response professionals (Syed et al., 2020). Key risk factors include limited social support, occupational stress, and inadequate coping strategies, which exacerbate mental health problems in this group. However, some studies suggest that the prevalence is not as high as commonly believed and that police officers experience mental health issues similarly to other employees in low-risk professions (Velden et al., 2013), such as bank employees, supermarket workers, and pre-deployment soldiers.

4.3. Training in conflict resolution and decision-making

Police decision-making during high-risk events is influenced by a complex network of physiological and neurological factors, including brain activity, heart rate, and blood pressure. These factors can affect decision-making processes when officers face threatening situations, impacting their ability to respond effectively under stress (Andersen et al., 2020). Active-duty

officers with more training and tactical experience demonstrate better decision-making under stress, despite experiencing stronger physiological responses to stress (Murray et al., 2023).

Short decision-making training sessions are positively valued by officers as a complement to their regular tactical training (Johnsen et al., 2016). However, Nota et al. (2021) found that a single-day training session is insufficient for officers to acquire the physiological awareness and regulation skills necessary for effective performance and proper decision-making during lethal force encounters. Training strategies to enhance decision-making include tactical gaze control and visual attention training, which reduce response times in live-fire scenarios (Heusler & Sutter, 2022), although this does not always result in faster impact times.

It is crucial to recognize that officers' individual characteristics play a significant role in assessing their decision-making in real scenarios. For instance, officers who strive to gather all necessary data to make the most optimal choice face more difficult decisions as they aim for the best possible option rather than an adequate one (Shortland et al., 2020). Additionally, gender and military experience influence decision-making processes, affecting how situations are assessed, and responses are made in high-pressure environments, though prior police experience appears to have a less significant impact (Tejeiro et al., 2023). However, greater prior police experience correlates with experiencing more positive emotions, greater control, and less intense emotional responses in use-of-force decisions compared to novice officers (Ta et al., 2021).

VR training offers advantages for police officers by allowing safe practice in high-risk situations and integrating challenging scenarios. However, as mentioned earlier, for this type of training to be effective, proper alignment between didactic content and VR's technical capabilities is necessary (Zechner et al., 2023). Scenario-based training (SBT) in police education has also proven to improve decision-making and public safety by preparing officers for complex tasks and addressing issues related to limited resources (Jenkins et al., 2021).

The Chicago Quality Interaction Program (QIP), designed for police recruits and focused on procedural justice, interpersonal communication, decision-making, cultural awareness, and stress management, has improved respectful behavior and decision-making during public interactions (Rosenbaum & Lawrence, 2017). However, its impact on procedural justice-related attitudes and interpersonal communication skills has shown mixed results, suggesting that further improvements are needed in these areas.

Despite the existence of these programs and initiatives, it is crucial to continue developing decision-making training programs for police officers, as these are fundamental to their ability to manage complex and high-risk situations (Horn et al., 2023). Decision-making skills are essential for enhancing police responses under pressure and fostering safer, more effective interactions with the public (McLean et al., 2020). Strengthening these skills will help officers act with greater accuracy and fairness in critical situations.

V. Conclusions

Police training faces numerous challenges that must be addressed to enhance officer performance and promote their well-being, underscoring the importance of continuous education in a dynamic context. As social and technological demands evolve, police training must adapt to prepare officers for complex situations.

While significant advancements have been made in police education, issues requiring greater attention persist, such as real-time conflict resolution training and the inclusion of deeper, updated content addressing mental health and discrimination.

Technological innovation is among the most impactful areas in contemporary police training. Implementing technologies like VR has enabled officers to train for high-risk situations safely. However, the effectiveness of these tools depends on their proper integration with didactic content.

Another critical aspect of police training is stress management and the development of emotional competencies. Stress management programs, including mindfulness-based ones, have demonstrated improvements in officers' well-being and performance during critical incident simulations. Emotional resilience has become an essential component of training, helping officers handle high-stress situations more effectively. Resilience and mental health are not only fundamental to officers' well-being but also influence the quality of their interactions with the public.

Training in emotional competencies and prevention through mindfulness-based programs enables officers to better manage conflict situations and improve community relations. However, while these programs have shown positive results, further research is needed to determine their long-term effectiveness and large-scale implementation.

Finally, decision-making under pressure remains one of the greatest challenges for police officers. Training in tactical gaze control and visual attention has improved decision-making in lethal force scenarios, though strategies that optimize response times and precision in these contexts still need to be developed.

Only through a comprehensive approach to training can security forces be adequately prepared to face the challenges of today's security environment, ensuring not only operational effectiveness but also officer well-being and public trust in their actions.

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Chapter 3. Connecting Generations: Intergenerational Programs Between University and Business as a Key Tool to Bridge the Digital Divide

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I. Introduction

In today's workforce, disruption driven by Artificial Intelligence (AI) has become a constant reality. The rapid pace of technological evolution is drastically reshaping work environments and presenting new challenges for employees across all sectors (Kong 2023). This transformation is particularly challenging for older adults, who face additional obstacles due to potentially slower learning and adaptation processes, as well as resistance to change rooted in lifelong habits they may be reluctant to modify (Milanez 2023). This situation not only causes frustration and stress among older workers but also threatens their stability and continuity in the labor market.

Forecasts from various studies predict an increasingly automated and digitized labor landscape. According to research conducted by Furendal & Jebari (2023), the McKinsey Global Institute (2017) warns that AI and automation are expected to have a significant impact on almost every industry, transforming the nature of work and redefining the skills required for professional success. Meanwhile, the Norwegian Ministry of Foreign Affairs (2022) highlights the urgent need for workers to adapt quickly and continuously to remain relevant in an ever-evolving job market.

On the other hand, the entry of younger generations into the workforce presents its own set of challenges. While these young professionals possess extensive knowledge, particularly in technology, they often lack essential socio-emotional skills such as discipline, collaboration, and the ability to follow instructions (Franco & Vargas 2022). Moreover, their tendency toward job volatility raises concerns about their long-term commitment to organizations (Flores 2019). This dichotomy between the innovative potential of younger generations and the productivity and organizational risks they pose presents a significant challenge for companies in today's labor market.

In this context, it is essential to explore how intergenerational learning tools can help mitigate these difficulties and capitalize on the opportunities presented by the contemporary work environment. By fostering collaboration between workers of different generations, organizations can leverage the experience and stability of older employees while incorporating the creativity and technological skills of younger ones to promote innovation and business growth (Petersen & Swider 2021). This intergenerational integration not only benefits the individuals involved but also enhances organizational capacity and competitiveness in a constantly evolving labor market.

This chapter proposes that intergenerational programs between universities and businesses can serve as an essential tool to bridge the digital divide. We aim to offer a comprehensive

set of tools and strategies to facilitate knowledge exchange between different generations, improving the professional qualifications of both young and older workers. The chapter will explore how these programs can foster collaboration and the exchange of experiences among students, young professionals, and more experienced workers, thereby promoting a mutually enriching learning environment. Additionally, it will examine how these initiatives can aid companies in adapting to technological changes and contribute to the professional and personal development of employees of all ages.

II. Aging: a significant milestone in contemporary society and education

In recent decades, one of the most pressing challenges facing education and society is the aging population. This demographic shift underscores the importance of fostering values that enhance the learning of new generations while improving the social well-being and quality of life of all members of society (Elvira-Zorzo, 2023). With the global increase in life expectancy, aging has emerged as a milestone of great social relevance, bringing about significant changes where education plays a pivotal role.

Today, aging shapes social dynamics, including educational systems. As life expectancy rises and the proportion of older individuals in the population increases, it becomes essential to understand and address the implications of this phenomenon across all aspects of life, particularly in education.

The increase in longevity is the result of advancements in medicine, technology, and improved living conditions and habits. Consequently, today's society is characterized by greater age diversity, presenting both new challenges and opportunities that must be addressed from various societal perspectives.

From an educational standpoint, population aging introduces several critical considerations. Educational institutions must adapt to the evolving needs of students across different age groups, requiring adjustments in teaching methodologies and resources. Additionally, the growing proportion of older individuals increases the demand for educators trained to teach students of all ages, including those in later stages of life. This highlights the need for specialized training programs to equip educators with the skills necessary to address the specific needs of a diverse student population in terms of age and experience.

Throughout the learning process, it is crucial to address issues of equity, rights, and social justice, while also tackling the cultural, technological, political, and social challenges of the present.

Aging challenges the ways we teach, learn, and interact within a diverse society. By embracing human complexity, we can build a more inclusive future. Education must adapt to the realities of aging and other demographic shifts, fostering social values and preparing individuals for future challenges through a multidimensional approach that promotes respect, appreciation, and intergenerational responsibility.

III. Stigma toward older adults in contemporary society

Stereotypes are generalized beliefs that define the characteristics, abilities, and roles attributed to certain social groups. These perceptions take root through education and often remain unchanged over time (Mora, 2020). For years, stereotypes about older adults have persisted, contributing to a negative and, in many cases, inaccurate portrayal of the aging process and older individuals themselves (Vélez, 2009). While stereotypes can carry both positive and negative connotations, negative stereotypes overwhelmingly prevail in the case of older adults (Muñoz et al., 2001), significantly shaping societal behavior toward this group (Elvira-Zorzo, 2023).

These prejudices and negative stereotypes about older adults and the aging process are encapsulated in the term “ageism,” derived from the English concept “ageism” (Toledo, 2011). According to Butler (1980), ageism manifests through actions, attitudes, or institutional structures that subordinate individuals or groups based solely on their age. In the context of aging, ageism involves attributing various characteristics—such as health status, personality traits, or behavioral tendencies—solely based on an individual's age (Nelson, 2005).

Ageism assigns discriminatory roles to older adults solely based on their age. Butler introduced the concept, suggesting that ageism reflects a form of rejection rooted in the fear of aging, prevalent among both younger and middle-aged populations. This rejection often manifests as a lack of respect or even aversion toward aging, as it is associated with illness, loss of abilities, changes in social roles, and proximity to death (Guerson & Ibarra, 2021).

As a result, the development of negative and stereotypical attitudes toward older adults and the aging process has led to a distorted perception of old age as an incompetent and undesirable stage of life. In contemporary society, youth is valued for its productivity, novelty, and dynamism, while old age is marginalized for being perceived as the opposite.

IV. Artificial intelligence vs. Emotional intelligence in the workplace

A crucial debate has emerged between two seemingly opposing forces: artificial intelligence (AI) and emotional intelligence (Selenko, 2022). This tension extends beyond technology, delving into the complexities of leadership, decision-making, and organizational culture (Brynjolfsson & Mitchell, 2017). While AI offers unprecedented efficiency, automation, and data analysis, emotional intelligence underscores the importance of interpersonal skills, empathy, and human understanding in the workplace (Selenko, 2022).

At the crossroads between the implementation of disruptive technologies and the preservation of employees' emotional well-being, companies face a fundamental challenge. On one hand, adopting AI and other technological innovations is essential for maintaining productivity and remaining competitive in a constantly evolving market. On the other hand, this digital transformation poses risks to employees' sense of belonging and emotional health (Petriglieri, 2011). The impact of these processes on human capital can significantly disrupt organizational progress, as it is impossible to exclude the human element. Positive organizational conditions and a healthy work environment are crucial for employees to perform effectively.

Thus, the need to integrate AI and emotional intelligence becomes a vital strategy for navigating the ongoing workplace revolution.

To adapt to these divergent forces, organizations must develop strategies that balance technological efficiency with a work environment that values human relationships. Achieving this balance requires not only training in digital skills but also promoting emotional intelligence and establishing corporate cultures that prioritize empathy, collaboration, and mutual support. Key measures include promoting flexible work arrangements, fostering teamwork, and implementing mental well-being programs.

Companies that successfully integrate technology with the emotional care of their employees will not only thrive in the market but also cultivate a healthier and more sustainable work environment in the long term.

V. Generation Z and the challenges it poses to the workplace

Generation Z, defined as those born between 1995 and 2010, exhibits distinct characteristics compared to previous generations such as the Baby Boomers (1946–1964), Generation X (1965–1980), and Generation Y (Millennials, 1981–1996) (T.-O., Lev., 2022). Key traits of

Generation Z include strong technological skills and the ability to learn independently. They value flexibility, collaboration, and innovation, seeking work environments that promote socialization and entrepreneurship. However, they also tend to display emotional instability, difficulty coping with frustration, resistance to authority, high job turnover rates, and hypersensitivity to criticism. Research shows that this generation prefers large companies or independent entrepreneurial ventures, favoring dynamic environments that foster an entrepreneurial spirit. They prioritize work-life balance, enjoyment, and socialization in the workplace (Pelin & Özgünay, 2023).

One of the major challenges for companies is the responsibility of appropriately assigning and positioning this generation within the corporate sphere. Work environments must evolve toward greater flexibility to meet the technological demands and preferences of Generation Z. The increase in collaborative work and the inherent flexibility of this generation are reshaping traditional workplace paradigms. Unlike previous generations, Generation Z does not seek stable, traditional models such as fixed positions or long-term careers that ensure retirement. Instead, they look for diverse opportunities and spaces that encourage creativity, entrepreneurship, and innovation, where they can leverage their social instincts, participate in new projects or initiatives, and generate collaborative synergy with others. It is crucial for companies to understand and adapt to these trends to maximize Generation Z's potential in the modern workplace (Pelin & Özgünay, 2023).

Studies such as those by Lev (2022) highlight how Generation Z has integrated into the workforce alongside older generations: Baby Boomers, Generation X, and Generation Y. A study conducted in Israel with executives from technology companies examined intergenerational gaps in workforce management. Although Generation Z stands out for its technological skills and independent learning capabilities, their organizational commitment and ability to engage in long-term tasks are significantly lower. Despite their advantages over previous generations, this finding underscores challenges related to talent retention and commitment in the modern workplace (Lev, 2022).
Human Resources (HR) departments must adapt to the demands of this new generation while continuing to address the needs of older generations. There are already initiatives in place to develop dynamics that adapt HR practices, improving intergenerational management and increasing job satisfaction and commitment. Understanding Generation Z's preferences is essential to meeting their expectations and aligning with workplace realities. These studies provide valuable insights into analyzing generational differences and their impact on job performance (Arpitha et al., 2020).

VI. The value of intergenerational education

Education is a fundamental element in everyone's life, as it conveys the cultural heritage accumulated over the years within society. Moreover, education is shaped by knowledge derived from the values inherent in our civilization and era. Through education, progress has been made in addressing social issues, thereby contributing to the development of a more democratic and cohesive society. In this sense, education stands as one of the primary processes for the continuous improvement of individuals within society, with intergenerational education driving this progress forward.

According to Bedmar (2003), the implementation of intergenerational education fosters the development of four fundamental pillars of lifelong learning:

- Facilitating coexistence within a community by promoting dialogue as a means of conflict resolution. This process of socialization is marked by mutual enrichment, driven by the contributions of different generations.

- Encouraging the ability to perform tasks and acquire knowledge through active interaction and reflection.
- Facilitating personal and collective development, strengthening self-concept and self-esteem both individually and in groups.
- Promoting knowledge, enhancing the capacity for independent and autonomous research.

Intergenerational relationships are an intrinsic part of human experience. However, various contemporary circumstances contribute to an increasingly age-divided society. This generational gap is a defining feature of our time, especially as population aging demands new ways to foster respect, solidarity, and collaboration across different age groups.

Intergenerational programs first emerged in the United States around the 1960s. According to Newman & Sánchez (2007), three distinct stages can be identified in their historical development:

- The first stage, from the late 1960s to the 1980s, saw the rise of intergenerational programs designed to mitigate the effects of geographic distancing occurring in the U.S. This generational separation, a result of increased family mobility, weakened contact between different generations, leading to the emergence of prejudices and stereotypes across age groups, as well as loneliness and isolation among older adults, and a lack of emotional connection for children and young people. In this context, intergenerational programs emerged as an effective tool to connect people of different ages, providing opportunities for interaction through a variety of activities.
- The second stage, from 1980 to 1990, focused on developing programs aimed at addressing specific issues affecting both young people and older adults. For young people, intergenerational programs sought to tackle problems such as drug abuse or to intervene in disadvantaged social contexts, such as schools and neighborhoods facing socioeconomic challenges. For older adults, these programs aimed to reduce issues related to isolation, loneliness, illiteracy, and unemployment.
- The third stage, spanning from the 1990s to the present, highlights the use of intergenerational programs as tools for social and community development, as well as the expansion of intergenerational initiatives across various countries.

Intergenerational programs serve as mechanisms to rebuild values, relationships, and, consequently, the social fabric that appears to have deteriorated. This is particularly relevant as political, educational, and economic frameworks increasingly prioritize age-based criteria.

VII. Dialogue between business and academia in developing content for intergenerational programs

The collaboration between businesses and universities is essential in the process of creating educational content. This strategic partnership leverages academic expertise and business innovation to develop training materials that align with the needs of the labor market. Through this exchange, companies contribute their knowledge of industry demands and trends, while universities offer their expertise in research, teaching, and curriculum development. This synergy between academia and the business world not only enhances the quality of educational content but also fosters the training of professionals better equipped to meet the challenges of today's and tomorrow's work environment (Cuerdas, 2013).

To ensure the effective integration of artificial intelligence (AI) and emotional intelligence (EI) in the workplace, close collaboration between companies and universities is vital. This partnership can lead to the development of training programs and curricula that incorporate both technical skills and emotional competencies. Universities can adapt their study plans to include courses that address the interaction between AI and emotional skills, while businesses provide input on labor market needs and the challenges they face.

In this context, intergenerational education emerges as a valuable strategy for facilitating the transition to AI adoption, particularly for those who have performed traditional tasks for many years. This approach allows the accumulated knowledge and experience of older workers to be passed on to younger generations, especially those entering fields where AI is predominant. Experienced employees, in turn, offer essential insights into conventional work processes as well as critical social and professional skills such as problem-solving, teamwork, and effective communication—skills that are invaluable in shaping the new workforce.

This intergenerational collaboration not only promotes the successful integration of AI but also enriches the workplace by fostering diverse perspectives and continuous learning among employees of different ages and experience levels (Satterly, Cullen, & Dyson, 2018).

By implementing such programs, universities will not only promote inclusion and diversity but also prepare students to face the challenges of the modern workplace, where intergenerational collaboration is increasingly valued and essential for driving innovation and progress within companies**.**

VIII. Intergenerational program between university and business: building bridges

8.1. General objective

To develop a collaborative bridge between universities and businesses aimed at reducing the digital divide, enhancing the exchange of knowledge and experiences across different generations.

The program's specific objectives are detailed in Table 1.

Table 1.
Specific objectives of the program.

Specific objectives of the program	
Facilitate Intergenerational Learning	• Provide a space where university students and company employees can share knowledge and experiences in technology. • Foster a collaborative learning environment where younger and older generations can benefit from each other.
Develop Digital Skills	• Provide concrete opportunities for older individuals to acquire digital skills relevant to the current work environment. • Train university students to become facilitators of technological education for older generations.
Promote Digital Inclusion	• Reduce the digital divide by providing access to and training in technology for people of all ages and backgrounds. • Foster a sense of inclusion and belonging in the digital society by enabling all participants to fully engage in the digital age.
Stimulate Innovation and Creativity	• Encourage collaboration between university students and company employees to address technological challenges and develop innovative solutions. • Inspire new ideas and perspectives by bringing together people from different generations and areas of expertise.
Boost Employability and Adaptability	• Equip participants with updated and relevant digital skills that enhance their employability in an ever-evolving job market. • Increase adaptability to change by exposing participants to new technologies and digital practices.
Build Professional and Social Networks	• Provide opportunities for networking between university students, company employees, and community members. • Build a support and collaboration network that transcends generational barriers and promotes the personal and professional growth of all participants.

Source: own elaboration.

8.2. Methodological proposal

To develop this initiative, we propose the incorporation of an Intergenerational Learning course into university curricula to promote interaction and knowledge exchange between different generations. This course will offer two teaching models: Service Learning (Gerholz et al., 2017), which involves students in community projects where they apply their academic skills to address real needs, and Experiential Learning (Espinar & Vigueras 2020, Albort, Martelo, and Leal 2017), which emphasizes practical learning through reflection on concrete experiences.

Intergenerational Learning will facilitate the transfer of knowledge and experiences between younger individuals (Generation Z) and older adults (Baby Boomers, Generation X, and Generation Y), creating an enriching environment for both sides. Students will have the opportunity to learn from the wisdom and experience of older generations, while the latter will benefit from the dynamism and fresh perspectives of the youth.

8.3. Program Development

This program will take place over one academic semester. During this time, several phases will be implemented to ensure a gradual and organic evolution of the process. Below are the actions to be carried out in each phase:

8.3.1. Phase 1: Awareness

At the start of the intergenerational learning program, the focus will be on raising awareness among students about the importance and benefits of knowledge exchange between different generations.The value of diverse experiences and perspectives will be emphasized as an

enriching factor for learning, promoting an environment of openness and mutual respect between young people and older adults.

In the first meeting, the program's purpose and objectives will be presented, encouraging reflection on the unique contributions that each generation can make to the educational process. Following this, necessary training will be conducted to broaden students' perspectives, where young experts in technology and experienced professionals will share their knowledge and experiences. As the program progresses, students will begin to appreciate the richness of intergenerational learning by drawing inspiration from the success stories and wisdom shared by older adults, recognizing the value of experience in technology and the ability to innovate. During this first month, the foundations will be laid for a transformative educational journey, where the exchange of knowledge transcends generational differences and strengthens both the academic and professional community.

Table 2.
Phase of Implementation 1: Young to Older (Artificial Intelligence).

Activity	Contens	Responsible Individuals
1. Initial Meeting	Introduction to the program and objectives. Presentation of participants. Discussion on the importance of intergenerational learning.	Program Coordinator, representatives from the company and university
2. Training in Technological Tools	Introduction to technological and artificial intelligence tools. Use of office software.	Young students who are technology experts.
3. Training in Best Work Practices	Importance of best work practices. Professional ethics. Time management and teamwork.	Older expert professionals.
4. Integration Session	Integration activity between students and professionals. Dynamics to promote communication and teamwork.	Facilitators designated by the university.

Source: own elaboration.

8.3.2. Phase of Awareness 2

In the third month of the program, special emphasis will be placed on the valuable contribution of older professionals, sharing their experience in attitudinal and behavioral factors in the workplace with younger participants. The importance of work ethics, perseverance, and adaptability will be highlighted, exploring topics such as time management and conflict resolution.Tutoring sessions will provide opportunities for open dialogue, allowing students to receive personalized guidance. This exchange strengthens professional skills and provides a deeper understanding of the values that underpin a successful career.

By the end of the month, students will have a clearer understanding of the importance of experience and the decisive role of attitude and behavior in the workplace, as well as a solid foundation of knowledge and skills provided by expert professionals. This learning will contribute to both professional development and personal growth, equipping students to face workplace challenges with confidence.

Table 3.
Phase of Implementation 2: Older to younger (emotional intelligence).

Activity	Contens	Responsible Individuals
1. **Collaborative Work on Projects**	Assignment of collaborative projects between students and professionals. Development of technological solutions applied to workplace practices.	Program Coordinator, representatives from the company and university.
2. **Tutoring Sessions**	Individual or group sessions where professionals provide guidance on technical andattitudinal aspects.	Expert professionals of advanced age and young students.
3. **Monitoring and Feedback**	Review of project progress. Constructive feedback on the work completed.	Program Coordinator, representatives from the company and university.
4. **Presentation of Results**	Presentation of completed projects to an evaluation panel. Reflection on the learning acquired throughout the program.	Program Coordinator, representatives from the company and university, expert professionals of advanced age, and young students.

Source: own elaboration.

8.3.3. Evaluation Phase

In the final month of the program, feedback and subsequent evaluation of the work developed will take place. This will be a highly important space as it becomes a crucial moment to reflect, analyze achievements, and identify areas for improvement.
An exhaustive evaluation of the activities and outcomes will be implemented, focusing on reviewing collaborative projects and their impact on productivity and knowledge exchange.

Table 4.
Evaluation Phase.

Indicator	Description
Participation	Evaluation of the active participation of students and professionals in the program activities.
Collaboration	Measurement of the degree of collaboration and teamwork in the assigned projects.
Project Performance	Evaluation of the performance and outcomes of the collaborative projects developed during the program.
Interactive Learnin	Analysis of the level of interaction and mutual learning between generations throughout the program.
Feedback	Collection of comments and opinions from participants regarding their experience in the program.

Source: own elaboration

8.3.4. Documentary Phase

Once the evaluation is completed, the achievements and areas for improvement will be documented, using these results to inform and enrich future iterations of our intergenerational learning program. This evaluation phase will not only allow for assessing the program's impact but also provide the opportunity to continue innovating and improving the mission of promoting collaborative learning across generations.

IX. Conclusions

In conclusion, intergenerational training is a powerful transformative force in the labour market. While there are many contributions it can make to future business development, there are also significant challenges, particularly for older individuals who may struggle to adapt to new technologies and work approaches and embrace new work methods. This highlights the urgency of accelerating efforts to create points of convergence and interdependence between man-machine, artificial intelligence-emotional intelligence.

Hence, the importance of adopting innovative pedagogical approaches tailored to the diverse generational needs and abilities, which is a crucial step towards closing the existing gap and

fostering more effective collaboration between professionals of various ages and backgrounds.

Similarly, the synergy between business and academia enables the diversity of perspectives and skills that each can contribute to this process, increasing competitiveness and corporate transformation, as well as the continuous improvement of teaching and learning both inside and outside the classroom.

Companies should develop strategies to encourage older workers to engage in intergenerational learning through refresher courses, diplomas, or specializations that, in dialogue with academia, foster this awareness and openness to the knowledge that younger generations can offer them.

Without a doubt, there are many hopes that this historical moment is beginning to shape. The response given will determine many variables soon.

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Chapter 4. The influence of Artificial Intelligence (AI) on higher education: new tools, risks, and benefits

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I. Introduction

Artificial Intelligence (AI), as an operational tool, is a topic of current study, but it has also been the subject of academic research for the past thirty years, despite appearing to be a much more recent tool.

It is true that, traditionally, AI has always been presented as a technology primarily applied in the field of computer science. However, over the years, its scope of application has expanded to the point where it is now used in a much broader way in other disciplines such as business, medicine (Wood et al., 2021), biology, and engineering (Johnson et al., 2022) to name just a few.

Within this new scope, the field of education emerges. There is no doubt that AI holds enormous potential for transforming teaching and rejuvenating and updating more traditional learning methods (Hamal et al., 2022). Thus, the integration of AI into education has been widely explored, including its applications to improve student assessment (González-Calatayud et al., 2021) or even to transform the methodology of certain specific disciplines, such as physical education (Mahligawati, 2023).

In the specific case of higher education, AI is already recognized as an important disruptive agent, having demonstrated its ability to improve teaching and learning processes (Simonsen & Almeida, 2020). Authors have published studies demonstrating AI's broad potential to enrich education and improve learning activities within university education, higher artistic education, higher vocational training, higher education in plastic arts and design, and even higher education in sports (Simonsen & Almeida, 2020).

Meanwhile, the application of AI in the educational field, particularly in the academic disciplines of science, technology, engineering, and mathematics (commonly known by their English acronym, STEM), poses tremendously interesting challenges when it comes to effectively integrating diverse AI techniques to meet the various learning and knowledge needs (Xu & Ouyang, 2022).

Thus, the impact of AI has extended to highly specialized fields such as radiology education, where this new tool plays a crucial role in shaping formative practices (Wang et al., 2023). Moreover, when guiding administrative decisions within educational institutions, the changing role of AI highlights an essential aspect—the symbiotic relationship between human decision-making and AI in educational leadership (Wang, 2021).

Finally, while the benefits of AI in education may seem evident, there is no doubt that certain ethical and moral considerations need to be addressed in its use. Its application raises a series of highly dangerous considerations, extending beyond the early stages of students' educational maturity, and must be considered to ensure that AI's impact on both students and educators is positive (Akgün & Greenhow, 2021).

II. Artificial Intelligence as a tool in university education

Thanks to its ability to offer new opportunities for development and learning (Chaika, 2023), artificial intelligence possesses tremendous potential to impact, and in a very significant way, many aspects of university teaching. This impact is already being realized through, among other things, enhancing the effectiveness of teaching itself, supporting pedagogical actions undertaken by instructors, and improving the quality of teaching and learning processes. Several studies have already demonstrated that the integration of AI as a tool in higher education can lead to the creation of innovative approaches to delivering training and engaging students during these processes (Lin, 2022; Liu et al., 2022).

When university instructors make use of AI technology, they can receive support in various aspects of teaching, such as providing individualized and personalized support for each student's learning (which is particularly useful when addressing special needs), analyzing student data to understand learning behaviors, or offering alternative intervention suggestions when necessary (Dickhaut et al., 2021; Ng et al., 2023; Kasepalu et al., 2022). On the other hand, due to the innovative nature and great power of this tool, artificial intelligence generates significant interest and curiosity among young people, who constitute a large portion of the university student body. If these positive attitudes from students are combined with a good disposition from the faculty, the implementation of this technology in educational settings could be a transformative force with very positive effects (Hussain, 2020).

In this regard, research based on real experiences has been developed, which allows us to conclude the usefulness and positive effects of AI on very specific aspects of higher education, such as:

- Helping faculty and institutions identify potential knowledge gaps among students in the same group, providing personalized support in cases where such identification shows a need for personalized attention for students who require additional assistance (Khan et al., 2022). With AI, it is possible to first identify students who may have special or extraordinary needs, and then offer intervention suggestions during collaborative learning, thereby enhancing pedagogical actions (Kasepalu et al., 2022). The application of this new technological tool in university education has allowed the individualization of learning experiences, leading to greater efficiency, offering new global learning opportunities, and ensuring a more appropriate delivery of content (Chen et al., 2020). This ability of AI to personalize in education enables the creation of personalized learning experiences that meet

the individual needs (and even preferences) of students who require such attention.

- Helping instructors understand students' learning behaviors through data analysis, which would improve the quality of teaching and learning processes (Ng et al., 2023; Liu et al., 2022).
- Alleviating instructors from routine administrative tasks, which are often tedious, frustrating, and consume considerable time, energy, and resources, thus preventing teachers from focusing on more important issues, such as designing more effective teaching strategies and developing more efficient teaching resources (Khan et al., 2022). This is achieved through the automation of administrative tasks made possible by AI (Ahmad et al., 2022). By streamlining administrative processes through tools provided by this new technology, university institutions can allocate resources more effectively and focus them in a much more optimal way to improve the overall quality of the education they offer.
- Developing intelligent systems to assist teachers (sometimes even replacing them, though this is not viewed as a positive aspect of AI use) in their routine educational tasks, offering innovative tools of great interest for enhancing the educational experience, such as software capable of holding real-time conversations, either through text or voice (chatbots); robotic assistants for performing routine tasks; or three-dimensional images created through light projection, which can be used to simulate real-world situations (3D holograms), to name just a few examples (Zhao & Nazir, 2022; Yin, 2022).

However, we must not forget that we are discussing an innovative and novel tool for everyone. This means that, to effectively integrate artificial intelligence into university teaching, it is essential for educators to be properly trained and qualified in its various uses (Shirin, 2022). In other words, a successful implementation cannot take place unless educators are adequately prepared and equipped to use AI tools effectively (Shirin, 2022; Zhao et al., 2022). An improper implementation of AI tools in any area of education, and the university setting is no exception, can lead to undesirable and unsatisfactory results. In this regard, in the field of physical education, there is already some experience indicating that it has led to ineffective teaching and a decrease in student enthusiasm (Wang, 2023).

To this end, professional development programs focused on the acquisition and development of competencies in artificial intelligence that have been designed and are available, which can equip educators to effectively leverage these new technological tools in their teaching practices (Zhao et al., 2022). These teacher training programs should focus on curricula, the diversity of content, and a variety of methods to improve the training of educators in artificial intelligence (Zhao et al., 2022). The competence of educators in both the knowledge and pedagogy of artificial intelligence is crucial for fostering student learning, especially when it comes to nurturing their digital competencies (Yau et al., 2022).

Perhaps the most significant case is that of medical schools and faculties: here, the integration of AI learning into their curricula is becoming increasingly important, as it is a key avenue for improving competencies in the field of healthcare education (Wood et al., 2021).

In this regard, collaborative efforts between faculty members and researchers are crucial to developing the necessary AI curricula that align with the institution's teaching objectives and

classroom practices, ultimately improving the overall learning experience (Chiu et al., 2022; Dai et al., 2022).

In conclusion, we can affirm that artificial intelligence is a tool that is here to stay, endowed with extraordinary potential. So much so that it has the potential to become a revolutionary force within university teaching, as it can offer personalized learning experiences, improve the efficiency and effectiveness of teaching, and provide significant support to educators in many aspects of their current roles. However, to fully harness these benefits, it is essential that educators develop knowledge of this new technology, effectively integrate it into their teaching practices, and continuously improve their professional skills in the age of artificial intelligence.

By adopting AI technologies, universities can improve the quality of education, enhance student outcomes, and adapt to the changing needs of the digital age.

III. Main uses and applications of Artificial Intelligence in higher education

The previous sections have served to contextualize the impact of artificial intelligence (AI) on university education. Its effect on learning in higher education is of great interest due to its ability to substantially transform the functioning and internal structure of higher education institutions (Tomar & Verma, 2021). The application of AI in higher education is not limited to teaching and learning processes but also extends to educational management, where the complementarity between AI and education management is considered the starting point for a new journey towards the modernization of higher education management (Yu, 2021). Furthermore, we have also highlighted the potential use of AI in universities to carry out real-time processes, including the provision of comprehensive sampling and the acquisition of accurate results (Wang, 2022).

Within the broad universe that comprises artificial intelligence, we can classify it into various distinct levels (Wirtz et al., 2018; Ge et al., 2022). These include:

- Artificial Narrow Intelligence (ANI), designed for specific tasks.
- Artificial General Intelligence (AGI), designed to reason and solve problems without pre-designed tasks; and
- Artificial Superintelligence (ASI), called so because it has shown the potential to surpass human intelligence in specific areas.

A separate and very specific case is that of generative AI. When we talk about generative AI, we are referring to a class of AI systems designed to generate new content, such as images, text, or audio, which matches he data with which they have been trained. The goal of generative AI is to achieve Artificial General Intelligence (AGI), where the AI system can perform a broad collection of cognitive tasks at a level comparable to or even surpassing human intelligence (Hein, 2018; Williams, 2021).

We could say that generative AI focuses on teaching machines to create unique and imaginative material. Generative AI can learn from data and produce content autonomously, unlike classical AI, which follows predefined rules. Using algorithms and networks, this technology recognizes patterns and generates results resembling human creative abilities. These systems are often based on Generative Adversarial Networks (GANs), a type of neural network architecture (Radford, 2015). Research has already shown that GANs are effective in

unsupervised learning, where the AI system learns to represent and generate data without explicit labels or guides (Karras et al., 2017). The development of generative AI has led to significant advances in various fields, including computing, business, and energy sector management (Hwang et al., 2021; Hinojo-Lucena et al., 2019; Doroshuk, 2021).

As noted in the previous section, AI's application extends to various areas, and generative AI is no different: it has been and continues to be applied in fields such as predicting photovoltaic energy generation, improving smart ports, and managing talent in the information era (Ge, 2024; Du, 2023; Liu et al., 2021). However, the rapid development of AI, including generative AI, has raised ethical and governance concerns, leading to recommendations to regulate AI governance based on values and principles (Wang & Zhang, 2022; Yang, 2022).

Generative AI has the potential to have a significant impact on university education by offering transformative opportunities for teaching and learning. The use of generative AI in education, through tools like ChatGPT, has been proposed as a theoretical framework that emphasizes identifying desired outcomes, determining appropriate levels of automation, ensuring ethical considerations, and evaluating effectiveness (Su & Yang, 2023). This aligns with the idea that AI offers transformative potential to enhance and, potentially, replace human tasks and activities in various applications, including education (Dwivedi et al., 2021). Furthermore, the implementation of generative AI in education could lead to the optimization of sports activity development models, reflecting its potential as a crucial auxiliary tool in physical education and sports training (Liu et al., 2021).

The potential benefits of introducing AI into the education industry are emphasized, particularly for students, alongside other benefits received by various stakeholders in the industry (Ahanger et al., 2022). Additionally, the importance of AI and adaptive learning technology systems in education cannot be underestimated, underscoring the significant role AI can play in improving the educational experience (Vir Singh & Kant Hiran, 2022). The use of AI in modern education is seen to make learning a continuous and permanent process, reflecting its potential to revolutionize the traditional educational model (Tang & Deng, 2022).

3.1. Applications

3.1.1. Wibbitz

Wibbitz is an automated video creation tool that accelerates production by providing numerous useful templates and offering corrections with just a single click. Wibbitz gives users access to full-spectrum color palettes, text overlays, video intros and outros, and distinctive watermarks.

With the help of this automated video creation technology, educators can transform their best videos into a powerful content tool, which can be distributed through various channels (e.g., social media) to increase the reach of their production.

3.1.2. Adobe

Adobe has consistently stated that efficiency is its primary concern when it comes to the development of video material. For this reason, its resources have always been aimed at helping users save time and effort during the editing process through the use of artificial intelligence technology.

One of its most interesting features is automatic reframing, which allows the application to automatically reframe the subject of a widescreen video to export to social media. Additionally, it uses AI to perform color matching, enabling users to adjust the color and brightness characteristics of their material according to a custom reference point. Rather than simply applying a particular color reference to the clips, the AI analyzes each selected clip and modifies them until they precisely match the reference value.

3.1.3. Synthesia

The ability to create realistic videos using text inputs makes Synthesia AI a revolutionary tool in content creation. Synthesia transforms knowledge into captivating visual experiences through a skillful fusion of text with realistic imagery, employing cutting-edge deep learning techniques.
This AI-powered tool effectively turns text into videos by generating dynamic scenes, graphics, and avatars. Content creators can use it to produce personalized video messages and tutorials.
This technology is significantly transforming how ideas are communicated and visualized, making it useful not only in the educational field but also in other sectors like marketing and entertainment.

3.1.4. Murf AI

Over the past few months, the primary focus and interest in generative artificial intelligence has been its ability to produce original texts and images. In line with this, Murf AI stands out as a unique AI technology: Murf uses text prompts to generate realistic voice-overs. It can create high-quality voice-overs for films, slide presentations, and virtually any other use case imaginable. This application enables the creation of voice-o3.1vers for podcasts, social media videos (YouTube, Dailymotion, TikTok, etc.), audiobooks, advertisements, and more.

Murf AI includes over one hundred voices that sound indistinguishable from human voices. This means that Murf users can generate new voice-overs as many times as needed, using these voices to create narrations that effectively engage their target audience (e.g., university students). An added benefit is that this voice repertoire is available in over twenty languages. Furthermore, Murf allows users to clone their own voice for personalized voice-overs.

3.2. Creation of question banks using generative Artificial Intelligence

Building a consistent question bank is crucial for conducting efficient student assessments and establishing clear learning objectives in higher education. In this regard, generative AI can automatically create a diverse set of questions tailored to specific topics and varying difficulty levels.

According to various studies (Boscardin, 2023; Chaika, 2023; Mangera et al., 2023), approximately 50% of teachers in some countries already rely, to some extent, on generative AI for lesson planning. They use it for tasks such as gathering general information, updating content, or generating engaging ideas to make classroom sessions more dynamic (Ng et al., 2023; Liu et al., 2022).

All the solutions listed below are tools designed to save teachers significant time while offering a wide and diverse range of student assessments. They automate question creation and provide remarkable versatility by incorporating numerous customizations and adjustments.

3.2.1. Eklavvya

Eklavvya is a tool designed for creating online assessment tests and managing knowledge. With the capabilities provided by artificial intelligence, Eklavvya can quickly and easily develop a comprehensive question bank for any subject requiring such questions.

Once Eklavvya generates the questions, they can be modified to meet additional requirements and specific criteria that may not have been initially considered. This ensures that the assessments students undertake are appropriate for the required level and effort.

Eklavvya saves teachers significant time by automating question generation compared to traditional manual creation. Additionally, it guarantees the development of a high-quality question bank, leveraging AI for its generation while allowing expert adjustment for optimal results.

3.2.2. Quizizz

Quizizz is a dynamic web-based platform that uses generative artificial intelligence to enable teachers to create online quizzes effortlessly, making the generation of engaging tests extremely simple. Quizizz is particularly useful for gamified learning environments and, above all, formative assessments.

Considering the vast variety of question formats available, Quizizz's AI provides recommendations to help form a battery of questions based on the selected topic. The platform also employs AI to adjust the difficulty of questions according to each student's performance.

Teachers using this tool can select one or multiple topics for their quizzes. Both teachers and students benefit from immediate feedback, enabling real-time identification of areas that need improvement to reinforce learning and areas of strength to further motivate and encourage student progress.

3.2.3. Canvas question bank generator

Canvas is a learning management and e-learning platform used to facilitate communication between key stakeholders, primarily students and teachers, within higher education institutions.

Among the many tools Canvas offers, its question bank generator stands out, designed to assist teachers in creating increasingly effective question banks. As previously noted, generative AI is revolutionizing the method of creating question banks in education.

The Canvas tool leverages generative AI to optimize both the content features and the visual presentation of the questions in the bank. It is designed to accommodate a wide range of disciplines and educational levels.

Canvas's generative AI makes the questions appear more professional and visually appealing by enhancing their presentation. The Canvas generator has earned its place in the field of educational technology due to its seamless transition between design and functionality, making it a valuable tool for creating well-adjusted and visually accessible quizzes.

3.3. Assessment using generative Artificial Intelligence

Assessment tools are increasingly utilizing generative artificial intelligence to create varied and personalized questions, adapting to each student's individual learning path. Furthermore, the use of AI significantly accelerates the grading process.

3.3.1. Assessment with Eklavvya

As previously mentioned, generative artificial intelligence encompasses the process of creating questions and answers for assessments, as well as developing complete evaluations using algorithms specifically designed in the field of AI. This is where the previously mentioned platform, Eklavvya, comes into play—a highly celebrated and award-winning tool for online exam creation and knowledge management. With it, exams become much more effective, adaptable, and diverse, benefiting both students and educators.

The operational mechanism is quite simple: based on the parameters entered on the Eklavvya platform, the system generates questions using generative AI algorithms, employing natural language processing (NLP) to understand the context and thus generate relevant questions.

Each time the process is repeated, a different and personalized assessment is produced, as the AI adjusts the questions according to the selected topic.

Additionally, the conversational format of the assessment itself, resembling a real tutoring session, keeps the participants (users) engaged throughout the process. This is particularly beneficial for conducting oral assessments, which are currently rare due to the challenges posed by large student numbers. Oral evaluations typically require numerous examiners, whose work may be influenced by subjective criteria, potentially leading to perceived unfair treatment by students.

AI can assist in this regard by allowing students to record their responses instead of conversing with a human examiner. This recorded session is then submitted to a generative AI system, which carefully listens to each student's answers to assess their understanding of the subject matter. The system evaluates their technical skills and other aspects identified as important during the assessment design process. Ultimately, the AI provides each student with a unique grade or feedback.

This method can be highly beneficial as it facilitates the evaluation of numerous students according to a uniform criterion, making the process significantly fairer. Oral assessments focus entirely on the student, evaluating their knowledge and attitudes, while minimizing the role of the examiner. Moreover, this tool not only assesses subject knowledge but also evaluates each student's communication and problem-solving skills.

Efficient assessment is crucial in higher education. Eklavvya's response verification system helps verify answers quickly, reducing grading time from months to minutes, with a fair system free from biases or emotions that could affect the evaluation. The system has proven to be highly effective, even recognizing punctuation rules, achieving accuracy rates of over 90% (González-Calatayud et al., 2021).

The advantages could bring about a significant and beneficial shift in assessment practices. Universities can grade exams much faster without compromising accuracy. The entire evaluation process will be more streamlined and better organized, enabling more frequent assessments while providing students with prompt feedback that helps them learn more effectively.

3.3.2. ChatGPT

ChatGPT has already been mentioned in previous sections. It is a chatbot application (focused on dialogue; see Section II of this chapter) developed just over a year ago by OpenAI, an artificial intelligence research and deployment company whose stated mission is to ensure that AI benefits all of humanity. ChatGPT specializes in dialogue, functioning as a language model refined through supervised and reinforced learning techniques.

ChatGPT's dynamic language model has gained global recognition for its exceptional ability to generate high-quality, realistic text. It is extraordinarily versatile, capable of producing organic dialogues, answering questions, and supporting creative writing processes (though it can also independently manage an entire creative writing task if assigned).

This tool is rapidly gaining traction across a wide range of industries, from content development and brainstorming for educational material authors to customer service chatbots. Its mastery of natural language is its cornerstone, and it continues to improve through regular updates (Su & Yang, 2023).

However, not everything is advantageous. The possibility of generating false information during interactions, combined with its occasional inability to fully grasp complex contextual subtleties, raises concerns and skepticism not only among its critics but also among many of its users.

ChatGPT’s ability to produce conversational content makes it a highly sought-after tool. It can generate imaginative and engaging texts that facilitate the participation of various stakeholders within a company. ChatGPT has gained widespread acclaim for its accurate responses and organically structured sentences.

Initially, ChatGPT was a free tool accessible to all users. However, its developers recently introduced ChatGPT Plus, which requires a subscription for access. Businesses can hire a qualified ChatGPT developer to integrate this AI tool into their systems.

According to a survey conducted by Best Colleges Across the Pond, nearly half (43%) of university students at certain institutions admitted to using AI at some point in their academic processes (Chaika, 2023; Su & Yang, 2023). Among those who acknowledge using AI, half specifically employ it to complete tasks or exams rather than simply gathering information (Boscardin, 2023).

3.4. Virtual mentoring through AI for students

Virtual mentoring through artificial intelligence is an essential tool for supporting students throughout their academic journey, offering individualized guidance, personalized support, and tailored assistance.

These online mentors use artificial intelligence to recognize each student's unique learning style, enabling them to provide personalized guidance and support for growth not only academically but also personally and developmentally.

To develop virtual mentoring, companies such as Cognii, Knewton, Kidaptive, and Thinkster Math have created various applications. Let’s analyze each of them individually:

3.4.1. Cognii

Cognii is an artificial intelligence tool specialized in assessment, capable of providing feedback on written responses. In the educational field, it has proven to be highly useful for evaluating and guiding students in subjects such as writing, critical thinking, and problem-solving. This tool was developed by Cognii Inc., a leader in the educational technology industry, which has consistently offered effective solutions for professional training and the development of educational applications, always based on the use of artificial intelligence. Cognii Inc. has collaborated with numerous corporate training groups as well as educational institutions, from primary education to higher education, in an effort to provide more cost-effective and efficient learning solutions.

The Cognii Virtual Learning Assistant is essentially an educational technology solution that offers users (students) personalized learning, intelligent instruction, and open-response tools. By employing virtual learning assistants and conversational technologies, the tool helps students obtain open-ended answers to their questions, thereby enhancing their critical thinking skills.

3.4.2. Alta (Knewton)

Knewton is a pioneering company in the field of adaptive learning technology, founded in 2008. Its artificial intelligence algorithms are designed to evaluate student performance and provide personalized recommendations for tasks and topics.

Its flagship application is the Alta program, which significantly assists teachers in delivering a wide range of courses across different educational levels.

Knewton has collaborated with various universities and companies developing e-learning applications to enable personalized learning for students worldwide, thereby improving their academic performance.

3.4.3. ALP (Kidaptive)

Kidaptive is another developer of adaptive technology, recognized for its excellence with several awards. Its adaptive learning technology creates a personalized learning path based on each student's interests, preferences, and potential.

This company's learning approach is based on games, through which it tracks students' behavior over time and provides feedback on their progress to parents, teachers, or students themselves.

Its flagship product is the Adaptive Learning Platform (ALP), a Big Data platform that combines information from multiple learning contexts to build a comprehensive psychometric profile of each student. ALP leverages artificial intelligence to present and challenge students more effectively based on the estimated strengths and weaknesses derived from their psychometric profile.

Notably, this platform can also predict future academic achievements by identifying underlying patterns and relationships.

3.4.4. Thinkster Math

Thinkster Arithmetic is a company founded in 2012. It aims to combine personalized arithmetic training, powered by artificial intelligence, with human guidance. Its platform offers math programs covering the entire academic journey, from preschool to high school, and can adapt to the pace and preferred learning style of each student.

By using technology, students are guided through their work step by step, with explanations of the correct answers and areas for growth.

The innovative approach of Thinkster Math is being adopted by numerous institutions looking to complement other educational applications with personalized training in a delicate subject like mathematics, all based on data.

IV. Advantages and disadvantages of Artificial Intelligence in university education

The content presented in the previous sections already allows for a broad understanding of the main advantages and disadvantages of artificial intelligence in university education. However, the following two subsections provide a more individualized analysis.

4.1. Advantages

Artificial intelligence offers numerous advantages in the field of university education, particularly for professors. One key advantage is its ability to simplify, facilitate, and even automate many administrative tasks, providing adaptive learning environments, differentiated learning tools and feedback, which potentially improves teaching efficiency and learning outcomes (Leoste et al., 2021).

Another interesting advantage inherent in AI tools is their ability to enhance students' cognitive abilities, personalize the learning experience, and help professors closely monitor student development (Jian et al., 2021). By automating certain tasks and summarizing some of the

results derived from them, AI can assist in personalizing the student learning experience and collaborate with professors to evaluate student progress more effectively (Aubeuf, 2022).

Additionally, AI enables the optimization of intelligent curriculum design systems, helping professors integrate AI into the teaching process to improve education quality. This new tool can also be used to develop expert-level systems for teaching specific subjects, addressing major challenges and overcoming barriers such as teacher shortages and limitations in current educational teaching methods (Tu et al., 2022). Furthermore, AI applications can improve student learning efficiency, potentially taking on some of the professors' tasks while fostering a constructive cooperation between professors and AI systems (Tang & Deng, 2022).

Thus, the main advantages of using artificial intelligence for university professors include streamlining administrative tasks, improving teaching efficiency, personalizing learning experiences, collaborating to create adaptive learning environments, and enhancing student assessment processes. By leveraging AI technologies, professors can optimize their teaching methods, monitor student progress more effectively and efficiently compared to current methods, and create infinitely more engaging and, above all, personalized learning experiences for students.

4.2. Disadvantages

Obviously, as seen in the previous sections, artificial intelligence in university education also presents disadvantages for professors. One of the biggest concerns it generates is the fear of job displacement, as AI has the potential to automate certain administrative tasks and create adaptive learning environments. This obviously raises numerous questions about the future role of teaching staff (Leoste et al., 2021).

Some experts argue the impossibility of AI tools completely replacing human teachers, with the irreplaceable human touch in education being the cornerstone of this position (Jian et al., 2021). Conversely, other experts have raised alarms about the biases and reliability of grading and evaluations through AI tools. Their research highlights that teachers are better equipped to provide personalized feedback to students based on a deeper, more individualized understanding of their work and performance (Yildirim et al., 2021).

Moreover, integrating AI into education, particularly at the university level, could lead to changes in the traditional roles of professors and students, especially if such integration is not carried out in a responsible and appropriate manner. This could hinder the effectiveness of educational programs by failing to properly support professors and educational administrations in using AI tools (Sun et al., 2020). Furthermore, professors may face considerable challenges in staying up to date with the latest AI developments and incorporating this technology into their teaching practices, given varying levels of awareness of AI among educators (Ferikoğlu & Akgün, 2022).

Therefore, while artificial intelligence can improve certain administrative tasks, offer personalized learning experiences, and provide differentiated tools and feedback, there is significant concern among university professors regarding their role and future in the face of these new tools. In addition to concerns about the lack of ethics and academic integrity in some students' use of generative AI tools, there are also worries about job displacement, changes in the roles of teachers and students, potential problems with grading and

evaluations, insufficient support for effective use of AI tools, and challenges in teaching AI itself.

V. Conclusions

The widespread implementation of artificial intelligence in the educational field signifies a paradigm shift, where efforts are increasingly directed towards much more innovative and personalized learning experiences. On the one hand, professors and educators, and on the other hand, educational institutions, must adapt to these significant advancements to fully leverage the potential of artificial intelligence for the substantial improvement of teaching and learning practices.

Artificial intelligence has the ability to revolutionize university education by enhancing teaching effectiveness, supporting personalized learning, and improving pedagogical actions. However, to fully capitalize on the benefits of artificial intelligence in higher education, it is essential for professors to acquire and develop knowledge about this tool, integrate it effectively into their own teaching practices, and continuously improve their professional skills, given the times we are in.

Additionally, the use of artificial intelligence tools in higher education requires a collaborative approach between all involved agents (educators, researchers, quality managers, program coordinators, etc.) to collectively ensure successful integration and maximize the benefits of AI technologies in teaching and learning environments. Generative artificial intelligence can make a decisive contribution to the university education sector (and, in fact, is already doing so) by automating and simplifying processes that were previously done manually, consuming large amounts of human and economic resources. Similarly, it opens a vast range of new possibilities for conducting evaluation processes, particularly exam processes, as it can generate multiple-choice questionnaires, which can be accompanied by the creation of learning videos.

Professors can employ generative artificial intelligence (and many are already doing so) in multiple areas, among which the authors have highlighted the following as examples:

- Drafting learning objectives for study programs or the subjects that comprise them or even developing course content and descriptions.
- Generating content materials, such as question banks, lesson plans, sample work, writing scenarios, or quiz questions, to name just a few examples.
- Having a virtual assistant, especially in the event of a hypothetical absence of the professor, so that during this absence, guidance can be provided to students, clarifications can be given, and students' questions can be resolved.
- Providing support in research tasks by analyzing large data sets, identifying patterns, and generating insights and research directions.
  Since the professor is not the only agent involved in the educational act, it is also important to consider the interest that generative artificial intelligence may have for students. In this way, among other functions, these tools allow:
- Boosting efficiency in the development of many educational tasks.
- Complementing their own studies.
- Generating ideas for work and group development.

- Receiving an in-depth explanation of a topic taught in class when required.
- Improving reading comprehension skills and writing ability, thus also refining language and communication skills.
- Receiving immediate grading and feedback on completed tasks. It is, therefore, a train that is passing right now through the station: educational institutions must adopt and explore these generative AI tools and integrate them into their existing systems to stay at the forefront of the world.

Thus, generative artificial intelligence tools seem to have a great future and potential in transforming university education through content creation, personalized learning, and administrative support. However, their integration also requires careful consideration of all ethical implications and the development of appropriate strategies to safeguard academic integrity.

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Chapter 5. Usualising and actualising: disruptive approaches to broaden the curriculum

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I. Introduction

Sue Sanders, originally from the United Kingdom, holds the position of emeritus professor at the Harvey Milk Institute. Over the course of her life's work, informed by her activism, she has developed a thought-provoking theoretical analysis of homophobia, broadly understood as LGTBphobia, with a particular focus on its manifestation within the realm of education.

Sanders' innovative perspectives on the pedagogy of diversity within the British educational framework revolve around the concepts of *usualising* and *actualising*. These aim to add to the variety of modes available such as the medical model, integration, inclusion, tolerance, and the occasional gay lesson. The aim of this article is to present the author's intellectual contributions, offering a theoretical, historical, and personal exposition.

II. Historical and theoretical foundation

The primary focus of this article is the concept of usualising, a term introduced by Sue Sanders. This particular section offers a certain degree of flexibility, as it stems from the author's personal reflections and life experiences. Hence, the author narrates the genesis of this concept in first person, although with frequent references to the British historical context and pertinent theoretical frameworks. As a result, going forward, the pronoun "I" should be understood as referring to "Sue Sanders", a practice that underscores academic integrity and situated knowledge (Haraway, 1995). This approach enables readers to gain insight into the foundational and epistemological underpinnings of the concept at hand.

2.1. Schools OUT UK

As the CEO of *Schools OUT UK*, an NGO established by a group of gay educators in 1974 due to the lack of support from educational institutions and unions, I work with an organization that initially operated under the name of *Gay Teachers Group*. This group's primary objective was to provide mutual assistance in an environment characterised by hostility towards non-heterosexual individuals. In those early years, the prevalence of homophobia was palpable, although the term itself was not commonly used at the time.

A pivotal moment for our organization occurred in 1988, when the Conservative government of the United Kingdom implemented Section 28 as part of the Local Government Act. This

legislation prevented local authorities from “intentionally promot[ing] homosexuality or publish material with the intention of promoting homosexuality” and from “promot[ing] the teaching in any maintained school of the acceptability of homosexuality as a pretended family relationship” (Local Government Act, 1988, articlue, 28). Its impact was detrimental, leading to a climate of fear and silence among educators and students regarding LGBT+ topics. Schools OUT responded by expanding its activities to include the development of resources, highlighting LGBT+ role models in the curriculum.

The Education Reform Act of 1988, ironically enacted by the same conservative government, inadvertently created an opportunity for Schools OUT to continue its work despite the restrictions imposed by Section 28, by withdrawing power in schools from the local governments. In addition, the organization adapted to the changing landscape by utilizing the internet as a platform for communication and advocacy. While our roots were in advocating for the rights of gay and lesbian individuals, our focus expanded to encompass a broader spectrum of the LGBTQ+ community.

During that period, there was limited discourse on the interconnected nature of various forms of oppression individuals may experience. However, it was understood that addressing homophobia effectively requires addressing and challenging other intersectional forms of discrimination such as racism, sexism, ableism, and classism.

2.2. Stephen Lawrence

On 22nd April 1993, Stephen Lawrence, a black adolescent residing in Plumstead, southeast London, was murdered as a result of racial motivations by his attackers while he waited for the bus. This racially-motivated homicide sparked an investigation commission initiated in 1998, culminating in the release of the *MacPherson Report* the following year. Nevertheless, the perpetrators were not brought to justice until the year 2012, and inquiries are still currently ongoing. The MacPherson Report comprehensively examined various institutions including the police, local authorities, and educational services, among others, and provided 74 recommendations to address the prevalent "institutional racism" within these public entities.

> "Institutional Racism" consists of the collective failure of an organisation to provide an appropriate and professional service to people because of their colour, culture or ethnic origin. It can be seen or detected in processes, attitudes and behaviour which amount to discrimination through unwitting prejudice, ignorance, thoughtlessness, and racist stereotyping which disadvantage minority ethnic people (Home Office, 1999, paragraph 6.34)

I had the privilege of participating in a team of professionals responsible for delivering necessary training subsequent to the aforementioned report, with the objective of increasing awareness of this issue among judicial system staff. Within this team, comprised of individuals of various backgrounds including those of Asian and African descent, as well as members of the LGBT+ community, a collective decision was made to propose the integration of this subject matter into the training program. It was imperative to educate law enforcement and other public officials on the importance of recognising that racism is not exclusive to individuals of certain ethnicities, as black individuals or those from the global majority (indigenous, African, Asian and Latin American) can also experience discrimination based on other factors such as gender, ability, sexual orientation, or social class, among others.

These insights prompted me to revise the official definition of "institutional racism", as outlined in the McPherson Report, to "institutional prejudice". This adjustment facilitates the

understanding that our institutions, established by affluent white men of the nineteenth century who were heterosexual and Christian, and lacked diversity in terms of ability, are inadequate in effectively promoting inclusivity in the twenty-first century, unless substantially revised and reformed.

Furthermore, we realised the need to alter our discourse, recognizing that language is not merely descriptive but also plays a performative role (Austin, 1962). The prevailing discourse inadvertently reinforced victim-blaming rather than emphasizing the underlying prejudice fuelling discriminatory acts. For instance, it may appear subtle to transform the statement "Stephen Lawrence was murdered because he was black" to "Racism was the cause of Stephen Lawrence's death", or "Julia was targeted because she is a lesbian" to "Julia was assaulted due to lesbophobia". Still, this transformation significantly contributes to a more appropriate conceptualisation of events and conveys a more accurate message regarding the distinct roles that individuals play in perpetrating or experiencing prejudice, discrimination, and violence.

2.3. Decolonising the curriculum

The rise of the Black Lives Matter movement and recent efforts towards decolonising the curriculum serve as a significant indicator that we have frequently omitted crucial information from our educational system.

Apple (2003) emphasises the interconnected nature of education and curriculum, underscoring the importance of social interactions. He suggests that viewing schools out of context entails understanding their connection to broader societal relations of power and exploitation. Therefore, it is essential to deconstruct these concepts, acknowledging that they are not objective entities but rather products of social relations shaped by specific historical contexts. Knowledge, schooling, and curriculum reflect the perspectives of dominant social groups, influenced by factors such as class, gender, race, ability and nationality.

> The representations and narratives contained in the curriculum privilege the meanings, culture, and viewpoint of dominant racial and ethnic groups. In short, if we understand the curriculum as a questioned territory, then it may be useful to adopt the metaphor of colonialism/postcolonialism to synthesise all these processes of construction of dominant/dominated positions through the knowledge embodied in it: the curriculum is a colonised territory, as Apple so aptly shows us in his essay. (da Silva, 1997, p. 73, our translation)

Concealing the history of a social group serves to render it invisible and diminish its importance, thereby reinforcing its marginalization. The historical background of the establishment of the educational system in colonial territories by the colonisers sheds light on this process: indigenous cultures are largely disregarded in the curriculum of the colonised regions. The native language is often prohibited, with the dominance of the metropolitan culture prevailing. As stated by Apple (2003), only certain interpretations are deemed valid, restricting the acceptance of alternative perspectives.

While the prevalence of this phenomenon is glaring in colonial societies, it is crucial to acknowledge that we inhabit a colonial culture that extends beyond geographical boundaries: one that is patriarchal, white-dominant, ableist, cisheterosexist, and often purports to be Christian. Hence, it is vital for the educational system to offer diverse viewpoints to the younger

generations because, as the saying goes, "you cannot be what you do not see"[1]. Failing to do so will perpetuate various forms of oppression in our society.

In essence, promoting an unbiased education is necessary to reaffirm the self-worth of marginalised groups, which has frequently been denied. This impartial education can only be achieved through the decolonisation of the curriculum in its broadest sense, eliminating all forms of oppression, not limited to ethnicity but also encompassing gender, sexual orientation, class, abilities, and age. Furthermore, it is imperative to introduce new concepts, perspectives, and issues such as hate crimes, environmental degradation, and structural inequalities to overhaul the existing educational framework that propagates the view of the "other" as foreign, inferior, or even hazardous (da Silva, 1997). Instead, an inclusive educational system should champion the principles of equality and diversity.

Society has perpetuated falsehoods across various narratives, including those concerning women, working classes, religions, and the LGBT+ community. Perhaps, the most disregarded group has been individuals with disabilities. Analysing how society has approached the reality of these people offers valuable insights into dismantling institutional biases and the accompanying oppression.

According to Velarde (2012), the historical treatment of peoples with disabilities has evolved through three stages: disregard, rehabilitation through the medical model, and the rights-based social model. The disregard phase, characterised by neglect, relegated these individuals to a dependent existence at best, reliant on the charity of others. The medical model went a step further by pathologizing these individuals, viewing them as diseased and in need of treatment to conform to societal norms. This trend, evident in mental health and physical health contexts, also extends to women, racial minorities, and LGBT+ individuals in Western societies, who have been seen as markedly "different" and thus subjected to various therapies to conform to the white, male, heterosexual norm. Women, for instance, were historically confined in institutions, subjected to treatments like lobotomies, electroshock therapy, and even forced hysterectomies to eradicate what was perceived as the source of their "problem": the uterus. Moreover, while conversion therapy for LGBT+ individuals is now banned in some nations, it remains legal in others. The systematic dehumanization of black individuals, leading to slavery and inhumane treatment, further underscores the pervasive belief in their inferiority.

Gradually, there has been a transition towards the social model, which places the onus on society and its institutions to adjust and accommodate the needs of all individuals. In this approach, individuals are not inherently disabled; instead, it is the societal constructs that perpetuate disablement, needing systemic transformation to ensure inclusivity and integration. This paradigm shift underscores the societal obligation to create enabling environments that foster the participation and empowerment of all individuals. The adoption of the social model reflects a shift akin to the journey of the LGBT+ community from self-reproach to self-acceptance, evident in their advocacy for pride as an affirmation of their identities.

Internalising one's identity as "other" also internalises negative biases such as sexism, racism, homophobia, transphobia, classism, or ableism, which can erode an individual's self-perception. When people are constantly exposed to societal and educational messages

[1] Popularised in the documentary *Miss Representation* by Jennifer Siebel Newson, presented in Sundance Festival 2011, by Marian Wright Edelman, activist for children's rights and founder of the Children's Defense Fund.

reinforcing their "different" status, there is a strong inclination to conform to the perceived "normal". Tragic accounts abound of peoples resorting to drastic measures to fit societal norms, such as Black individuals using bleaching agents to lighten their skin, or gay men and women engaging in sham heterosexual relationships to validate their identities and conceal their true selves.

The perpetuation of stereotypes regarding ethnicity, class, gender, disability, and sexuality limits children's personal horizons and damages their self-esteem. Schools and society bear the responsibility of challenging prevailing stereotypes and ensuring that the experiences of all social groups are accurately represented in the curriculum, enabling individuals to find themselves reflected in official educational materials. As Torres (2012) put it, this is a matter of achieving "curricular justice".

2.4. LGBT History Month

In 2004, my colleague Paul Patrick and I initiated LGBT+ History Month in the United Kingdom in collaboration with Schools OUT UK. This endeavour aimed to address the notable lack of visibility of the LGBT+ community, particularly within the domain of education due to section 28. To facilitate this initiative, a website was established containing essential resources and a calendar for the dissemination of related events. Although the idea was not entirely novel, given the existence of Black History Month for some time, it received favourable reception from various local and educational authorities. The official launch took place at the Tate Modern Gallery in London in November that year, and it has since become an established event occurring yearly in February since 2005[2]. Furthermore, several other nations have embraced this initiative, designating different months for the commemoration of LGBT+ history, with Spain being the most recent to announce its inaugural *Mes de la Historia LGBTIAQ+*[3].

Subsequently, The Classroom Website[4] was created to provide a diverse range of resources aimed at promoting visibility of the LGBT+ community throughout the entire year, rather than being confined to a single month. This platform, developed by David Watkins, serves as the forum where I formalise and systematise the concept of usualising, which I have incorporated into my workshops and training sessions over the years.

III. Usualising and actualising

Individuals within the LGBT+ community have traditionally been characterised as deviating from the norm. The medical framework discussed by Velarde (2012) required individuals to suppress their true identity in order to undergo treatment and conform to societal standards of "normalcy". This approach starkly contrasts with the ideals of embracing pride and dispelling shame. The use of the term "normal" and its associated terms inherently carry a negative connotation towards anything that deviates from the perceived norm, thus labelling it as "abnormal". In consequence, advocating for the normalisation of LGBT+ individuals undermines the very essence of our objectives. Our aim is not to assimilate into the confines of normality, but rather to challenge and critically assess its implications.

[2] Available on https://lgbtplushistorymonth.co.uk/.
[3] Available on https://meshistorialgbtia.wordpress.com/quienessomos/.
[4] Available on http://the-classroom.org.uk.

> Normalise is problematic when describing humans as it assumes there is a 'right' way of being and is therefore a pejorative term to many who consider themselves outside the majority. It also has connotations of 'trying to fit in' rather than embracing diversity. (http://the-classroom.org.uk)

However, the occasional inclusion of LGBTQ+ content in the curriculum, usually limited to a once-a-year "gay lesson" in certain subjects, was insufficient in addressing the widespread ignorance surrounding LGBTQ+ individuals. As a result, a proposal emerged advocating for the integration of LGBTQ+ topics, concepts, and figures throughout the curriculum from an early age. It is essential for young people to understand and appreciate the diversity of human existence, including different ethnicities, sexual orientations, and abilities, without attaching value judgments to these attributes.

The term "usualising" is not typically found in English-language dictionaries, but it can be understood to mean "making something usual or commonplace." Despite the fact that this definition is commonly attributed to "normalising", the decision was made not to use this term for the reasons previously outlined.

> When we usualise something, we acclimatise people to its presence and take away the threat of difference which creates fear and discrimination. Usualising in schools has more to do with familiarizing learners with a subject's everyday occurrence or existence rather than an in-depth understanding of the subject. [...] Learners should consistently be made aware of the presence of LGBT people. LGBT people are integral to our learner's lives. They exist in all times and all places. They exist in the here and now, essential to the UK society and culture. Teachers should try to use materials that span a diversity of sexual orientation. In the context of the classroom, "usualising" occurs when a teacher *references* Lesbian, Gay or Bisexual sexual orientation *without inviting further comment.* (http://the-classroom.org.uk, emphasis in the original)

Usualising is a form of indirect, non-instructional, and purely referential approach where the diversity of sexual orientations and gender identities is mentioned rather than analysed. It implies acceptance without explicit instruction and must be consistently applied to promote acceptance among students. This technique indirectly challenges prejudice and can help bring visibility to minority groups.

It is essential to complement usualising with a shift towards reflection. Usualising prepares students for actualising, which involves incorporating specific learning objectives that aim to promote a deeper understanding of LGBT+ identities and their significance in society and culture. Through conscious learning, explanation, and examination, students are presented with real-life examples of LGBT+ experiences: "Once pupils are habituated to something (LGBT life) they can then study it without distraction. A*ctualising* describes and disseminates subjects that *usualising* has made an acceptable part of reality" (http://the-classroom.org.uk, emphasis on the original). It intends to go beyond the merely superficial "interesting" to engage in actual critical thinking (Stryker, 2007).

A recent experience involving the co-author of this paper included a project to validate rubrics for official English-level certification exams. Due to confidentiality reasons, specific details of this task cannot be disclosed in order to maintain the integrity of the project. This confidentiality is necessary for the inclusion of this experience in the paper.

Figure 1.
Same-sex family.

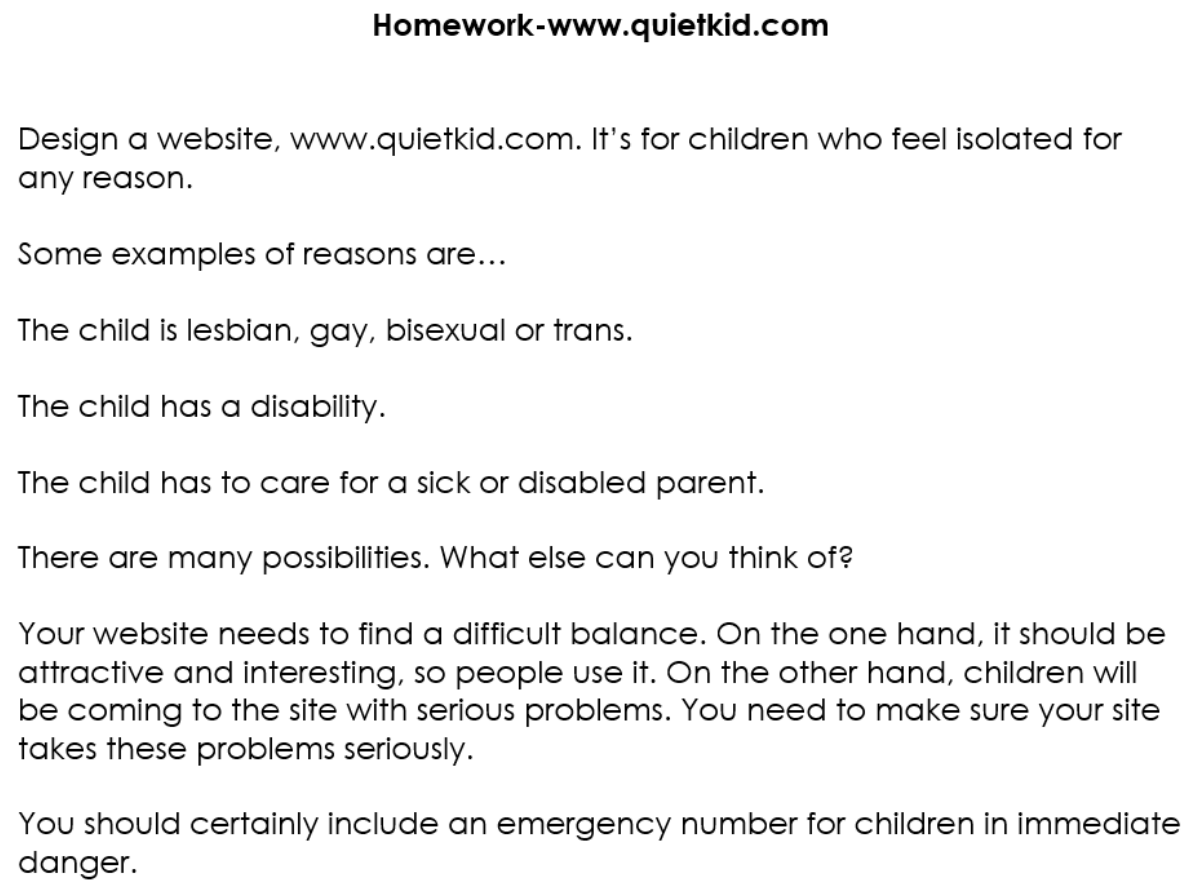
Source: own elaboration.

This is a clear example of usualising. The presence of same-sex families is acknowledged without dispute, rendered as a fact. Individuals tasked with discussing this topic in an examination setting are required to focus solely on the image provided. In contrast, if, hypothetically, in a subsequent task, they were asked to address the challenges that families consisting of two fathers or two mothers might encounter, they would find themselves in the scenario of actualising.

While the illustration showcased serves as an initial and commendable effort, it predominantly highlights individuals from the LGBTQ+ community who are already more visible, specifically white homosexual men. A more impactful effect could have been achieved by featuring an image of an interracial female couple, thereby prompting reflection on the intersectionality of various prejudices individuals may face and contributing to the decolonisation of the academic curriculum.

The website http://the-classroom.org.uk offers an array of practical examples designed to usualise and actualise LGBTQ+ realities, while still aligning with the official educational objectives outlined by the British curriculum across different subject areas. Of particular note in the realm of English, is a task asking students to develop a website catering to lonely children, with scenarios including lesbian, gay, or transgender minors mentioned as potential considerations.

Figure 2.
English assignment.



Homework-www.quietkid.com

Design a website, www.quietkid.com. It's for children who feel isolated for any reason.

Some examples of reasons are…

The child is lesbian, gay, bisexual or trans.

The child has a disability.

The child has to care for a sick or disabled parent.

There are many possibilities. What else can you think of?

Your website needs to find a difficult balance. On the one hand, it should be attractive and interesting, so people use it. On the other hand, children will be coming to the site with serious problems. You need to make sure your site takes these problems seriously.

You should certainly include an emergency number for children in immediate danger.

Source: http://the-classroom.org.uk

IV. Recent practical applications

In the realm of education, the topic of representation has been increasingly prominent. Initially focused on gender and the lack of female role models, research in this area has since expanded to encompass a broader array of subjects and disciplines, including LGBTQ+ individuals, people with disabilities, racialised populations, and refugees. Various scholars have addressed this shift in focus (Atienza, 2007; Gray, 2013; López-Medina, 2020; Motschenbacher & Stegu, 2013; Nemi, 2018; Pérez & Gargallo, 2008; Prat & Camacho-Miñano, 2018; Sunderland & McGlashan, 2015; Thornbury, 1999).

Ashley Moore (2020) proposed a classification system for queer representation spanning from explicit (cis)heterosexism to queer inclusivity. Efforts have been made in the 21st century to incorporate diverse realities into educational materials, with mixed outcomes. For instance,

Ben Goldstein (2015) shared his experience of including homosexual couples in English as a foreign language textbook, only for the publisher to swiftly alter the content to avoid backlash from less LGBTQ+-friendly markets. In an interview, Goldstein noted a change in approach towards inclusivity, shifting from debating contentious issues to simply integrating diverse perspectives without judgment. This transition mirrors the move from the gay lesson to usualising, as discussed in previous literature.

Building upon the concept of usualising, Tyson Seburn suggests a disruptive approach akin to Sanders' notion of actualising. He elaborates on these ideas in his book *How to Write Inclusive Materials* (2021), his website[5] and his teacher training workshops, advocating for more inclusive educational materials.

An example of this decolonised, depatriarchalized, and disruptive approach can be found in the *Raise Up!*[6] English as a Foreign Language series, which offers inclusive materials up to level B2 of the CEFR. Their aim is to provide teachers with practical, diverse material without stirring controversy or relying on mainstream publishers.

Focusing on sex and gender diversity, Laila El-Metoui, Stonewall Lesbian Role Model 2020, has spearheaded Pride in Education[7], a global conference on LGBT+ inclusion in educational settings. Additionally, university programs and research initiatives have emerged to explore the intersection of LGBT+ experiences with various academic disciplines. In the field of research, several publications have seen light in recent years and many more are to come in the near future, claiming for a usual introduction of LGBT+ realities in classrooms (Banegas, Beacon & Pérez, 2021; Banegas & Govender, 2022; Pakula, 2021; López-Medina, Beacon, Quinterno & Sotelo, in press; López-Medina & Quinterno, 2024).

In the UK, initiatives such as LGBT+ History Month have prompted cultural institutions to engage with the LGBT+ community through themed events and staff training. Museums like the Victoria and Albert Museum in London offer free LGBT+ tours[8], while projects like Outing the Past[9] showcase LGBT+ history in various institutions.

Moreover, LGBT+ History Month has inspired similar themed months in the UK, such as those celebrating Women and People with Disabilities. Projects like Rainbow Pilgrims[10] also shed light on the history of LGBT+ migrants in the UK, illustrating ongoing efforts to explore and update the LGBT+ narrative in the country.

V. Conclusions

These pages have described the genesis and definition of usualising and actualising, as strategies developed by Sue Sanders to address the gaps in the school curriculum regarding sexual orientation and gender identity, both theoretically and personally. The theoretical and historical coherence of these strategies has been examined in relation to concepts like the decolonisation of the curriculum (Apple, 2003; da Silva, 1997) and the social model of

[5] Available on https://fourc.ca/tyson-seburn/.
[6] Available on https://raiseupforelt.com/.
[7] Available on https://www.prideineducation.co.uk/.
[8] Available on https://www.vam.ac.uk/event/Xy3EDlGv/lgbtq-tour-2020.
[9] Available on https://www.outingthepast.com/.
[10] Available on https://www.rainbowpilgrims.com/.

addressing diversity, which contribute to the development of limited already existing perspectives, such as the medical model, normalising, inclusion, integration, tolerance, and the occasional gay lesson.

Usualising and actualising as instructional strategies are gaining ground in the United Kingdom, Sanders' home country. Similarly, in other English-speaking nations like Canada, there is discussion of usualisation and disruption (Seburn, 2021), which seems to match Sanders' notion of actualising. Examples of initiatives falling under these strategies in diverse contexts have been provided.

Comparing usualising to the concept of normalising, it was noted that the former focuses on the frequency of occurrences, without judgment on its deviation from the norm. Despite the imperfections of usualising, it serves to describe strategies effectively, leaving room for future refinement of labels through research and action.

The application of usualising and actualising extends beyond LGBTQ+ individuals, aiming to include other marginalised groups like those with disabilities or from racialised communities. These strategies can thus contribute to the broader and more inclusive process of decolonising the curriculum.

In light of all the above, the gradual substitution of normalising with usualising is proposed to distinguish between different processes in education. This initiative could be framed within queer pedagogies (Britzman, 2012; Nemi, 2018), which have emerged recently as practices focused on empowerment and on understanding privileges and oppressions in educational settings, emphasizing inclusivity and the visibility of diverse identities. Queer pedagogies should go hand in hand with decolonisation. Da Silva (1997) outlines the goal of decolonised education and curriculum as a means to promote diversity and challenge traditional power structures within the educational system.

> All this aims to build an education and curriculum aiming at criticism and dissent, transgression and subversion, dissemination and plurality, destabilization and disruption, movement and change and not acceptance and conformity, subjection and submission, hatred and separatism, fixation and stabilization, immobility and permanence. In short, an education and a curriculum that multiply meanings instead of closing themselves off in the received and dominated meanings, an education for insurrection and for the transgression of borders. (p. 8, our translation)

This article presents our modest effort in providing clearer terminology for establishing a decolonised education, focusing on queer education. Over the years, we have incorporated LGBT+ topics into formal education through occasional gay lessons. However, a review of prevalent school resources (López Medina, 2020; Moore, 2020) and educational laws suggests that we may have prioritised implementation over necessary groundwork, such as systematic usualising.

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Chapter 6. Inclusive and Adaptive Education: The University for Adults at BUAP

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I. Introduction

The education system in Mexico and worldwide faces numerous and diverse challenges, stemming from both global phenomena and the specific characteristics of the local contexts in which each institution operates. The project outlined in this document primarily addresses two key issues:

- The ageing population, which highlights the lack of educational infrastructure (in a broad sense) to cater for the population group beyond the traditional university cohort (25 years and older).

- The need for adaptability to the Fourth Industrial Revolution, that is, the impact of technology on life and work, with a sense of urgency imposed by the pandemic.

Addressing the intersection of these two challenges in a serious and responsible manner has been the driving force behind the creation and strengthening of the **University for Adults (UPA)** at the **Benemérita Universidad Autónoma de Puebla (BUAP)**. Since its inception in August 2016, the UPA has expanded its educational offerings to include continuing education, cultural activities, undergraduate degree programmes, certifications, and tailored training for both professional and personal development.

In the following pages, we shall briefly analyse the challenges that have shaped the development of this initiative, before presented a concise overview of its key features and shared its initial outcomes.

II. First Challenge: Population Ageing

The process of population ageing has been an ongoing phenomenon for several decades, although its magnitude and pace have varied by region and country. Globally, this trend can be traced back to the early 20th century; however, it has become particularly pronounced in recent decades due to advancements in medicine, improvements in living conditions, and declining birth rates.

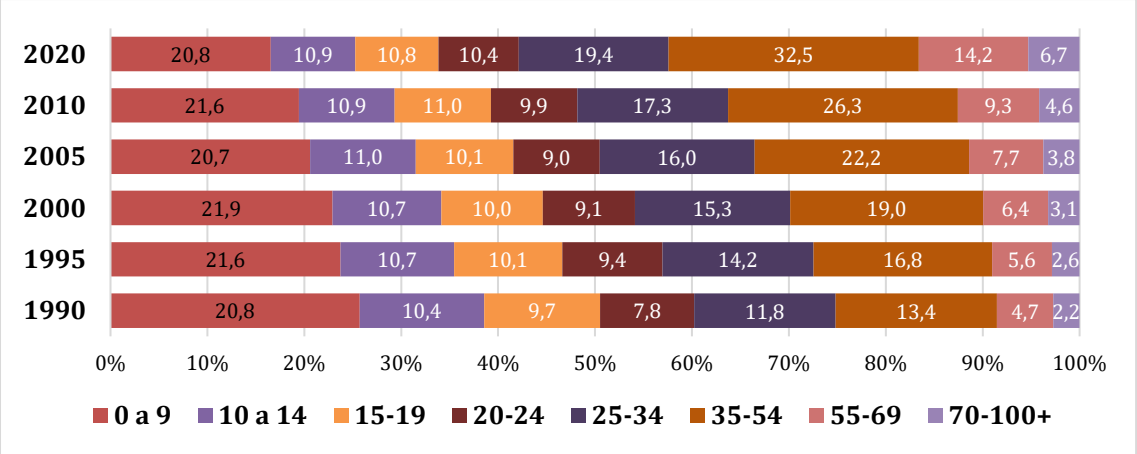
The demographic transition, which involves a shift from high birth and mortality rates to lower levels, has played a significant role in this process. In the Global North, this transition began earlier, whereas in the Global South, it has been more recent, but it is happening at a faster rate.

Overall, it can be observed that, from the mid-20th century to the present, there has been a clear global trend towards population ageing, with some regions experiencing this phenomenon more acutely than others.

In Mexico, this trend is evident through a significant increase in the older age groups. According to data from INEGI, the population of adults aged 55 and over has experienced notable growth between 1990 and 2020. For instance, the population aged 55 to 59 increased from approximately 1.89 million in 1990 to 5.69 million in 2020. This indicates a significant trend towards an ageing population in Mexico (see Graph 1: Mexico's Population by Age Groups).

As illustrated in Graph 1, all older age groups, including those aged 70 and above, have experienced growth. This evidences a general trend of increased life expectancy, which in turn alters the age structure of the population, resulting in a higher proportion of individuals in older age groups relative to younger cohorts.

Figure 1.
Population of Mexico by Age Groups.



Source: National Institute of Statistics and Geography (INEGI), Population and Housing Censuses and Surveys. Data in millions of inhabitants.

To analyse the relationship between the older and younger population, INEGI proposes an ageing index, which represents the number of elderly individuals (aged 60 and over) per every hundred children and young people (aged 0 to 14). A longitudinal analysis of this indicator from 1990 to 2020 suggests a common pattern of population ageing across the country, albeit with some regional differences (Mexico City exhibits one of the highest ageing rates, whereas Quintana Roo has one of the lowest). Furthermore, there appears to be an acceleration in the rate of population ageing in many federal entities towards the late 2010s, with ageing rates increasing more rapidly compared to previous decades. (See Table 1. Ageing Index by Federal Entity).

Table 2.
Ageing Index by Federal Entity.

Entidad federativa	1990	1995	2000	2005	2010	2015	2020
Ciudad de México	23.4	27.7	32.5	42.1	51.8	71.7	90.2
Veracruz de Ignacio de la Llave	16.1	19.6	23.6	30.8	37.4	45.7	59.0
Morelos	17.4	20.3	24.0	30.2	36.3	45.8	58.5
Colima	17.0	19.6	22.7	28.5	33.1	38.5	52.9
Sinaloa	15.4	18.6	21.6	28.2	33.9	41.2	52.7
Yucatán	20.7	22.7	25.6	30.5	36.7	43.0	52.4
San Luis Potosí	16.6	19.3	22.3	27.5	32.8	39.9	49.8
Sonora	16.8	19.5	22.0	26.6	30.3	36.8	49.5
Tamaulipas	18.6	21.6	23.9	27.9	31.6	38.0	48.9
Hidalgo	15.5	18.1	21.5	27.2	31.8	38.7	48.5
Oaxaca	16.5	19.0	22.4	28.5	34.2	40.4	48.0
Estados Unidos Mexicanos	*16.0*	*18.5*	*21.3*	*26.4*	*30.9*	*38.0*	*47.7*
Nayarit	17.8	20.9	24.7	31.0	34.7	38.2	47.6
Jalisco	17.7	19.8	22.3	27.0	31.4	37.1	47.5
Nuevo León	17.8	21.1	24.2	28.3	32.3	38.0	47.3
México	12.0	14.2	17.1	21.5	26.1	35.4	46.6
Michoacán de Ocampo	16.7	19.6	22.6	28.9	33.7	38.5	46.3
Chihuahua	17.5	19.5	21.4	25.6	28.8	34.2	44.6
Zacatecas	17.1	20.8	23.9	29.9	33.4	37.6	43.5
Baja California	15.4	16.5	17.3	20.3	23.9	31.6	43.2
Guerrero	14.1	16.3	19.3	24.4	28.8	35.4	42.9
Campeche	14.5	16.5	19.0	23.8	28.7	35.0	42.6
Coahuila de Zaragoza	16.7	19.5	21.6	25.3	29.3	34.7	42.3
Puebla	*15.9*	*18.3*	*20.7*	*24.6*	*28.6*	*34.2*	*41.9*
Tlaxcala	16.2	18.5	20.8	23.8	27.4	32.9	41.9
Guanajuato	15.2	17.3	19.4	23.7	27.6	33.0	41.7
Querétaro	12.9	14.3	16.6	20.6	25.0	30.9	41.2
Durango	15.6	19.0	21.7	26.3	30.2	34.5	40.8
Tabasco	11.1	13.5	16.4	21.3	25.1	31.8	39.4
Baja California Sur	13.9	16.2	18.4	21.2	23.6	30.6	38.4
Aguascalientes	14.5	15.6	17.2	20.3	23.9	29.0	37.7
Chiapas	10.7	12.0	14.3	18.1	21.0	24.4	28.7
Quintana Roo	8.1	9.1	10.8	13.8	16.8	22.9	28.7

Sources: INEGI. XI General Census of Population and Housing 1990. INEGI. Population and Housing Count 1995. INEGI. XII General Census of Population and Housing 2000. INEGI. II Population and Housing Count 2005. INEGI. Population and Housing Census 2010. INEGI. Intercensal Survey 2015. INEGI. Population and Housing Census 2020.

When analysing the specific case of the state of Puebla, it becomes evident that the ageing rate has experienced a gradual increase over the decades. While the pace of this increase may vary across different periods, the overall trend is one of steady growth. Compared to other federal entities, Puebla's ageing rate falls within a mid-range. It is neither among the highest nor the lowest, suggesting a relatively balanced demographic pattern within the state.

Population ageing in Puebla, as in other regions, presents both challenges and opportunities for economic, social, and public policy development. This includes the need to adapt healthcare services, social security, and urban infrastructure to meet the specific needs of an ageing population, as well as to harness the potential economic and social contributions of older adults. This development directly involves the education sector as a whole, and in particular, higher education institutions.

The challenges identified in the rationale of the University for Adults proposal are as follows:

1. **Active and Healthy Ageing**: education has been demonstrated to make a substantial contribution to the ageing process in a multidimensional manner. Its benefits include a) **Cognitive benefits**, encompassing both mental stimulation and the prevention of cognitive diseases. b) **Physical benefits**, as participation in university activities involves physical movement, while education also promotes healthy habits and provides better access to information on healthcare, disease prevention, and medical treatments, fostering a more autonomous and longer life. c) **Social benefits**, since interaction facilitates the creation of collaborative and support networks while promoting active participation in society, thereby enhancing a sense of purpose and social connection. d) **Emotional benefits**, as education can improve self-esteem and self-confidence, while also contributing to stress reduction through positive distractions. e) **Economic benefits**, derived from the expansion of employment and professional development opportunities, as well as improving financial management skills, enabling individuals to make more informed financial decisions.
2. **Demand for Continuing Education**: with an ageing population, there is an increasing demand for lifelong learning and continuous education programmes. Older individuals may seek educational opportunities to acquire new skills, remain updated in their professional fields, or explore personal interests.
3. **Adaptation of Curriculum and Teaching Methods**: there is a need to adapt curricula and teaching methodologies to accommodate the needs and preferences of a diverse student body in terms of age and prior experience. This may involve the implementation of flexible programmes, distance education, and more interactive, experience-oriented teaching methods.
4. **Greater Engagement with the Productive and Social Sectors**: while all university education necessitates a constant and in-depth dialogue with these sectors, this need becomes even more pronounced for adults, as a significant portion of this demographic belongs to the economically active population or requires strategies to enter, re-enter the labour market, or contribute to their community in an expedient and functional manner—whether through volunteering, mentorship, or participation in civic activities.
5. **Intergenerational Collaboration**: as the university serves as a space where different generations converge, it is crucial to foster intergenerational collaboration by encouraging interaction between students of different ages. This not only enriches the educational experience but also contributes to a greater understanding and appreciation of diverse generational perspectives.
6. **Research on Ageing and Education**: the ageing population also presents opportunities for research in the fields of education and ageing. The challenge here is to contribute to studies on how education can influence the well-being and quality of life of adults, as well as to explore ways to enhance teaching and learning methodologies.

7. The population is not only ageing but also carries with it certain lingering disadvantages stemming from its circumstances, which, in the educational sphere, are reflected in the following statistics: it has been identified that 82% of the adult population aged 25 to 64 has not attained higher education (OECD, 2019), four million individuals are illiterate, and out of every 100 students who enter basic education, only 27 complete a bachelor's degree. Meanwhile, the higher education coverage rate for young people does not exceed 40%.

III. Second Challenge: Adaptability to the Fourth Industrial Revolution

Also known as Industry 4.0, this phenomenon stems from the increasingly profound integration of digital technologies into both life and work. Its rise can be traced back to the second decade of the 21st century and refers to the current trend of automation and digitalisation in industries through the use of advanced technologies such as artificial intelligence, the Internet of Things, robotics, big data, cloud computing, and additive manufacturing.

This revolution represents a phase of rapid and profound change driven by the convergence of digital and physical technologies, impacting all aspects of human life and redefining economic and social structures on a global scale.

Digital technology brings about transformations in industry, which is increasingly geared towards automation, resulting in a reduction of repetitive and mechanical labour. It also fosters changes in our modes of communication, which have become more immediate and, at times, seemingly monologic and polarising, with a high degree of self-referentiality (particularly on social media). One of its key strengths lies in the use of increasingly precise and real-time data for decision-making.

The digital transition is a challenge that must be boldly confronted. It can shorten distances, but only if accessibility gaps are bridged; it can reduce waiting times and support decisions based on information, but only if transparency and data security are ensured; it can integrate a fragmented world, fostering interdisciplinarity and multiculturalism, but only if it is built upon principles of equality and respect.

Thus, the challenges that higher education faces in addressing this continuous and rapid transformation are numerous and constant, meaning that their resolution cannot be definitive; rather, it requires an alert attitude, one that is willing to correct itself and evolve throughout the process.

1. **Technological Infrastructure**: one of the primary challenges is ensuring access to high-speed internet and appropriate technological devices for all students. While many university students have better access compared to adult education, significant disparities still exist, particularly in rural areas and among low-income students. The solution to this challenge includes expanding the technological infrastructure on university campuses and providing subsidies or loans for devices to ensure that all students can benefit from new technologies. Additionally, it is crucial to invest in robust and scalable learning management systems (LMS) and ensure adequate technical support to facilitate online learning.
2. **Curriculum Development**: keeping academic programmes updated with skills and knowledge relevant to the Fourth Industrial Revolution is essential. This includes the integration of content reflecting the current demands of the labour market, such as

digital literacy, programming, data analysis, and artificial intelligence. Interdisciplinarity is another key consideration, as combining science, technology, engineering, and mathematics (STEM) with the arts and humanities can provide a more comprehensive and relevant education, enabling the development of solutions to complex problems and fostering the ability to engage in dialogue across different disciplines.

3. **Teacher Training**: continuous professional development of faculty is vital to ensure they are skilled in the use of new techniques and innovative teaching methods. Regular updates are especially required in the use of technology and adult learning methodologies.
4. **Accessibility and Equity**: bridging the digital divide between students from different socioeconomic backgrounds is a critical challenge for higher education. Ensuring that programmes are inclusive and accessible to students with disabilities and from diverse cultural backgrounds is also fundamental.
5. **Assessment and Continuous Improvement**: evaluating the impact of new technologies and working methods on student learning and outcomes is crucial for the continuous improvement of educational programmes. Using data analytics tools and continuous feedback allows for adjustments and enhancements, ensuring their effectiveness and relevance. Fostering a culture of continuous innovation in pedagogical practices is also essential.
6. **Adaptability**: recognising the changing needs of the labour market and the demands of the Fourth Industrial Revolution for life and work is a significant challenge. This involves establishing partnerships with the productive and social sectors to respond to the realities of the environment. Additionally, it is crucial to include the development of soft skills, such as critical thinking, creativity, and collaboration, in the curriculum to maintain the flexibility required to face uncertainty.
7. For universities, the intelligent integration of digital technology is more of an ethical responsibility than a technical one. It tests not only our knowledge but, especially, our values.

IV. The University for Adults at BUAP: A Socially Responsible Initiative

In the context of the global scenario, which on one hand projects a demographic shift towards an accelerated ageing population with limited educational attention for the ageing sectors, both in Mexico and the region, and on the other, the fast-paced and demanding digital transformation of the world, one of the major efforts undertaken by BUAP has been the expansion of coverage and the inclusion of diverse social groups. The outcome is reflected in the development of more educational programmes, new regional campuses, and the diversification of learning modalities.

Among these initiatives, the creation and development of the University for Adults stands out. This proposal is driven by the aim of promoting the quality of life for older individuals, so that they can remain engaged in rewarding and productive activities as they age and can face a globalised reality marked by constant technological advancements that continue to transform both the social space and the world of work.

4.1. Background

Since the 1970s, specific initiatives have been created in Europe to address the educational needs of adults, leading not only to the emergence of inclusion programmes but, more

importantly, to the study of the ageing process, raising social awareness of the realities of growing older, the creation of health programmes, the experiences of the life cycle, intergenerational coexistence, and training for older adults.

Subsequently, this initiative sparked the development of educational proposals for adults in various countries, with organisations such as the International Association of Universities of the Third Age emerging, which currently registers over 3,000 programmes. Moreover, many universities worldwide have incorporated policies aimed at addressing the needs of older adults and ageing, focusing on three dimensions: continuous and professional development; specific educational programmes for the care and attention of adults; and the promotion of research and intervention initiatives across various fields of knowledge to enhance their quality of life.

In our country, pioneering efforts were made by the National Autonomous University of Mexico (UNAM) and the Marist University. In recent years, the number of institutions offering proposals in this area has increased, extending the policy to foster a culture of ageing from an early age, in response to the challenges faced by the older adult population.

In this context, the Benemérita Universidad Autónoma de Puebla (BUAP) launched the University Programme for Adults Aged 50 and Over (PUA) in August 2016, as a space designed for individuals over 50 years old to acquire tools and focus on professional, academic, and work-related development goals in a flexible learning environment that encouraged creativity. The proposed interaction environment fostered the cultivation of relationships and the active participation of this population in society.

4.2. The Transformation into UPA

Building on the experience of the PUA and recognising the need to prepare adults for the workforce, the Universidad para Adultos (UPA) was established on 9th January 2020 by the agreement of the Hon. University Council. The aim of the UPA is to broaden opportunities and promote inclusion for individuals aged 25 and above.

The creation of the UPA is the result of research into theories and learning environments tailored for individuals aged 25 and older and arises from the BUAP's open and inclusive vision towards society as a means of addressing two of the major challenges of our time: ageing and education in the context of the Fourth Industrial Revolution.

This initiative represents an opportunity to contribute to providing adult learners with a comprehensive understanding of their societal contributions, as well as the skills to participate continuously in social, economic, cultural, and civic activities. It also promotes an intergenerational perspective for individuals over the age of 25 and encourages the inclusion of active ageing in educational discussions— a key element in fostering future citizenship for sustainable development.

The university is located at Avenida 11 Sur, number 4701, Colonia Reforma Agua Azul, C.P. 72430 in the city of Puebla, Puebla. The building features 16 classrooms, a teacher training room, three computer labs with 54 computers, a library, a multipurpose room, an auditorium, a kitchen, a recording studio, workstations, 14 administrative offices, six cubicles, a teacher workroom, three meeting rooms, a reception area, a cafeteria, and restrooms.

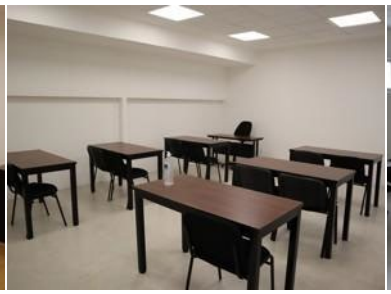
Figure 2.
University Facilities for Adults.

Common area


Auditorium

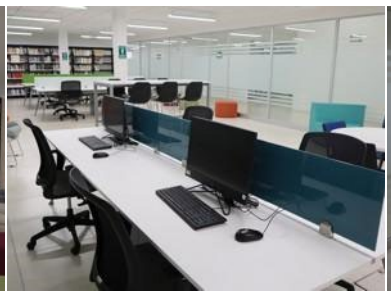

Classroom


Classroom


Classroom


Library


Library


Library


Workstations

Reading Club

Cinema


Kitchen


Cafeteria


Meeting room

Parking

Source: own elaboration.

4.3. Institutional Philosophy of the University for Adults

The UPA focuses on the education of adults over 25 years of age, presenting itself from the outset as an inclusive and equitable space, committed to lifelong learning through the design of formative experiences for life and work. It works on the design of innovative, diverse, and flexible educational environments that support the holistic development of adults, enabling them to adapt to changing contexts both professionally and personally, as well as contribute to society and achieve fulfilment within the framework of their growth, with an active presence in their surroundings.

The UPA, proactively and with a multi-stakeholder approach, opens communication spaces to the university community, external specialists, businesses, and civil society to listen, address, and create collaborative bridges focused on solving the needs of adult learners. Currently, the UPA's offerings include ongoing education courses and workshops, cultural activities, undergraduate degrees, certifications, and training for life and work (UPA 360).

4.4. Lifelong Education

The provision of lifelong learning at UPA dates back to 2016, inheriting the legacy of PUA 50 and Beyond. The courses and workshops typically last around 30 hours; enrolment is available three times a year, and the programmes are offered in hybrid, online, and face-to-face formats. This offering is very reasonably priced, with some options regularly available at no cost. The subjects covered span four areas (also known as constellations), through which it is possible, in some cases, to obtain diplomas, based on participation in courses, workshops, and cultural activities. The areas in which this type of training is offered are:

4.4.1. Human Development and Growth

Focused on improving quality of life and emotional well-being, this area offers courses that assist individuals in better understanding themselves, managing their emotions, enhancing self-esteem, and overcoming life's challenges. It includes mindfulness techniques, yoga, and tools for overcoming grief and healing emotional wounds. The courses also promote a positive attitude and the development of socio-emotional skills.

4.4.2. History and Cultural Heritage

Explore the rich history and heritage of Mexico and the world through courses covering topics from the pre-Hispanic era to the 20th century. With subjects such as the conquest, the revolution, daily life in New Spain, and the history of art and religion, these courses offer an in-depth understanding of cultural and social evolution. Strategies of evangelisation, pre-Hispanic worldviews, and the history of Mayan writing are also examined.

4.4.3. Interdisciplinary Arts, Culture, and Well-being

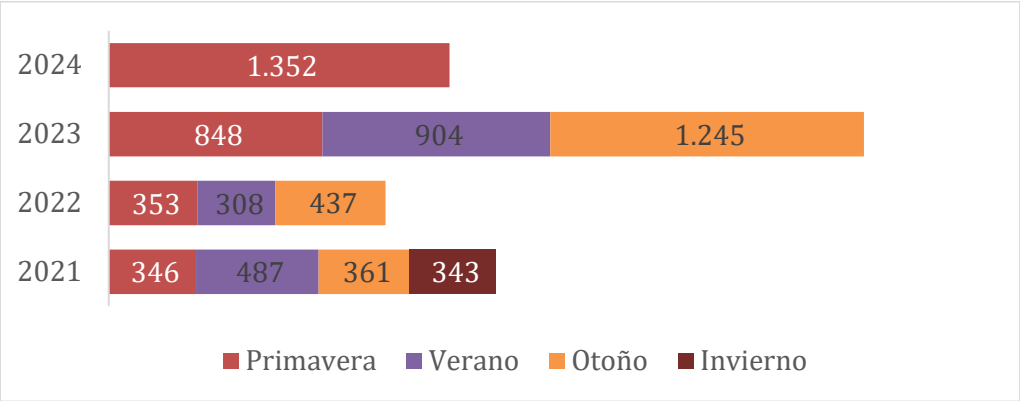
A blend of art, culture, and well-being techniques, this area offers both practical and theoretical courses across a variety of disciplines. From film appreciation and art history to creating home gardens and international cuisine, the courses are designed to enrich life through creative learning and personal development. It also includes physical activities such as Pilates and dance, as well as courses on digital tools.

4.4.4. Health and Quality of Life

Aimed at improving physical and mental health, these courses cover topics such as elderly care, nutrition, phytotherapy, and traditional Mexican medicine. They provide techniques to alleviate pain, stress, and enhance the quality of life through physiotherapy, acupressure, and herbal medicine. Health promotion and disease prevention programmes are also included, as well as physical activities for older adults.

During the pandemic, the courses transitioned to a virtual format, maintaining an average of 380 students per term. The return to in-person learning has led to a sustained growth in enrolment, with a corresponding increase in the range of courses offered, particularly in the face-to-face format, which, in addition to facilitating learning, provides greater opportunities for social interaction (see Graph 2. Students in continuing education courses per term).

Figure 3.
Students in continuing education courses by period.



Source: BUAP, University for Adults (2024).

4.4.5. Cultural Offer

The cultural offer of the UPA includes a film schedule, conferences in fields related to the educational offer, exhibitions, concerts, and course presentations. Participation in these activities is always free and open to the public. Spaces such as the auditorium, cinema, library, and common areas are primarily used for these activities (see Illustration 1. Facilities of the University for Adults).

4.5. Bachelor's Degrees

Following the pandemic and the integration of its lessons, and once the provision of lifelong education had been consolidated, the necessary conditions were in place to design a bachelor's degree offering that addresses the challenges posed by an ageing population and the digitalisation of culture.

The result is an initial proposal consisting of three bachelor's degrees: Information Management, Humanities, and Entrepreneurial Innovation, aimed at individuals aged 25 and over who are unable to engage in full-time university studies.

The **Bachelor's Degree in Information Management** is an interdisciplinary programme designed to train professionals in the identification, management, preservation, and valorisation of information across various formats and functions. It is primarily intended for individuals who are currently employed and wish to professionalise their skills in fields such as museums, libraries, archives, and other organisations that handle large volumes of information with heritage value.

The **Bachelor's Degree in Humanities** is an academic programme that explores culture, art, literature, philosophy, and history from a broad and interdisciplinary perspective. Its objective is to develop professionals capable of analysing and understanding the world from multiple viewpoints, fostering critical thinking and creativity, and enhancing communication skills and abstract reasoning.

Finally, the **Bachelor's Degree in Entrepreneurial Innovation** is designed to train productive adults with a strong focus on creativity and innovation. Graduates acquire the skills to create, develop, and advise on projects that generate value and address challenges within their communities, regions, or nations. The programme emphasises identifying and capitalising on opportunities for continuous improvement in various contexts, ensuring a distinctive focus on innovation that extends beyond traditional business models.

The undergraduate degrees at UPA share the following characteristics, which will also underpin potential new programmes:

4.5.1. Interdisciplinary Approaches

They are designed to integrate knowledge and methodologies from various disciplines, fostering a comprehensive perspective and a broader understanding of the subjects studied. Students learn to approach complex problems from multiple fields of knowledge.

In practice, this has involved leveraging the university's talent to promote collaboration among lecturers from different areas, both academic and administrative. This collaboration extends to tasks such as curriculum design, the development of specific learning units, student monitoring, and research.

The Bachelor's Degree in Information Management adopts an interdisciplinary approach incorporating STEAM elements, combining: the use and management of technological tools for the organisation and preservation of information; contributions from the social sciences and humanities to enhance understanding of the social and cultural context in information management; techniques and strategies for the efficient administration of informational resources; methods and practices for research and information analysis to support decision-making; creativity and the arts: the application of creative approaches to problem-solving and the innovative presentation of information.

The Bachelor's Degree in Humanities is distinguished by an interdisciplinary approach that integrates philosophy, history, language, and the arts, enabling students to attain a systemic understanding of humanity. This approach fosters a critical and creative perspective, equipping graduates with diverse tools to address complex issues. Through a learning process that incorporates both traditional knowledge and contemporary skills, students develop

practical and theoretical competencies that enable them to tackle current challenges in an ethical and effective manner.

The Bachelor's Degree in Entrepreneurial Innovation is characterised by an interdisciplinary approach that combines entrepreneurship and innovation to train professionals capable of designing, developing, and advising on value-creation projects. This comprehensive approach allows students to address problems and needs within their community, region, or country by identifying opportunities for continuous improvement. Graduates can pursue careers in a variety of fields, ranging from the development of initiatives within organisations to the management of family businesses, independent consultancy, social entrepreneurship, and the formulation of innovation policies. The interdisciplinary training ensures that professionals are equipped with technological skills, analytical capabilities, and a proactive and ethical mindset to confront contemporary challenges.

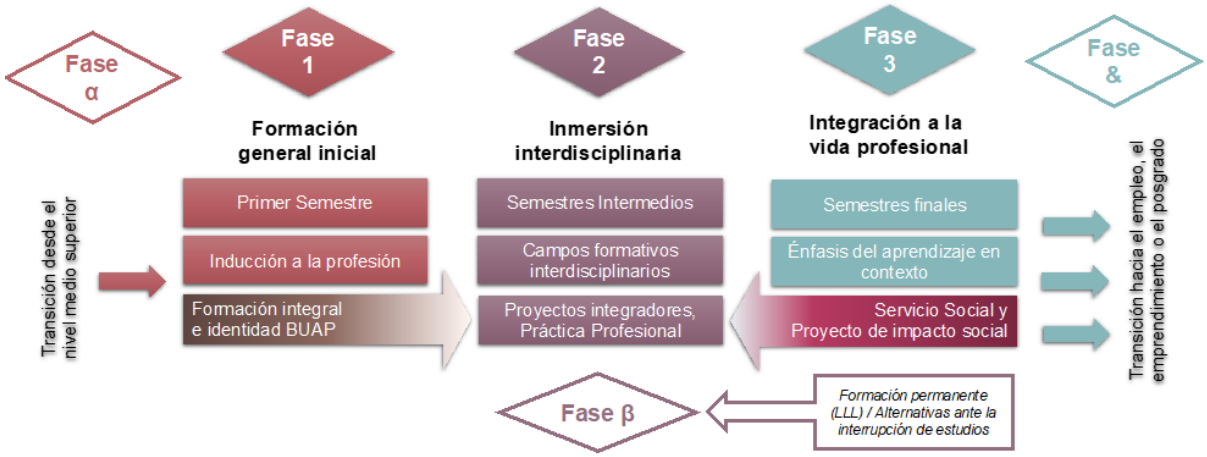
4.5.2. Innovative Curriculum Design

Lifelong learning is not a concept exclusive to individuals; it also applies to organisations. This often entails unlearning methods that were effective in the past, embracing creativity, adapting, and fostering resilience.

In the case of the curriculum design for UPA's programmes, a structure was adopted that differs from content-based programme designs, where stages typically involve increasing levels of content depth and progress from theoretical to practical learning. Instead, the structure establishes a pathway aligned with students' educational trajectories. In other words, the stages of the curriculum are designed to correspond with the phases that adult learners experience when entering university, integrating their academic journey with other aspects of daily life, such as work, family, leisure, and health care.

This curriculum architecture aims to promote the holistic development of students, recognising them as individuals in (trans)formation within their broader personal and social contexts.

Figure 4.
UPA Curriculum Architecture.



Source: own elaboration.

The transition from two levels (basic and formative) to three phases (initial general education, interdisciplinary immersion, and integration into professional life) marks the first step in shifting from disciplinary specialisation (focused on the object of study) to comprehensive student development and future certainty (focused on the learner as a subject).

This results in a reduction of the academic trajectory to three years and transforms our linear, accumulative perspective of knowledge into complex, contextualised learning experiences, necessitating ongoing dialogue with the productive and social sectors.

Moreover, this structure allows the first semester to be dedicated to supporting students in their transition to the university environment. This includes familiarising them with their institution, its history, principles, and support services (university induction); the technology they will use throughout their studies (digital literacy); academic language and forms of expression (academic literacy); their own life processes and tools to integrate this new activity into their daily lives (healthy ageing); and, of course, their specific programme, its scope, trajectory, and contexts (through a subject-specific educational field for each degree).

The new General University Education framework revisits the transversal axes of the Minerva University Model, assigns credit value to learning experiences outside the classroom, and promotes autonomy as a fundamental aspect of adult education. Furthermore, it provides meaning and context to the support offered by the tutoring programme throughout the entire academic journey.

The new structure and organisation encourage collaborative work among faculty members, integrate project-based learning, and foster interdisciplinarity through learning fields that replace traditional single-discipline subjects, which were previously delivered by individual lecturers.

The new Critical Professional Practice incorporates social service and promotes Social Impact Projects. By granting credit value, it enhances its educational nature by integrating into the curriculum through comprehensive projects developed within the practicum framework (from the interdisciplinary immersion phase)[11], making use of relevant learning fields and strengthening the mentoring process for the project that will serve as a graduation requirement. The expectation is that, upon completing the required credits, students will be prepared to sit their professional examination and receive their degree at the graduation ceremony.

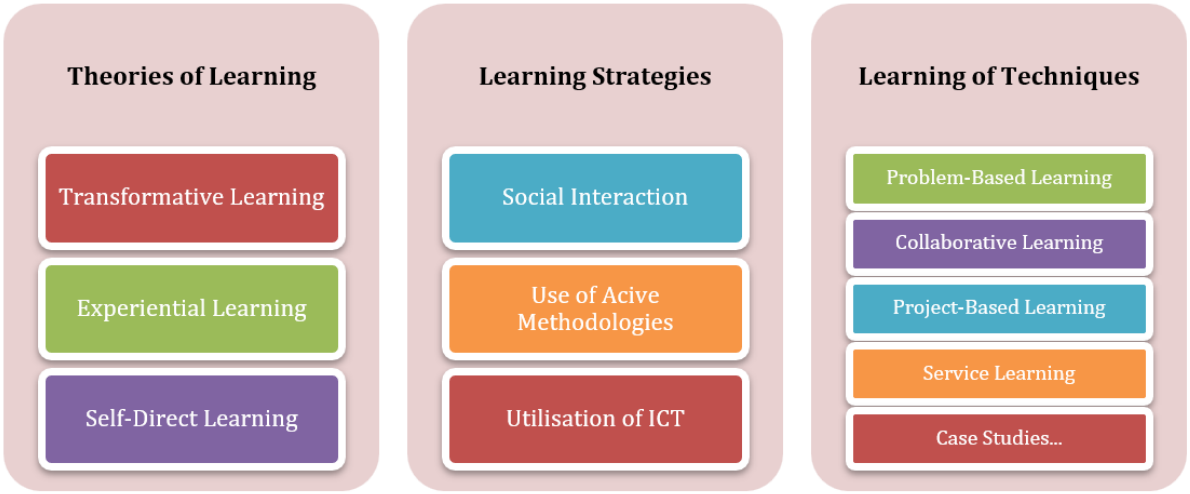
4.5.3. Learning Model for Active Adulthood

The third common characteristic of the undergraduate programmes at UPA is that they are based on a **Learning Model for Active Adulthood (MAA)**, which integrates theories of

[11]The set of transversal subjects shall be referred to, for the purposes of the Minerva University Model, as General University Education (formerly known as the Common University Core). This General University Education shall be offered as subjects under the responsibility of the Academic Units and/or University Support Services for Education. (BUAP, 2007). The MUM is the educational model of BUAP, in effect since 2007. It is based on five interconnected principles, grounded in the theories of humanism and sociocultural constructivism, with the aim of contributing to the social function, which underlies aspects of human rights, university autonomy, and national and regional development. The principles are as follows: Philosophical (critical humanism), Political (social impact), Socioeconomic (lifelong education), Administrative and managerial (respect, recognition, and support for university policies), and Educational-academic (sociocultural constructivism). (BUAP, 2007)

experiential learning, self-directed learning, and transformative learning to foster the creation of learning environments.

Figure 5.
Elements of the Learning Model for Active Adulthood at UPA.



Source: own elaboration.

The MAA is focused on ensuring that students develop their critical and creative thinking, enabling them to direct their educational pursuits towards meeting their needs in an inclusive and sustainable manner. This model acknowledges that acquired knowledge contributes to deep and lifelong learning. Furthermore, it recognises that learning is an innate human ability, occurring within a collective, intergenerational, and inclusive process. Emphasis is placed on caring for others within an accelerated learning environment, adopting a holistic perspective that fosters soft skills, which in turn facilitate the development of more complex competencies.

The model aims to prepare adults for active and healthy ageing in both social and behavioural domains, within a global learning ecosystem encompassing formal, non-formal, and informal education. It integrates individual and collective approaches through various flexible and structured study modalities that support continuous learning and, ultimately, equip individuals as digital citizens.

This last aspect underpins the rationale for the UPA's entire academic offering being designed and delivered in a blended format, incorporating varying degrees of in-person engagement while always leveraging virtual environments. This approach ensures greater flexibility, accommodates diverse learning styles, and enhances inclusivity.

For online learning environments, the institution utilises its available technology (Microsoft Teams), providing the university community with email accounts, office software, and other education-related applications, as well as 100 GB of cloud storage.

4.6. UPA 360: Education for Life and Work

As of 2024, a new training area for life and work has been integrated, offering tailored training and certification programmes for public and private organisations under UPA 360.

This programme distinguishes itself from the competition by adapting to the specific needs of each organisation that requires it, following a continuous framework of improvement. It is backed by the Meritorious Autonomous University of Puebla, an institution with over 400 years of academic experience, and incorporates the innovative andragogical model of the University for Adults. Below are some of its key features:

- **Needs Identification**. A needs assessment is conducted to determine the most relevant competencies for the target group and its specific work environment. The results of this assessment alone enable organisational leaders to make well-informed decisions to enhance their teams.
- **Customisation**. A training offer is designed to suit the individual needs and skill levels of participants, aligning with the organisation's overall objectives and expectations.
- **Participatory Methodology**. This approach encourages active engagement from attendees through practical exercises, case studies, role-playing, and group discussions, ensuring sustained motivation throughout the training process.
- **Contextualisation**. The programme connects intelligent competency concepts with specific workplace situations and challenges that participants may encounter, reinforcing the benefits of continuous professional development.
- **Constructive Feedback**. Constructive feedback is consistently provided, fostering self-assessment and continuous development while strengthening confidence in individual capabilities and supporting team interaction.
- **Practical Application**. It facilitates the practical application of the skills acquired in the workplace, offering resources and tools for effective implementation.
- **Continuous Assessment**. Formative assessments are integrated throughout the workshop to measure progress and make adjustments as necessary.
- **BUAP Quality Assurance**. We are backed by distinguished professionals across all fields, state-of-the-art facilities, and the most innovative methodology to offer the best possible proposition for our clients. Certificates with academic value are awarded to individuals who successfully complete the programme.

V. Conclusions

The University for Adults (UPA) at the Benemérita Universidad Autónoma de Puebla (BUAP) represents an innovative and socially responsible initiative, designed to address the dual challenges of an ageing population and the Fourth Industrial Revolution. This project not only provides an educational solution to the growing demand for continuous training among the adult population, but it also promotes a comprehensive and adaptive approach in its teaching model.

In terms of innovation, the UPA stands out for its ability to integrate adults into a formal educational environment, fostering active and healthy ageing. The institution acknowledges and responds to the need to adapt higher education to meet the needs of a rapidly ageing population. Through its diversified educational offerings, which include undergraduate degrees, certifications, and training programmes, the UPA helps adults to remain mentally

active, physically healthy, socially connected, and economically productive. This multidimensional approach is crucial for enhancing their quality of life and harnessing their potential to contribute to society.

The creativity of the project is evident in the design and implementation of its various educational programmes. The UPA utilises experiential, self-directed, and transformative learning theories, fostering an environment where students can develop critical and creative thinking. This is particularly important in the context of the Fourth Industrial Revolution, where soft skills, such as creativity and critical thinking, are increasingly valued in the labour market.

The adaptability of UPA is another of its main strengths. The university offers a blended learning model that combines face-to-face and virtual learning, providing greater flexibility and accessibility for adult students who may have work and family responsibilities. The implementation of digital technologies in teaching not only facilitates access to knowledge but also prepares students for an increasingly digitalised labour market. Furthermore, the curriculum is continuously updated to reflect the changing demands of the labour market and technological innovations, ensuring that graduates are equipped with the necessary skills to thrive in the modern economy.

Collaboration is a fundamental pillar of UPA's educational model. The university fosters an inclusive and supportive environment where interaction and intergenerational learning are encouraged. This not only enriches the educational experience of students but also contributes to a greater understanding and appreciation of diverse generational perspectives. Collaboration with the productive and social sectors is also key to UPA's success, as it allows educational programmes to align with the real needs of the market and the community, thereby ensuring the relevance and impact of the education provided.

In conclusion, the University for Adults at BUAP is an example of how higher education can innovate and adapt to address contemporary challenges. By integrating creativity, adaptability, and collaboration into its educational model, UPA not only improves the quality of life for older adults but also contributes to the sustainable and equitable development of society as a whole. This holistic and progressive approach ensures that higher education continues to be a driver of positive change in an ever-evolving world.

VI. References

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Chapter 7. Artificial Intelligence and digital literacy for teachers: a view from the European context

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I. Introduction

Media, information, and digital literacy are closely related concepts (Wuyckens et al., 2022). The ability to interact reliably and with certain guarantees regarding a vast amount of content is essential in an era characterised by information overload, misinformation, and the increasing technical capacity for data management and storage.

To a large extent, digital literacy follows the path previously established by media and information literacy. The impact of the press in the 19th century, as well as that of radio and television in the 20th century, profoundly transformed society, and the educational sphere was no exception. Indeed, this field constitutes a key area due to its crucial role in fostering citizenship and democracy, particularly within the context of digitalisation at the beginning of the 21st century.

Although there is an extensive body of literature addressing this subject, there is no unanimous consensus on how to conceptualise digital literacy (see Reddy & Shaudhari, 2020; Tinmaz et al., 2022; García, 2007; or Dobson & Willinsky, 2009, among others). However, what can be clearly established is that, as a concept, it has continuously evolved alongside technological advancements. Attempting to approach it from a broad perspective and considering Paul Glister's early observations in an interview following the publication of his book, digital literacy can be understood as the ability to comprehend information and, more specifically, to evaluate and interpret it, using as a starting point the multiple formats accessible via the Web (Pool, 1997).

This brings forth a central idea: literacy should not only be conceived as the ability to access information but also as the capacity to engage with content under certain guarantees. This remains a pressing and contemporary issue, although its study has a long history and is frequently incorporated into reference frameworks addressing both digital competence in citizenship and teaching, such as DigCompEdu and UNESCO's ICT Competency Framework, among others.

To understand how the evolution of digital literacy has impacted the educational sphere, it is essential to examine how this concept has changed over the past two decades.

II. First-Generation and Second-Generation Digital Literacy

Originally often associated with other forms of "literacy" such as computer literacy and network literacy, the first references to the term in academic literature emerged in the 1990s and early 2000s. During this period, research on this topic was primarily linked to access or the ability to interact with the Web and digital channels (Glister, 1997; Cassany, 2002; Bawden, 2002, among others).

In this context, Glister defines digital literacy as "the ability to understand and use information sources when they are presented through a computer" (Glister, cited by Travieso & Planella, 2008, p. 2). Much like traditional literacy, this concept has evolved alongside the development of digital technologies. Although it initially focused on a basic understanding of technical functionalities, it soon became evident that this level of knowledge was insufficient for effective interaction online. This realisation has driven the continuous transformation of its definition up to the present day.

As various issues such as the digital divide across different countries,[12] the quality of connectivity, and the rise of information overload—closely linked to the emergence of Web 2.0[13]—become more pronounced, a new ecosystem with profound implications takes shape. This environment, described early on by Castells (2001) as "the network society," has a direct impact on how digital literacy is conceptualised.

At present, the term is associated with mastering the key challenges faced by internet users, such as the creation of valuable content, the democratisation of knowledge, and the impact of emerging technologies such as artificial intelligence.[14] This highlights the fact that the concept of digital literacy evolves through distinct stages, as the requirements for interacting with technology continuously demand new competencies.

III. Digital Literacy and Teachers' Digital Competencies

As previously mentioned, the development of teachers' digital competencies always finds a framework to address aspects related to digital literacy. In the European context, DigCompEdu (The European Framework for Digital Competence of Educators) proposes six key areas to address various technological aspects. These areas include different sub-sections (with specific levels of scope and development) that detail specific domains such as data protection, content creation, among others.

The purpose of this document is not to delve deeply into the areas developed in various guiding frameworks—diverse and numerous across different realities—already thoroughly discussed in the works of Martínez et al. (2021) and Padilla et al. (2019). However, it is

[12] Particularly relevant to this topic is the joint study by the Inter-American Institute for Cooperation on Agriculture (IICA), the Inter-American Development Bank (IDB), and Microsoft in 2022, along with the 2023 document *Conectados: Digital Technologies for Inclusion and Growth*, which highlight the ongoing limitations in many countries within the Latin American region to bridge the digital divide and improve internet access conditions.

[13] A concept coined by Tim O'Reilly (2005), it refers to the ability of any user to produce or share content, changing what had until then been the common pattern. Information is no longer shared from a few to many, but now there is the possibility of many-to-many exchange. Social networks later came to give a greater push and ease to this process. It can be consulted at: https://www.oreilly.com/pub/a/web2/archive/what-is-web-20.html

[14] In less than three years, we have witnessed the arrival of various models (GPT-3, GPT-4, etc.), and it is enough to follow the information published by mainstream media to confirm that there is a true race among leading tech companies to develop increasingly efficient and accurate models. The anticipated changes are such that many experts agree on the possibility of drawing a clear picture in this field within two or three years.

necessary to note that many of these frameworks have become outdated at an accelerated pace due to significant technological advancements, particularly evident in the current era marked by the acceleration in the development of machine learning and generative artificial intelligence. Although the reference may still seem somewhat unusual in the educational field, this phenomenon has led to the emergence of tools such as ChatGPT (2022), Bard (2023), and the upcoming launch of META AI. According to experts, it is expected that this dynamic of change will continue to intensify in the coming years, making it even difficult to predict short-term advancements (for example, in just a couple of years).

On the other hand, all these transformations are fully justified. The gap between existing frameworks and the conditions posed by this new scenario, driven by artificial intelligence, is evident in practically all areas related to digitization. This gap is reflected in domains such as content creation, copyright protection, and information verification, to mention just a few relevant examples included in various areas of DigCompEdu.

In this context, it is essential to address these issues from the specific perspective of the educational field, recognizing their impact and scope on educational practice.

IV. The Emergence of Artificial Intelligence and Teachers' Digital Literacy

Building on the previous discussion, it is impossible to advance in this field without analysing the impact of this new landscape on the development of teachers' digital literacy. First and foremost, it is essential to highlight that artificial intelligence (AI) plays a crucial role in democratising information and reducing the gap in access to quality educational resources, particularly in remote areas or regions with limited technological infrastructure. Tools such as ChatGPT and other virtual assistants provide real-time support, answering queries and offering complementary educational resources that enrich the learning process. Research by Montiel & López (2023) underscores the significance of these tools, especially in contexts such as Centros Rurales Agrupados (CRA), where their integration facilitates lesson planning, teaching, and student assessment across different educational levels, allowing educators to adapt to diverse learning needs.

Initiatives such as Khan Lab School have also implemented AI-driven systems targeting other groups of learners. These projects have helped democratise access to advanced educational materials, regardless of students' geographical location, demonstrating that this technology not only benefits educators but also enables learners to engage with these advancements independently.

Returning to the teaching profession, educational chatbots[15] have become valuable allies in lesson preparation. These tools provide didactic resources and pedagogical strategies based on the latest research. When complemented with additional tools such as Research Rabbit or Scispace, they can help identify common patterns and enhance the final outcome (Lugo, 2023). All of this contributes not only to improving educational equity but also to empowering

[15] This reference is particularly interesting when considering that experts such as **Robert Gómez-Reino**, who has held various significant positions at **CERN (European Organization for Nuclear Research)**, stated in a recent article that a true revolution is expected in the near future, driven by **AI agents**. These tools share characteristics with chatbots but can be considered, using a simple approach to the topic, as an **evolution of the same**. See: https://www.elmundo.es/opinion/2024/12/04/674eeb7de4d4d869688b4576.html

teachers with tools that enhance the quality of teaching, helping to reduce gaps caused by economic or contextual factors (Méndez, 2023).

V. Key Aspects of the Relationship Between Digital Literacy and Artificial Intelligence

Artificial intelligence is especially useful for addressing three fundamental aspects of digital literacy: information, communication and collaboration, and content creation. Each of these aspects is explored below.

5.1. Information

AI helps educators assess the quality and veracity of information available online. Information literacy is closely tied to the ability to identify, evaluate, and use information effectively. Tools such as fact-checkers enable educators to verify the authenticity of sources, promoting responsible use of information in the classroom (Nygren et al., 2021; Nygren et al., 2022).

Given that information overload and misinformation are two of the most pressing issues in today's use of the internet (Portugal & Aguaded, 2021), it is crucial that educators—who serve as information multipliers and key figures in the digital education of new generations—have access to reliable tools that ensure rigorous processes for online research and documentation. In this context, AI literacy can be an indispensable ally, as we will see shortly.

While we have extensively discussed the advantages of AI, it is important to remember that its use also poses significant ethical challenges, issues that have been effectively addressed in the specialized literature (see Flores-Vivar & García-Peñalvo, 2023; Paguay et al., 2024; Polanco, 2022, among others).

5.2. Communication and Collaboration

AI-powered platforms facilitate the exchange of ideas, resources, and experiences among educators, fostering a culture of collaboration and continuous learning. To cite a few examples, tools like Edmodo and Kahoot[16] integrate AI functionalities that suggest shared resources and enable both synchronous and asynchronous communication among teachers from different contexts, educational levels, and countries. These AI-enhanced digital communities not only enrich collective knowledge but also promote pedagogical innovation through collaboration.

Other tools, such as Zotero or Slack, although not specific to the educational field, encourage collaborative work by facilitating tasks such as sharing content, working in real-time in a common environment, and managing individual participation. Moreover, it should be noted that this technology operates transversally, enabling even individuals without advanced technical knowledge to engage with new topics or tools.

[16] Many of the features discussed when mentioning various tools in this chapter can only be accessed through a subscription model. Although, to some extent, this may become a limiting factor, it is equally true that there is an expectation of greater democratisation of these features as new ways to monetise innovation are explored.

5.3. Content Creation

Thirdly, AI allows educators to develop interactive and engaging content more efficiently. Applications such as Nearpod and ThingLink use AI algorithms to assist in creating dynamic presentations, helping teachers produce content that is both educational and stimulating for students Simulations and Other Teaching Materials.

AI-driven tools also help create simulations and other teaching materials that capture students' attention and foster active learning. These environments not only save time for educators but also enhance the quality and interactivity of educational materials, adapting to various learning styles.

A key aspect highlighted by the specialized literature is AI's ability to personalise learning through detailed analysis of individual interaction data (Parra, 2022; Mera, 2023; López & Santiago, 2024). This enables content to be adjusted in real-time based on student performance, offering tailored responses based on parameters such as response time and interaction patterns. This capability has a significant impact by reducing the time educators spend preparing materials to meet the diverse needs of the classroom (with a direct impact, for instance, on inclusive education).

It is important to note that content creation is closely tied to personalised learning. This area, one of the most explored in studies on AI and education, is a key factor in understanding the success of these technologies in educational contexts.

5.4. Comparative Experiences and Adaptive Learning

Completing the areas described, it may be interesting to explore international experiences that showcase successful cases where AI and adaptive learning are effectively integrated. A notable example is serious games, where the combination of AI and personalisation generates unique educational pathways. Cisneros et al. (2024) point out that platforms like KNearn or virtual tutoring systems such as Cognii provide responses tailored to specific needs, becoming key examples of AI use in education.

The number of AI-based tools continues to grow exponentially, and by the time you read this document, it is likely that new applications have already been developed. This phenomenon highlights the rapid pace at which AI is transforming the educational landscape.

VI. Digital Intelligence Literacy

Although we have explored in depth the impact of artificial intelligence on the educator's digital literacy, it is crucial to acknowledge that AI literacy is a specific area (distinct and focused) that is still in its early stages (Kalantzis & Cope, 2025). This field, while emerging, is beginning to gain significance due to the rapid integration of AI-based technologies across various sectors, including education (Sperling et al., 2024).

In response to this need, European legislation has early on recognised the importance of AI literacy.[17] Included within the instruments designed to regulate this area, it underscores the

[17] Please refer to Article 4 of the Artificial Intelligence Act (Regulation (EU) 2024/1689).

urgency of democratising access to and use of AI by both institutions and individuals. This legislative approach ensures that, in order to achieve responsible and effective use of AI, investment in the education and training of citizens and professionals is essential. Furthermore, it aims to foster initiatives that ensure the population is prepared to interact with advanced technologies, promoting an equitable and ethical development of AI.

Despite these advancements, the journey towards robust AI literacy is still brief, as previously discussed. While key knowledge areas have been identified, such as the concept of human in the loop, which highlights the importance of maintaining human intervention in automated processes to ensure the quality and relevance of the generated results, there is still much work to be done. This approach emphasises that, while AI can process and analyse large volumes of data, human supervision and judgment remain crucial for accurately interpreting and applying the results (Liu et al., 2022; Pinski & Benlian, 2023, among others).

On the other hand, a current issue is that the specialised literature on AI literacy in Spanish is still limited. It is widely known that research takes time to adapt and observe reality in a solid and secure manner, but in topics where the impact is so pronounced, this delay can be more tangible for educators who can only access information in this language. A large portion of current studies focus on exploring the advantages and disadvantages of AI, as well as understanding its technological foundations, leaving more profound topics, like the one mentioned, for later stages. This exploratory approach reflects that we are still in the early stages of integrating AI effectively and ethically into various contexts.

VII. Challenges in the Development of Teacher Digital Intelligence Literacy

One of the main challenges in promoting artificial intelligence (AI) literacy is the knowledge gap between different educational actors (Olari & Romeike, 2021). Many teachers and education professionals may feel overwhelmed by the complexity of these technologies, making it difficult for them to adopt and use AI effectively in the classroom. Overcoming this barrier requires specific training programmes that not only provide technical knowledge but also address the ethical and social implications of AI in the educational context.

Another significant challenge is the scarcity of resources and suitable educational materials for teaching advanced AI concepts (Sperling et al., 2024). Creating curricula that effectively integrate AI literacy is essential to provide teachers with the necessary tools to incorporate these technologies into their teaching practices. Furthermore, it is crucial that educational institutions have the appropriate technological infrastructure to support these training programmes.

VIII. Potential Benefits of a Strong Artificial Intelligence Literacy

Promoting AI literacy among teachers can be associated with numerous benefits. Firstly, it would enable educators to effectively integrate AI tools into their teaching methods, personalising learning and enhancing the educational experience for students.

Moreover, a deep understanding of AI could facilitate a critical evaluation of the available technologies, ensuring their ethical and responsible use. It would also prepare teachers to lead educational innovation by incorporating new methodologies and technologies that can significantly transform teaching and learning (Ayanwale et al., 2024).

Finally, being well-informed about the capabilities and limitations of AI can allow educators to design pedagogical strategies that maximise the potential of these tools, fostering a more dynamic learning environment that adapts to students' needs (Sperling et al., 2024).

IX. Strategies to Promote Artificial Intelligence Literacy

Considering everything mentioned earlier, a series of comprehensive strategies can be implemented to promote solid AI literacy among teachers, though it is important to prioritize them (some have already been anticipated in this document). These strategies can include the following:

1. **Specific Training Programs**: develop courses and workshops that address both the technical and ethical aspects of AI, tailored to the different levels of knowledge and experience of teachers.
2. **Accessible Educational Resources**: design and distribute educational materials that simplify the understanding of complex AI concepts, including practical guides, tutorials, and case studies applied to the educational context.
3. **Fostering Communities of Practice**: establish collaboration networks among teachers to share experiences, resources, and best practices in using AI in education. These communities can act as spaces for mutual support and continuous learning.
4. **Investment in Technological Infrastructure**: ensure that educational institutions have the tools and technologies necessary to effectively implement AI literacy programs.
5. **Supportive Policies**: develop and implement educational policies that support the integration of AI into teacher training, ensuring a coherent and coordinated approach at the institutional and regional levels.

X. Conclusions

Technological transformation, marked by rapid advancements, presents unprecedented challenges and opportunities in the educational field. While it is impossible to precisely predict the future impact of these changes, we have clear evidence that technology, particularly artificial intelligence, has the potential to significantly improve teaching and learning processes. AI should not simply be considered as another tool, but as a lever capable of profoundly transforming education, making it more personalized, inclusive, and efficient. Its revolutionary impact is already evident in other sectors.

Beyond the well-known challenges associated with its implementation, such as ethical dilemmas, the digital divide, and resistance to change, the focus should be on teacher training. Training educators in the proper use of AI-powered tools not only optimizes their daily work, reduces the time spent on repetitive tasks (which do not add value), and maximizes efficiency in managing workloads, but also indirectly contributes to the development of digital competencies in students. By equipping teachers with the skills needed to handle these technologies, we prepare future generations to thrive in an increasingly digitalized and technologically advanced world.

The challenge is immense but also unavoidable. Reality demands the development of solid knowledge that allows educators to adapt to an ever-changing environment. This requires continuous training programs that go beyond technical skills, fostering resilience, constant

learning, and critical thinking. Designing teacher training curricula that effectively integrate artificial intelligence, addressing both its potentials and limitations, is a crucial step. Moreover, these programs must include a deep analysis of the ethical and social implications of AI, ensuring its responsible and equitable use (minimizing the negative impacts of its integration, which have also been documented).

In addition, the role of not only educational institutions and teachers is fundamental, but also the involvement of policymakers in this framework. The successful implementation of AI in education will largely depend on the ability to provide the necessary resources, from adequate technological infrastructure to accessible digital tools for all teachers, regardless of their socioeconomic context. Creating learning environments that encourage innovation, and experimentation will be key to ensuring that teachers can effectively apply what they have learned in their specific contexts, and all of this largely depends on the support of public policies that address the current challenges.

Moreover, it is essential to prioritize collaboration among all stakeholders. Only through a joint and coordinated effort between educational institutions, governments, and other key actors can an educational ecosystem be built that enables all teachers to develop solid digital competencies. This collaborative approach will ensure that the opportunities offered by AI are maximized, while potential risks are mitigated.

Ultimately, although the technological future remains uncertain, what is clear is the urgency of preparing both teachers and students to adapt and thrive in this dynamic and highly digitalized environment. AI represents an unprecedented opportunity to transform education, making the educational process more equitable, accessible, and efficient. However, its success will depend on our ability to proactively address the challenges it poses and to invest in teacher training as the cornerstone of this transformation.

By laying the foundations for solid digital literacy and artificial intelligence literacy, we are not only responding to the demands of the present but also building a resilient educational system prepared to face the challenges of an ever-evolving world.

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Chapter 8. Active Methodologies in Teaching-Learning Processes

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I. Introduction

Education has undergone transformation and renewal in recent years, adapting to the new demands of society, thus moving towards an inclusive, active, global, and competency-based perspective. Innovation has been regarded as the essential ingredient that drives change. Nowadays, this term is commonly associated with everything related to the digital and information world, but its meaning is much simpler.

According to the basic definition of the concept of innovation, defined as “to change, alter, or modify something by introducing novelties” (RAE, 2023), we might conclude that any modification or improvement inherently involves innovation, which, in the field of education, is often attractive and methodologically engaging. However, it is important to clarify that not every change made in an educational context should be considered an innovative act. As Sein-Echaluce, Fidalgo-Blanco, and Alves (2017) suggest, educational innovation is the practice of an idea that brings about a planned change in teaching and learning processes, as well as in all aspects that contribute to improving educational objectives.

Regardless of the complexity of the innovation to be implemented, there is an imperative responsibility on teachers, as they are the ones who must ensure its practice. Therefore, basic training in research and teaching innovation competencies is necessary, as it is crucial for developing practical skills and enhancing the ability to adapt to changes (Gómez, 2023). In the same way, students must adapt to innovation and engage in their learning process, committing themselves with a proactive attitude towards these challenges. For this reason, we can assert that educational innovation is a task closely shared between teachers and students.

We understand learning as a social event, not an isolated one, where students must develop competencies, and, in turn, teachers must be aware of the training required for students to acquire new skills. This will involve the use of new methodologies and innovative practices, that is, a form of personalisation of teaching.

According to Carbonell (2015), educational innovation should be understood as a series of interventions, decisions, and processes, with a certain degree of intentionality and

systematisation, aimed at modifying attitudes, ideas, cultures, content, models, and pedagogical practices. At the same time, it seeks to introduce new projects and programmes, curricular materials, teaching and learning strategies, didactic models, and alternative ways of organising and managing the curriculum, the institution, and classroom dynamics, all within a framework of renewal.

II. The Importance of Methodology in the Teaching-Learning Process

Starting from a simpler definition, De Miguel (2006) states that teaching methodologies are the way in which each teacher acts to carry out their teaching duties. Authors such as Cid-Sabucedo et al., (2009) highlight a series of characteristics that teaching methodologies must meet:

- Promote the progress and advancement of knowledge.
- Improve the teaching and learning process itself.
- Extend beyond the school context.
- Should be based on experiences.

Delgado-Cobeña et al. (2023) refine this definition by stating that the way each teacher acts integrates a set of techniques, instruments, and resources.

The teaching method has evolved throughout history, and innovation has increased in recent years with the advent of new technologies in the educational field. We must not forget that today we live immersed in what is known as the Information and Knowledge Society (IKS), in which technology has influenced all aspects of our lives, thus changing the way we communicate, study, and interact (Pescador, 2014), opening new paths for research and, consequently, for innovation in education (Morales, 2010).

This new society in which we live requires a modification of teaching methods and necessitates that teachers adapt to the new circumstances that arise in order to provide appropriate, proportionate, and effective responses to the educational needs of students (Gómez, 2023). As Robinson (2011) pointed out, the major issue with the current education system is that it was conceived for a different era, with economic circumstances that are not comparable to the present ones, which results in a system that does not align with the real needs and characteristics of today's students.

Not only do times change, but so does the student body. In today's classrooms, we face a complex situation: children born and raised in the digital era, or "digital natives" (Prensky, 2001), are being taught by teachers who are "digital immigrants," or those born before the digital age. This situation constitutes one of the greatest challenges in modern education, as we are dealing with a generation that is fully familiar with ICT, learns at a different pace, and is influenced by different stimuli, all while being taught by educators who "are struggling to teach a population that speaks an entirely new language" (Prensky, 2012, p. 69). Therefore, today's learners cannot learn as the young people of previous generations did, which will require a necessary adaptation of teaching methods that enable students to develop all their potentialities, considering the following characteristics of digital natives (Prensky, 2001):

- A strong interest in receiving information instantly and at an increasingly faster pace.
- A preference for multitasking.

- A tendency to favour information conveyed through images rather than text.
- Enhanced performance when using resources and tools available on the internet.
- The ability to track their progress instantly with greater feedback.
- Increased motivation from the ability to receive immediate rewards.
- A greater preference for playful methodologies over traditional ones.

III. Active Methodologies as an Innovative Strategy

When we talk about innovation, we can either refer to the creation of new tools or applications, or to innovating through already existing tools (Carbonell, 2015); in the latter case, we would be referring to the renewal or improvement of more traditional educational practices (Gómez, 2023).

As a complement to the above, Salinas (2004) adds that innovation should be perceived as a process through which a new idea, practice, method, or tool is introduced, having previously undergone a process of selection, organisation, and ultimately implementation, with the aim of addressing pre-established objectives. Salinas (2004) states that change will occur as long as it follows a process that has been planned by competent educational agents, stemming from prior deliberation, being systematic, that is, aligning with a set of norms, and having a clear intention or purpose, in this case, educational.

Research in education will involve the discovery of new educational methodologies, teaching models, and formative viewpoints, which will translate into real innovation in practice (Sáez, 2012). Innovation is always understood as the educational action that puts into practice novel actions or elements, taking into account the context and reality in which it develops, positively modifying it and offering individualized attention to the needs of students, while providing them with integral education (Imbernón, 2024).

When we talk about innovative educational methodology, we refer to the option proposed in the 1980s by Barrows (1986, in Servicio de Innovación Educativa, 2008), an approach centred on the student through a real concretisation of meaningful learning via an inquiry-based approach.

Labrador and Andreu (2008) define active methodologies as "those methods, techniques, and strategies used by the teacher to transform the teaching process into activities that encourage active student participation and lead to learning" (p. 5). Talking about teaching based on active methodologies means referring to a student-centred teaching model. One of the key elements underpinning this is that the strategies within active methodologies view the learning process as a constructive, rather than receptive, development (Arregui, 2017). Another element that supports the use of active methodologies is self-directed learning, based on the development of metacognitive skills, which lead students to understand how to use alternative strategies for understanding materials, solving problems, and evaluating their progress in acquiring knowledge (Arregui, 2017).

Next, and following Curipoma et al. (2023), we present a series of active methodologies that may be of interest when carrying out a teaching intervention.

1. Flipped Classroom, or inverted classroom – In this approach, students are required to work on the lesson at home for the following day, through reading texts or watching explanatory videos from the teacher on the topic to be covered. Once in the classroom,

doubts are addressed, and activities are carried out to consolidate and integrate the concepts.

2. Participatory lecture – This involves an organised and structured oral presentation designed to facilitate students' acquisition of knowledge. The presentation requires active engagement and feedback from students through questions about concepts or examples to assess whether they have understood the information clearly. In the case of online teaching, this will be carried out via video call with the students.

3. Dialogic discussion – A group participation strategy in which the entire group works together to construct meaning related to the topic being addressed. It is particularly useful in conflict resolution to understand the different viewpoints of individuals on a particular issue. This strategy can be used in any teaching modality.

4. Case study or case method: This approach integrates theory and practice, fostering critical thinking and improving problem-solving skills in students. The student faces potential real-life situations that bring them closer to their immediate environment, for which they must provide viable solutions.

5. Challenge-based learning: This is a pedagogical approach that actively involves the student in a real, relevant, and contextually linked problem situation. It requires the definition of a challenge and the implementation of a solution. A challenge is an activity, task, or situation that provides the student with both a stimulus and a challenge to be carried out.

6. Cooperative learning: It enhances the learning of content, both the specific curriculum material and those related to values such as solidarity, mutual assistance, and respect for differences. Additionally, it encourages participation in various teaching activities, with the student being the protagonist of the entire process. It creates an ideal environment for interaction, establishing quality relationships between students.

7. Collaborative learning: From a constructivist approach that views education as a socio-constructive process, allowing students to explore different perspectives to address a particular problem, students develop their own learning strategies, set their own goals, and take responsibility for what and how they learn. The teacher’s role is to support the student’s decisions.

8. Learning landscapes: A visual representation of information, aimed at enhancing effective teaching and learning processes based on the use of games—specifically, video games—that promote cohesion, integration, motivation for content, and the creativity of individuals.

9. Gamification: It motivates students by having them solve a series of challenges or activities using game mechanics, integrating game dynamics into the classroom in non-playful environments. The aim is to learn, enhance concentration, effort, and other positive values common to games. Game-based activities physiologically stimulate the production of several neurotransmitters, such as endorphins, which promote well-being and help consolidate the concepts acquired.

10. Simulation and play: It provides students with a framework to learn interactively through a lived experience. In this way, they face situations they may not be prepared to handle in real life, express their feelings about learning, and experiment with new ideas and procedures.

11. Learning contract: Between two or more parties, it is increasingly common for teachers to establish contracts with their students to achieve learning goals through a proposal for autonomous work.

12. Visual thinking: A tool that involves expressing and manipulating ideas through simple and easily recognisable drawings, creating connections via mind maps with the aim of better understanding them, defining objectives, identifying problems, discovering solutions, simulating processes, and generating new ideas.

13. Service-learning: An educational approach that combines learning processes with community service in a well-structured project. Participants learn by working on real needs within their environment, with the aim of improving it. Ultimately, service-learning is a method that combines social commitment with the acquisition of knowledge, skills, attitudes, and values. It is about learning to be competent while being useful to others.

14. Problem-based learning: A pedagogical strategy in which a problem is presented to students, who then begin a process of investigation to find possible solutions. Morales Bueno (2004) describes PBL as a methodology where small groups work collaboratively to solve a problem posed by the teacher, triggering self-directed learning by the students, with the teacher taking on the role of facilitator of learning.

15. Project-based learning: A set of learning tasks based on solving questions and/or problems that requires the student to design and plan their learning, decision-making, and research processes. This provides the opportunity to work relatively autonomously for most of the time and culminates in the creation of a final product that is presented to others (Curipoma et al., 2023).

IV. The role of the teacher in active methodologies

Although teachers are aware of numerous active methodologies, it is their responsibility to implement them. Therefore, practical action is required to consolidate the theory. An innovation process involves change, not only in the resources and strategies to be used but also in a restructuring of the teacher's competencies (Imbernón, 2024).

The fundamental principle of competence proposed by UNESCO in relation to the teacher's profile is based on the four pillars of Education: knowledge, personal attributes, coexistence, and performance (Delors, 1996).

Some authors who have approached this conceptualisation of competence distinguish between:

- Know – A set of knowledge that enables the achievement of competence.

- Know-how – A set of techniques, strategies, tools, procedures, and ultimately, the application skills necessary to achieve competence.

- Know-being – Attitudes aligned with norms, rules, values, or social, scientific, or personal paradigms that are essential to achieving competence (Vélez et al., 2024).

In addition to these, reference is made to:

- Wanting to do and being able to do (Vélez et al., 2024), where aptitudes and the willingness to do something are contrasted with the feasibility or accessibility of actually doing it.
- Emodiscience (Mellado, 2012), where the teacher engages with students in daily activities while adopting an empathetic role. This involves the role of emotions in social skills, as in order to manage others, one must first be able to manage oneself.
- Knowing to know and knowing to unlearn, both referring to the constant adjustment in the construction of knowledge, often at the expense of what has already been acquired (Vega et al., 2023).
- Knowing how to transfer in the educational context, which could be reflected in service learning, where the importance lies not in the action itself but in the transmission and retention of that knowledge (Mendoza et al., 2023).

Every good teacher must consider these competencies of knowing, without neglecting their role as a leader, in order to successfully achieve the objectives set with the group, as well as effectively manage classroom coexistence.

The teacher acts as a facilitator and mediator of learning; however, not all teachers engage in innovation with the same level of involvement. According to the degree of involvement, Tejada (1995) distinguishes three types of teachers:

- Executor – Makes use of ICT as instructed by experts, as if following a manual, and does not incorporate any modifications to adapt to the needs of their class group.
- Implementer – Relies on experts, as in the case of the executor, but is capable of adjusting the methodology to the context.
- Curricular agent – A fully active agent in teaching innovation, taking into account expert information but acting with a high level of autonomy in the design and redefinition of materials and tools to adapt them to the context.

Ideally, all teachers should be curricular agents, not only using innovative tools but also integrating them into the teaching process. Therefore, to implement these active methodologies, it is not enough to simply bring them into the classroom; a series of steps must be followed to ensure that learning takes place as planned and that students develop the necessary competencies.

The following table outlines the functions that teachers need to follow in order to implement any of the active methodologies.

Table 1.
Teacher's Functions for the Development of Active Methodology.

Functions	Description
Coordination between involved teachers	It would only be necessary in the case of conducting interdisciplinary or inter-school projects.
Selection of content	Analyse which content from the different subjects aligns best with the project to be carried out.
Selection of methodology	Once the content is established, the teacher, or teachers if applicable, will analyse and choose the methodology that best fits the project.
Preparation and selection of resources	Forecasting and preparation of the necessary resources.
Training of students	Certain methodologies, especially if they have not been used before, will require prior training so that students are familiar with the dynamics.
Implementation and coordination of students	Implementation of the methodology in a collaborative manner. Greater coordination among students will be required if it is a project involving multiple year groups from the same school or other schools.
Dissemination and presentation	It is one of the most important phases. On one hand, students will work with greater motivation if they know their work will have an impact, be presented, and valued. On the other hand, dissemination can be beneficial to other schools that are just starting to implement this methodology.
Evaluation	Evaluate the entire process, not just the result. Evaluation will help introduce improvements in future projects.

Source: own elaboration.

To conclude this section, it is important to emphasise that the drive to learn and implement new educational methods and techniques should not be a temporary endeavour but rather an ongoing aspect of teachers' daily work. As Carbonell (2015) states, "the role of the teacher is to create the conditions for fostering a smooth and meaningful relationship with knowledge through the fullest development of the students' potential" (p. 12). In other words, starting from the group's inherent characteristics, investigating which methods and styles best align with the needs and interests of the students, in order to provide quality teaching that results in comprehensive learning.

V. Challenges and obstacles in the use of active methodologies.

Despite the significant advances in innovation and technology, our educational system is still, at times, anchored in structures, processes, and methodologies inherited from previous decades. Therefore, we can present a series of current challenges and obstacles we must face.

First, the limited training of teachers in the implementation of active methodologies. This requires innovations in the curricular content by teachers, aimed at equipping students for entrepreneurship and promoting autonomy in both professional and social aspects.

Secondly, the lack of time available to teachers for professional development and adapting their lessons to this new methodology must be considered.

Thirdly, we face the rigidity and lack of flexibility when it comes to accepting new changes, creating a barrier before even beginning to investigate how to implement active methodologies in the classroom.

On the other hand, there is the challenge of individualized attention to students or personalized learning, providing more pertinent support to those who need it most.

VI. Conclusions

To conclude this chapter, it would be interesting to formalise various future lines of research for the achievement and development of the subject..

I. To assess the suitability of applying active methodologies both in theoretical sessions and practical ones.

II. To implement training offerings based on active methodologies for the initial teacher training.

III. To conduct a quasi-experimental study to evaluate the results obtained with one group of students who receive classes through traditional methodologies and another group in which more active methods are used. The results would be compared, along with aspects such as motivation, attention to diversity, teamwork, meaningful learning, academic results, engagement, among others.

IV. Another line of research could arise from studying, by locality or province, which innovative methodologies teachers have used to achieve better results in the aspects mentioned above. This study would help teachers in choosing methodologies, as they could select one or another based on the objectives they wish to achieve.

We would like to highlight the words of Marchesi, Palacios, and Coll (2017): "In this period of life, we are faced with a nervous system in formation, a psyche under construction, and a personality being developed." Therefore, we must continue in this direction to embrace new changes and look towards progress, innovating with active methodologies and using resources and tools different from those used in traditional methodologies. In this way, we can contribute to shaping happy individuals, prepared for the future, capable of working in teams, motivated, and engaged in their tasks, always starting from each individual's zone of proximal development.

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Chapter 9. I think and feel, therefore I am. Emotional Education prevents Early Scholar Abandonment

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I. Introduction

One day, in class of the subject Philosophy of the History, a teacher addressed the correlation between reason and individual's feelings matter, her intention was that the students assimilate that human's behaviour is influenced by both aspects and that individual's humanity depends to a large scale on a decision making based on using reason and feelings in a balanced way. She reached her goal with solvency, for that she used an example, she said to imagine this: A married couple goes to the doctor to know the results of tests conducted on their daughter, the diagnosis could not be worse, the girl has a life expectancy of 3 days due to a grave illness. Casually, the girl's birthday was the next day, father and mother prepared everything with much care. They set the cake and the moment of opening the presents arrives, the girl gets ready to open her father's present and when she uncovers it, to their surprise it was a coffin. The father chose the most useful thing because his daughter was going to die in two days, he took this decision only applying reason, he forgot feelings, in anyone's eyes and with rightness, it would look like the attitude of a person that is not in their right mind, therefore, we should understand that to make correct and human decisions we should give reason and feelings the same importance. The question that we make is, could the scholar abandonment in our country be related to the fact of no developing a comprehensive education that includes emotions?

Historically the educational system has put his attention essentially on promoting students' cognitive capacity, turning his back to emotional learning. The reason behind this comes from an old paradigm extended through time that relates emotions with an animal sense of humans, so that if a completely rational study was promoted we would be building our humanity. However, how comment Santander et al., (2020) the human being is composed besides intelligence, of emotions and personality, this means that, to be able to develop a comprehensive learning, without forgetting the cognitive part, the educational system needs to incorporate the emotional and attitudinal aspects of the context that involves students. In this sense, the Spanish Constitution brings light to the matter in its 27.2 article, in which it

explains that education should thoroughly develop individuals' personality (*BOE-A-1978-31229 Constitución Española.*, 1978).

Nevertheless, the Spanish educational system is in a worrying situation as the high scholar failure rate in Spain shows. And following Tarabini (2020) a student does not take the decision of abandoning school without a reason and does not abandon school overnight, it is really a phenomenon that happens because of a dysfunctional academic passing on time, referred to multiple causes that encompass the scholar level, but also the social and the individual. In this sense, Rosado & Cáceres (2018) show how one of these aspects is the one referred to the investment that the State make in the educational system and that would explain in a way the difference between the number of early abandonments in education in Spain and in the Europe Union, as well as the autonomous community of the national territory. There are different risk factors that predict the early scholar abandonment, between them we can highlight: the fact that the students believe they cannot reach high professional levels like Choi & Calero (2013) say, they also think they would not be able to improve their academic marks just like (*CIDOB - Abandono escolar prematuro y alumnado de origen extranjero en España*, s. f.) defends. When the students miss class, because a really pronounced absenteeism complicates maintaining the academic level of their classmates, as well as, the fact that the students are not motivated inside the class, this can be due to the methodology that is used by the teachers or the scarce utility demonstrated of the contents taught, just how García & Razeto (2019) shows, or even physical and mental health problems, because if there is something needed to face any task prolonged in time, is to have a healthy mind in a healthy body, like the roman writer Junio Juvenal says "*mens sana in corpore sano*" (Sánchez & Pedreño, 2019). In this regard, we also count on predictive factors of the scholar abandonment like Soler et al., (2021) points out, such as: labelling the students depending on their good or bad academic results as good or bad students, it also does not help with scholar abandonment if a healthy relationship between teachers and students is not established, between equals or the existence of a violent scholar environment. Also, the predictive factors act as a vicious circle that feeds back itself, since all the factors indicated previously influence in teachers' stress that keeps growing as the factors mentioned previously worsen. This promotes low quality in teacher's teaching, a bidirectional effect that increases the scholar failure flame.

Moreover, we have to point out the predictive factors of scholar failure inside the family context Soler et al., (2021) such as: belonging to a dysfunctional family, the presence of a negative attachment between parents and children, or even the economic resources shortage needed to support students' learning, keeping in mind that the students are aware of the socio economic circumstances of their family and in purpose of that of the possibilities of personal development. On a social level, predictive factors of early educational abandonment are the shortage of support offered by social institutions, the different conceptions had in a cultural level of education itself, since not all societies give it the same value, and a violent and continued social environment that surrounds students in their neighbourhood. A circumstance that happens commonly in marginal neighbourhoods in the city, where a lot of young people are absorbed by delinquency in their surroundings, they find themselves in some kind of bubble from where they cannot get out, so that if they want to continue with their education, they feel that they are rowing in the opposite direction.

Between all the things mentioned previously, a common aspect is identified, and it is that early abandonment of education is closely related to the emotional part. So that making an analysis

of the impact of emotional education in scholar efficiency would help to make teachers aware of the necessity of their training in this area and of their commitment with the transversal development of emotional intelligence in the subject they teach, causing a positive contagious effect in all educational agents about the importance of it, that will allow to develop programs and workshops in a centre level of emotional education, promoting a better atmosphere of the scholar context, a decrease of teachers' work stress, the affinity of the students that now feel a positive bond with their school, and the improvement of the students on the academic part in a marks and behaviour level. Therefore, it is thought that school should not only develop students' capacities and abilities, but also their identities, since only in this way we will be able to develop a comprehensive learning.

II. The concept of personality

As Gallardo (2021) reflects, personality can be built from a formative intervention inside an interpersonal relations' framework, having said that, personality will develop through the student's life. In the first years of life, individuals are inside the first socialising agent, family, the bond is very close, and their beliefs are determined by their familiar mentor. However, when they grow up these mentors change and the beliefs of the group of equals start to grow more relevant in their development, that is, their classmates, it cannot be forgotten the growing influence of media, mainly because of the well-known influencer, youtuber or tiktoker, who they imitate at times. But, leaving the influence exercises in the said one by the social, scholar and family context behind, they will have a life experience different from other people that will give them continued and dynamic social information, that will transform their beliefs and social values, so their personal development is in a process of continuing building and modification.

III. Differences between ability, skill, intelligence and emotional competence

Before getting to know what emotional intelligence refers to, it is necessary to distinguish concepts like ability, skill, intelligence and emotional competence how Alzina & Rebolledo (2021) include, since if they are not distinguished unwanted confusions can happen. Ability concept is related with that innate trait, that is, aptitudes that that individual has from the moment of birth, however, this does not mean that you cannot learn inside a regulated or not regulated learning process. On the other hand, ability is based on the skill that a person has to do any action obtaining a positive result and continued in time, that is, that happens on more occasions with a similar result, one ability could be to distinguish between flavours or distinguish various smells like sommeliers do, or to hold the breath under water just how apnoea athletes do. Regarding intelligence, it is understood as a series of capacities with which the individual might have been born or might have learnt through time, influenced by the context in which is involved in a socio-cultural way, which makes easier the adaptation and development inside society for the individual, acquiring a little autonomy for solving any sudden problem. The last concept, the emotional competence does not appear since birth, that is, it is not innate, on the contrary, it must be acquired by learning. When the individual has developed their emotional competence, it means that they have those knowledge, abilities, skills and attitudes that lets them express their feelings and control their emotions, this will lead to them integrating appropriately inside the scholar and social context, because they will substantially improve their way of interacting with other people.

In this sense, we can question ourselves what is more correct if we talk about emotional competences or emotional intelligence, to which some researchers of the area have given a solution. For his part, Salovey, Mayer and Brackett understand that an individual can learn to manifest and control their emotions, for another part, authors like Bar-On, Petrides and Furnham point out that emotional intelligence is not unstable, and it is linked to people's characteristics, how it is mentioned previously they have them since birth, so they are innate. In any case, what it is clear according to Alzina & Rebolledo (2021) is that feelings can be educated, the individual can learn to identify, manifest and regulate the emotions, just like acquiring that information, abilities, skills and attitudes that are interconnected with intra and interpersonal feelings. So, we reach a conclusion, emotional competence is a wider concept. Once we have differentiated between different terminologies it can be clarified that emotional education intends to promote different emotional competences that will help students to acquire indispensable knowledge to identify, compare and regulate their feelings and to learn those emotional abilities and attitudes that will allow an appropriate development of their interpersonal relationships.

IV. Emotional education

Different researchers have resolved that feelings can be identified and located at any evolutionary stage of the life of a person, because they are essentially social beings. When it is referred to the necessity of learning emotional competences, it is pointed out that the students have to build the image that they have of themselves, that is, their self-concept, and the value that they give to it, that is, their self-esteem, so that if they are able to build a positive picture of themselves, they will have more confidence when they face any vital experience. All of this will make them think they really have control over the different experimental situations that come their way, this will facilitate the development of an appropriate behaviour with everything that surrounds them, building healthy interpersonal relationships, just as Gallardo (2021) shows. Keeping in mind all these personal benefits, we have to highlight the importance of emotional intelligence's development in the educational system and make all the agents involved in education aware, from politics, directors, heads of studies, secretaries, teachers, staff, students and legal tutors. But to teach emotional competences through experiential and significative learning, a kind of learning that is not forgotten and is interiorised by the students, teachers should accept that their purpose is not based only on a cognitive part teaching, they also have to promote the improvement of their students' emotional intelligence. Because just how Gallardo (2021) reflects, a lot of studies have confirmed that academic success can be understood just as obtaining high marks of conceptual contents that are closely related to the students' cognitive part, it is also associated to the cultivation of emotions inside the class, because these have an effect on the improvement of scholar coexistence and at the same time of the academic efficiency. In this sense, to understand what academic success refers to, it would be necessary to ask ourselves if the students that are not capable of regulating their feelings of sadness before any situation that promotes it, will obtain the same mark than the one who is capable of overcoming unfavourable situations that generate sadness and regulate that feeling understanding that it is not negative and even they can learn from it.

What is known as emotional education is related to the concept of emotional intelligence, because human beings have the necessity to learn how to manage their own emotions, since they affect their interpersonal and intrapersonal relationships. A concept that the writers began to popularise since 1990 thanks to the transformation of social mentality predicted by the

experimented revolution by ten in the socioemotional cognition area, influencing the education and psychology area according to Bisquerra (2022). The concept of emotional education can be found for the first time following González et al., (2019) in the *Journal of Emotional Education* in 1996, published 7 years later by the *Instituto de Psicología Aplicada en Terapia Racional Emotiva Conductual (TREC),* with other words, it can be understood also as a kind of cognitive-behavioural psychotherapy developed by the American psychologist Albert Ellis since 1850. Therapy understands that emotional problems are caused by cognition, feelings and actions, corroborating what the Greek philosopher already mentioned of the Stoic school from I to II centuries A.D. Epicteto when he made an allusion saying that the individuals are not disturbed by the fact, but because of what they think about them (Bisquerra, 2022). So that, following this Greek author, when an individual is emotionally disturbed is due to the interpretations that they make about their specific life experience, therefore, every person's goal is to question themselves about their own opinions about the incidents experienced, a lot of these being non-rational and changing them for other opinions that are rational and more adjusted to reality. The concept of emotional education for Bisquerra (2022) is not recent, its origin dates back to ancient times, fundamentally to the classic world, where it was considered that the Greek students' feelings were the main part of the educational system, a consideration that persisted in contemporary and later cultures.

As we have mentioned, the concept of emotional education has been developing since the past century (Vygotski, 1998), however, researchers in their empiric works collect more actual systematic definitions. In this sense, Cornejo (2018) suggests that teachers' work is tightly related to feelings, since the teaching-learning process is built thanks to the different emotional exchanges, being that the key to be able to carry out an actual significant learning. In the educational process, emotional abilities have an important role, since they facilitate the confrontation of spontaneous and unexpected experiences in an appropriate and effective way. Without this condition they will not be able to do their academic work, even in moments when they have teachers' support inside the class, neither in their homes with their parents' support and even less in an autonomous way. Regarding this, the study made by OECD about (*Habilidades para el progreso social*, s. f.) those socioemotional abilities required to make a progress in society, it defends that feelings characterise people and they allow them to reach an optimal health and well-being state, and success in the economical area thanks to the improvement of productivity, moreover these can be measured and modified according to the ambient context. A definition from which Goldberg sets off in his work about The Personality, Seligman in his Positive Psychology, Goleman with his work Emotional Intelligence and in those programs developed to learn how to manage emotions socially in the United States since the 90s, who were possible thanks to the economic support that the different institutions made. For his part, Bisquerra & López (2021) suggest that people's feelings are only complex states in which the organism is found on due to changes made or the adrenaline that it produces in a natural way the action itself, therefore, what it is intended to highlight is that emotions produce specific behaviours.

If there is anything more important in people's life is their emotions, since without them they cannot develop personality, just how Buitrago & Molina (2021) affirm. Likewise, feelings are linked to elements that can be impartial as well as relatives, since in some way they are related to the immune system, with people's hormones and their own neuronal structure, moreover, they nourish from the experiences lived that allow a continued learning. Along the same lines, the concept of emotional characteristic refers to the feelings that are established in function of

the genotype, which is known as the biological systems that promote a determined reaction in individuals, just as sociotype, closely linked to a series of structures linked to interpersonal coexistence. Each person's specific characteristics influence the emotional answers they produce, since it generates a repeated tendency of behaviour that extends through time, that, at the same time, generates changes in the person's temporary sentimental states. An individual will be able to adapt better to its social context if they manage to develop their emotional intelligence, which would allow them to be resilient with those difficult and unexpected situations that arise every day. It is a key concept for the achievement of its success in its education.

Every person builds their emotional structure, a kind of unique framework composed by those basic feelings that they experience, therefore, they can be considered innate, the person has born with them, so it is understood that these can not be modified by external circumstances of the person, among all of them it can be highlighted feelings of surprise, rage, happiness, fear or disgust, all of them being, according to Estevan et al., (2019), essential to accomplish a healthy lifestyle. But not only the human being is composed of primary emotions, but secondary feelings also exist, they encompass the individual's moral and their social relationships, the individual is conscious of them at all time, among them it can be pointed out feelings like embarrassment, jealousy, guilt or pride. In this case, these emotions are influenced by sociocultural rules, and they are linked to the goals that each human being has. People throughout their lives keep learning to manage their feelings and for that the educational system is an angular piece that allows students to jump into quality for their emotional intelligence development. Following up, we will analyse Salovey and Mayer's emotional intelligence model, relating emotional education with student's academic efficiency.

V. Salovey and Mayer's Emotional Education Model

Following Fernández (2018) Nemotional intelligence is built by a double intelligence, the interpersonal one, related to relationships with other people, and the intrapersonal one, with itself, both were defined by Gardner in his Theory of Multiple Intelligences. Since 1990 Salovey and Mayer, both North American psychologists specialised inside psychology on the personality area, the first one being teacher at Yale University, while the second one teaches ay New Hampshire University, they describe emotional intelligence as that ability that facilitates the managing of the feelings, in a way that the person's cognitive framework can be refocused and influence in the behaviour framework. As Fernández (2018) collects, these authors elaborate an emotional intelligence model that is shaped on the base that is that the learning of emotional abilities helps people to improve the decisions making and if there is something that the students have to do properly and in a continued way all through their educative phase is to make the correct decisions, when elaborating an investigation project, when displaying a project orally in front of their classmates, for doing a cooperative project or for the resolution of some case study. Salovey and Mayer in their model collect up to four abilities or emotional divisions, the first place is occupied by the ability of perceiving emotions by individuals, this refers to the acquire ability by ani human being to identify any feeling without any doubt, for what it is necessary a lot of practice, as well as be able to do value judgement about experienced emotions and express feelings in an appropriate way. In the second place, they identify the division of the ability to facilitate the emotional thought, in other words, each individual's feelings should be inside the cognitive system with the goal of transforming it, being able to set out a hierarchical organisation of emotional thoughts. In the

third place, they present the division of the ability for the comprehension of emotions, this will allow to control feelings, without letting them dominate the behavioural reactions, offering to the person its own life's control, without letting themselves get carried away by incorrect emotional interpretations of some specific vital experience or by impulses that manifest feeling turmoil occasioning sometimes irreparable damage in the person's social and internal relationships. As an example, we can offer the real case of a student that will keep anonymity, of third grade of secondary school that did not know how to control his impulses until he bursted into tears, his face was one of panic, he felt as if he was drowning and could not rise to the surface, such was the case that his family relationships, between equals were falling apart, and what is worse, his self-esteem, making him angry with himself, all of this has affected his marks, something that could be avoided with the teaching of emotional intelligence in class. With all of this, it can be observed that emotional intelligence has a high grade of complexity, conformed by a circle of four factors fed into each other.

VI. The Evaluation of Emotional Intelligence.

When evaluating the development of emotional intelligence in students, according to what is collected on *I Estudio Nacional sobre la Educación Emocional en los Colegios en España (2021*) it must be understood that the student who lives in a negative environment has more difficulties to develop emotional intelligence than other that live in a much healthier environment and so more favourable. Recently, the family environment has changed a lot, being very unstable. This complicates a well-balanced emotional development in students.In Spain the number of dysfunctional families has increased, with an average of 260 daily breakups in the last 15 years. Likewise, the time of paternal-filial interaction has decreased a lot, there are a lot of cases in which parents work and do not have a minimum of family conciliation. A reduction of family interaction facilitated also by the connectivity to social networks and the use of new technologies. The residual emotional education at homes is affecting scholar relations, translating this in an increasing of bullying, a higher rate of scholar abandonment, teenage depression and behavioural disorder. A panorama that has worsened due to the pandemic situation that the world has lived with Covid-19, since lockdowns provoked serious consequences in students' mental and emotional health according to the World Health Organization (WHO), fundamentally anxiety and depression disorder.

Specifically, for teachers to know if students have improved their emotional intelligence or if they have acquired different emotional competences, a series of tools must be used to measure its achievement. Just how Alzina & Cassa (2021) include, to measure emotional intelligence we have the MSCEIT (*Mayer Salovey Caruso Emotional Intelligence Test*), the TEIQue (*Trait emotional Intelligence Questionnaire*), the ECI (*Emotional Competence Inventory*), or the EQ-i (*Emotional Quotient Inventory*) that is used to measure emotional intelligence through the Bar-On model. On the same line, to measure emotional competences we can use tools like the ASC (*Affective Social Competence*), used for Pre-School, the ASCA (*Affective Social Competence in Adolescence*) from Booker and Dunsmore adapted for adolescence or the ASCTCRQ (*Affective Social Competence in Teacher – Child Relationship Quality*), that covers a wider spectrum, evaluating the existing relations between family, students and teachers. Surveys can also be used to evaluate concepts linked to emotional intelligence like empathy, through the *Interpersonal Reactivity Index* (IRI), which allows us to make a multidimensional analysis because it includes two emotional factors and two cognitive factors.

VII. Emotional Education Programs: RULER, MADEMO and INTEMO.

In Spain, even though official statistics do not exist, the *I Estudio Nacional sobre la Educación Emocional en los Colegios en España (2021*) estimates that only 5% of schools institute measurements related to emotional education. Schools find serious difficulties to institute emotional education, for example, just in one of the seventeen Spanish autonomous communities, emotional education is a compulsory subject, only 6% of Spanish schools include emotional intelligence in educational programs, moreover 90% of Spanish teachers confirm that is really difficult that students acquire emotional competences while teachers are not trained enough, what's more, 62% of directors point out that its implementation is really complex. In spite of all, schools should assume their responsibility and take the initiative, since curriculum changes take too much time to happen. It is not a subject that the teacher has to teach, emotional intelligence is a transverse basic knowledge that has to be imparted in all of the subjects. To achieve emotional education's success in class, the teacher must be coherent in the educational practice, train for it and use Information and Communication Technology (ICT).

To institute emotional education in schools, different programs to educate emotions can be carried out. Just how Berrocal & Cabello (2021) indicate, emotional intelligence has been worked as an ability through different programs to educate kids and teenagers, and even teachers, that is, all the educational community. One of these programs is RULER (*Recognizing, Understanding, Labelling, Expressing, and Regulating*), a program elaborated by the professor Marc Brackett, whose fame is owed to its efficacy, used in more than two thousand United States schools and other parts of the world, it follows Salovey and Mayer's model, since it is focused in five essential emotional abilities: acknowledgement, comprehension, labelling, expression and emotions' adjustment. The goal of this program is to encourage an improvement of the individual's welfare, an improvement of the teaching-learning process, promoting the educational leadership, and obviously the students' own efficiency.

In Spain various programs of emotional education have been developed, one of them is the MADEMO program, an emotional education program by the International University of Valencia. Following what is collected by Schoeps et al., (2020) the MADEMO program pursue as the fundamental goal to improve teachers' emotional competences that should introduce emotional education in their classes, and secondary goals such as: apply the emotional competencies to develop tools that allow to teach the emotional education in the class and improve the teacher to student interaction to develop students' emotional competences. This emotional education program uses a based in reflection methodology, with the intention of acquiring the emotional competences in a natural way. The sessions start with an initial contact in which the assignments done previously are analysed, through the sessions activities are made to explore the content from real cases, in groups it is intended to analyse the emotional information and organise it in a cognitive way, at last at the end of each session it is asked to made a task that will require the comprehension of the worked content in the session or present the teachers to the new topic that will be developed on the next session. Specifically, the sessions have a duration of two and a half hours and are conducted once a week.

We also have another program of emotional education, the *Programa INTEMO* elaborated by the Laboratorio de Emociones de la Universidad de Málaga. The launching of this program has thrown very positive results regarding the emotional intelligence learning by Spanish students

between the ages of 11 and 17, that got a bigger psychological adjustment, specifically, they decreased their depression, negative affectivity and anxiety levels, they decreased the somatisation, the external control locus, social stress and they improved their self-esteem. At the same time, the aggressive behaviours levels decreased, thanks to an increase of empathy and prosocial behaviours. This program has twelve sessions that are distributed in four phases: perception and expression, easement, understanding and emotional regulation. To work through these divisions of emotional intelligence in a joined way a script and an emotional newspaper are made. The activities that are proposed in the program have exercises that can be made during class time, just like support exercises that develop the curricular contents of the educational stage, that also serve to develop them in the family context. The sessions have a duration of fifty-five minutes. The sessions follow the next structure, firstly, a brief explanation of the ability to work is made, secondly, the awaited benefits are mentioned, in third place, the activity is done, in fourth place, the personal activity is analysed and at last summary of the developed session is elaborated.

As it can be confirmed, the emotional education programs have a series of activities that are scheduled through a concrete time and following the protocol. These programs offer multiple educational benefits in the short as well as in the medium term according to mental health and the prevention of disruptive and aggressive behaviours. Nonetheless, to be able to incorporate these emotional intelligence programs to the project of the centre is necessary a solid training of the teachers regarding the knowledge of the concepts that surround emotional intelligence.

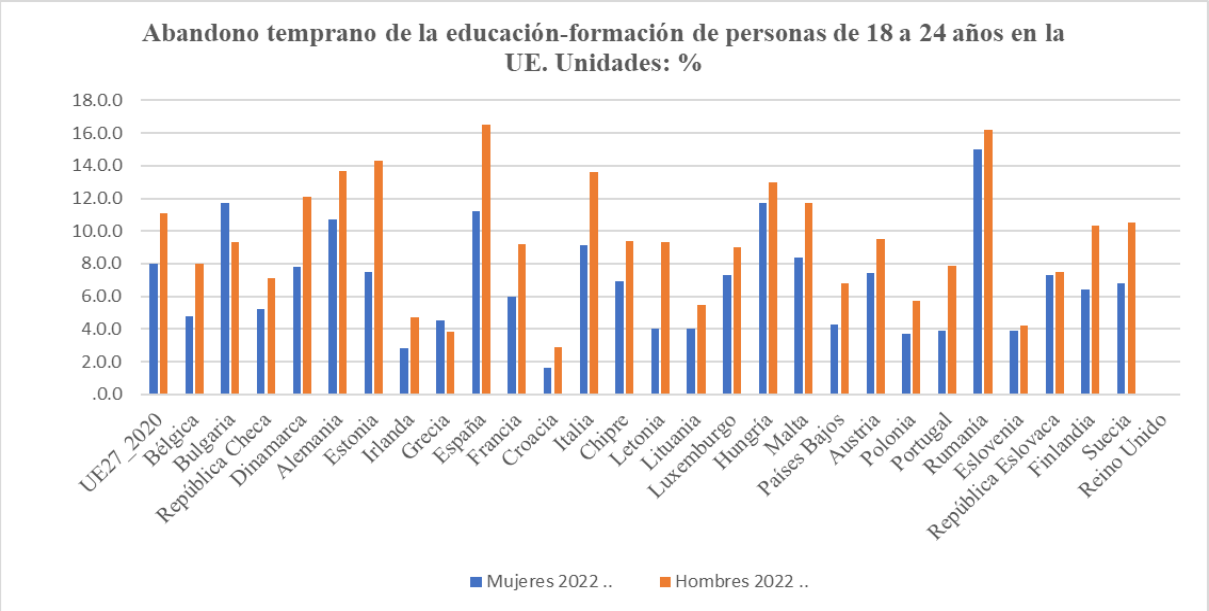
In this sense, Nages et al., (2021) point out that of the last meta-analysis that have been developed of the different programs of emotional education, specifically of 249 programs, it is drawn as results that these promote an important improvement of students' behaviour, decreasing the antisocial behaviour, with an important drop of the aggressions and in consequence an improvement of the social abilities, likewise the results of these investigations highlights that the promotion of emotional competences in students allow an improvement of the resilience, that is, their ability of overcoming complex situations, keeping in mind that the scholar field can be considered as a training place for social life, this benefit will extrapolate to the family and social field, it will also offer students more efficacy in their academic tasks and abilities for a positive socialisation.

VIII. High rate of early scholar abandonment in Spain and Andalucía. Is it reason enough to wager for emotional education in Spanish and Andalucian classes?

It is known as scholar failure, following what Lanzat et al., (2018) collect, to not get minimum knowledge, abandonment or finalisation of Secondary School without getting the degree, and those labour circumstances in which some individuals find themselves in adult age due to having not acquired the necessary training. Specially, just how Lanzat et al., (2018) reflect, various projects have been made in which it has been analysed which is the main cause of scholar abandonment's prediction, resulting in low academic efficiency. On the other hand, some studies reflect that the absence of social relationships between students and teachers is another important reason for scholar failure, and the scholar curriculum itself, since it does not promote scholar experiences that motivate students that attend to cognitive development as well as the emotional one. Likewise, some projects also indicate that scholar failure does not exist as much in feminine gender.

The graphic that we see below reflects that in 2022 Spain had the worse masculine scholar failure rate of Europe Union (16,5%), while feminine scholar failure rate took up the fourth place (11,2%), really superior percentages comparing to the rates of EU-27, that specifically have a masculine scholar failure rate of (11,1%), (5,45) lower than the Spanish masculine failure rate, and a feminine scholar failure rate of (8%), a (3,2%) lower than the Spanish feminine scholar failure rate. So, based on this situation there are a lot of investigations made to locate those elements that fail in the Spanish educational system, one of them could be the scarce or absent implementation of emotional education in schools.

Figure 1.
Early school leaving of education-training in the EU in 2022.

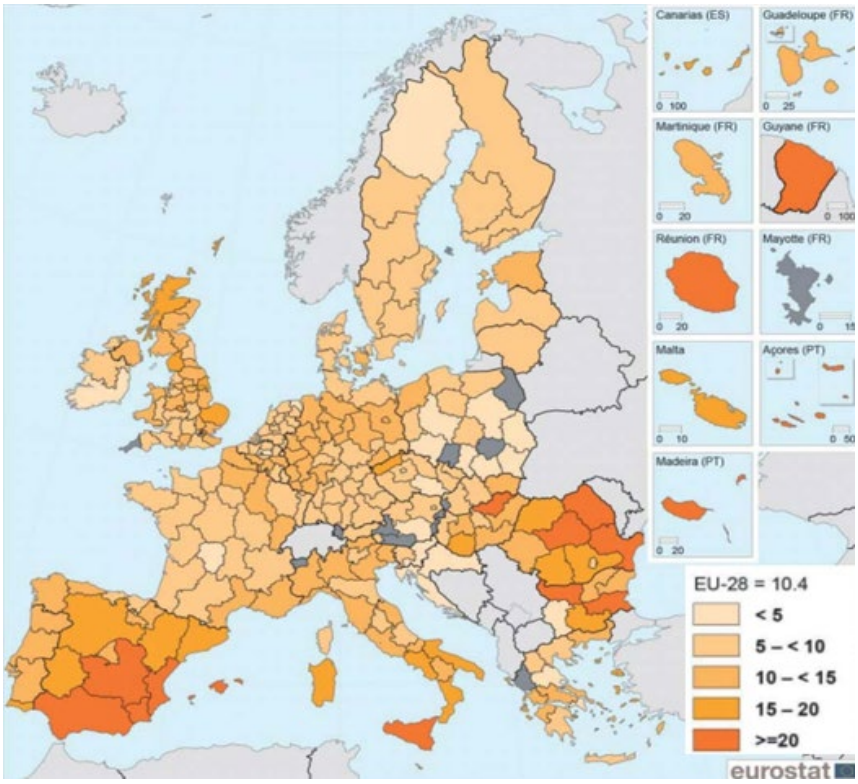


Source: own elaboration based on Eurostat.

Regarding all of this, it seems essential what is mentioned by the American specialist in emotional intelligence, Joshua Freedman that includes in *I Estudio Nacional sobre la Educación Emocional en los Colegios en España (2021*), "Emotional intelligence is a way of recognising, understanding and choosing how we think, feel and act. It affects our interaction with other people and our understanding of ourselves. It defines how and what we learn; it allows us to establish priorities; it determines the majority of our daily actions. The investigation suggests that it is responsible for 80% of our lives "success ". And if it is kept in mind the low level of implementation of emotional education in Spanish schools, about 5% of them, we can comprehend it being an evident and predictive reason for scholar failure. According to the information collected by the *I Estudio Nacional sobre la Educación Emocional en los Colegios en España (2021*), those schools' directors that have implemented emotional education in the project of centre, determine that it has allowed to improve interpersonal relations, reduce bullying, improve the motivation for learning, and scholar efficiency itself, and as an indirect consequence of it, they have received a better knowledge to introduce them in the labour market. Specially, between all emotional competences existing, students of all educational stages in Spain fail, according to *I Estudio Nacional sobre la Educación Emocional en los Colegios en España (2021)*, in empathy, and this is concerning, since it is the base of

emotional competences as well as active listening, communication and teamwork. On other hand, Spanish's teachers include as essential competencies for students, communication, since without doing an active listening is difficult to comprehend the message that is transmitted, self-esteem, that positively influence optimism, the level of bullying, depressive tendencies, personality alterations, as well as academic efficiency, and at last, self-control, since it allows the students to postpone the rewards, keeping in mind that the teaching-learning process is prolonged in time and the benefits of it are collected in short or medium term, it is essential that students learn to control their impulses, since with that they will control their own lives and they would be actually happy. Following up, we show a choropleth map that reflects early scholar abandonment rate by communities inside the European Union.

Figure 2.
Early scholar leaving rate. Countries of the EU-28 according to NUTS 2 (Nomenclature of territorial units for statistics) regions. 2018.

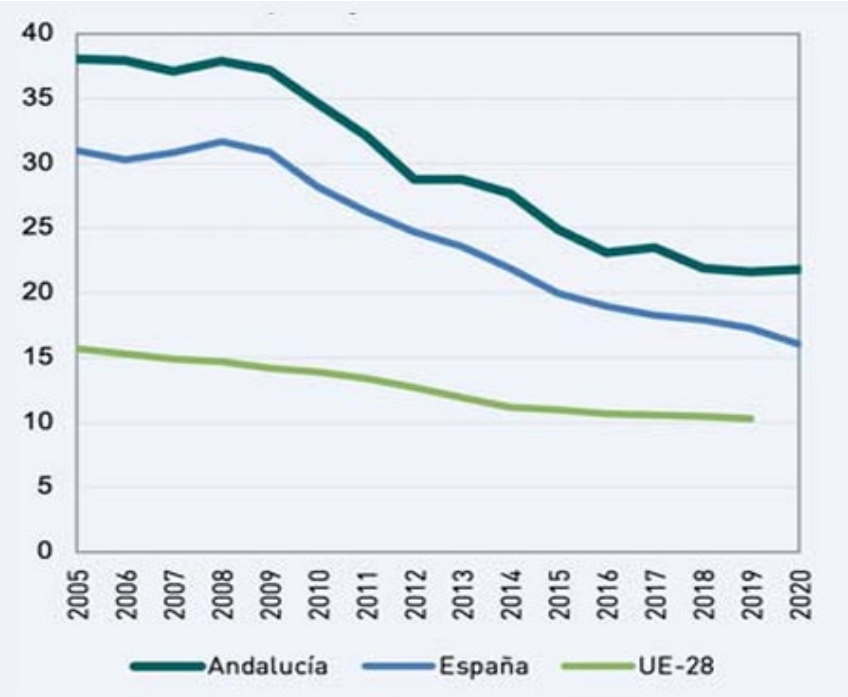


Source: Eurostat.

Scholar abandonment rate in Andalucía per gender is 27,80% for masculine gender and 19,09% in feminine gender according to the *Informe General AET*. Generally, the population that end up obtaining the ESO degree is 14,87%, while the 80,72% does not obtain it, a number that as we can see are really alarming. The situation does not get better in older people, the scholar abandonment rates are superior in the ages between 21 and 24, so that a minimum of the population reach studies superior to A levels, higher levels, a degree or master's degree.

In the next graphic we can see a decreasing evolution of early scholar abandonment rate in Andalucía, Spain and the EU-28 between 2005 and 2020.

Figure 3.
Early educational abandonment rate. Andalucía, Spain and EU-28. (2005-2020).



Source: Eurostat and INE.

It can be observed in this graphic how the dynamic of early scholar abandonment rate is decreasing in Europe, even though it has been stabilising in the last five years. Spain has a much higher early school abandonment rate than the average in Europe, but it has been decreasing significantly from 2005 to 2020, this tendency will keep happening in the next few years. However, in the autonomous community of Andalucía, not only has the early scholar abandonment rate stabilised, but we can observe a slight rise. In the analysis of the reasons that have put Andalucía in more unfavourable circumstances than the national and international panorama, a variable to keep in mind and that can answer to these circumstances is the little implementation of emotional education in schools, since as we have seen previously its influence over students' academic efficiency is evident.

But this difficult panorama in the Spanish educational system in general and Andalusian in particular has a complex solution, since there are a lot of factors that determine scholar failure, one of them being the consideration that a lot of schools make of emotional education as a superfluous benefit, a luxury that they cannot afford, the approach of these schools is that they have to reach the cognitive academic goals, forgetting an essential tool to achieve it, emotional education. A scepticism that hides the scientific evidence made along the last three decades regarding emotional intelligence and its relationship with important aspects of life such as happiness, good health, good relationships in school and in class, and the academic efficiency of our students, last aspect that depends on a lot of the previous aspects' accomplishment, just how Fernández, P.,(2018) points out.

IX. Emotional Education's benefits in academic efficiency.

López & Medel (2021) point out that emotions are necessary to make good decisions, particularly when the students are in negative and stressful mood situations, different from what it has been though traditionally. And if there is something that Secondary's student has to keep in mind during their teaching process is good decisions, in a commitment with their own training level, with doing their assignments, scholar projects and written tests. They also remind that a healthy relationship with the school and the class improves motivation and in consequence academic results, emotional intelligence being an essential element to achieve an optimal well-being state in secondary schools. Authors such as Pascual et al., (2019) affirm that cognitive learning and emotions are related, for example, anxiety reduces the students' ability to learn and memorise. So much so that López & Medel (2021) in line with what has been mentioned affirm that, to be able to consolidate memories in human's memory some element related to emotions is needed.

For students to be able to study through an extended period of time, for hours with the goal to achieve a good mark, they will need a high level of emotional commitment with the knowledge that they are learning, if it is not like this, in short-term they will not be able to maintain that effort in a sustained way. On the other hand, student's cognitive strategies that allow them to make decisions, solve problems, make concepts, plan their work and adapt to changes are associated with emotional intelligence and academic efficiency Quea & Huacasi (2020).

On another note, Pulido (2018) confirms that emotional abilities have been traditionally linked to feminine gender. If we do a retrospection, we will remember that emotions are linked to an improvement of academic efficiency, and this matter would explain the reason why feminine gender scholar failure in Spain is much lower and it is in much approximated levels to the Europe average. Literature leads people to think that academic efficiency improves with an appropriate emotional learning, however, this author reports that emotional abilities are not being cared for correctly by the new scholar curriculum in Spain. The study made by Pulido & Herrera (2017) resolves that students with a higher level of emotional intelligence acquire better academic results keeping in mind the obtained mark in their written tests.

The same author alludes that people that are emotionally intelligent have better mental and physical health, this reflects on them having less anxiety, depression, stress, psychosomatic symptoms, aspects that without any doubt affects students' academic efficiency. At the same time, Fernández (2018) points out that it helps to prevent suicidal ideas and attempts, and risk behaviour such as tobacco, alcohol and drug consumption. On the same line, Gómez et al., (2017) point out that between a lot of already mentioned benefits that emotional intelligence offers, we can find students' development of empathy, tolerant and civilised behaviours with their equals. This is translated into more positive relationships and a decrease of aggressive behaviour like bullying or cyberbullying, these benefits improve scholar relationships as well as academic efficiency, from which we understand not only the final marks that show the acquiring of key competencies, but also, daily work and attention paid in class.

If we make a retrospection, following Nages et al., (2021) Salovey and Mayer's model of emotional intelligence is composed of four aspects, one of them is perception and emotional expression, that is based on the individual being capable of recognising its own emotions, being able to understand what they feel through language, because of this, oral expression is

closely linked to emotional education, a component of one of the key competencies that students should acquire, social competence, that will allow them to establish social bonds, just as show investigation projects with clarity and organisation, being able to transmit what they really think and feel, their needs and necessities. A key aspect that will allow them to substantially improve their academic efficiency independent of the subject.

Equally, emotional education prevents students' anxiety caused when they have to confront an academic challenge, like the oral exposition of an individual or group project, in the making of some video for the class blog or carrying out a written test. Just how Sobradiel et al., (2021) include, he refers in his investigation to the students at the last school year of primary school, aside from the differences, it also happens in secondary school. It is anxiety that is a lot of times created by the fear of failure, the fear of the unknown or simply for the fact of having to face a situation that escapes their complete control. This anxiety shows up in students with symptoms such as respiratory and cardiac acceleration, gastric problems and body shivering, just as feeling relaxed when teachers chose to postpone a written test, or any projects discussed previously. Usually, this anxiety comes from negative experiences that have been lived previously when facing some of these challenges, according to those negative consequences that they wish to avoid, like for example a mental block or those derived from the family environment after failing the written test. Now, it is not about understanding anxiety as something completely negative, speaking evidently about disproportionate levels that affect students' self-esteem, their own self-concept, just as their academic efficiency. Because of this, according to some meta-analysis recently made to which MacCann et al., (2020) refer to, students with more development of their emotional intelligence have better academic efficiency and success because it understand with solvency emotions that are nice to humans like sadness, boredom or anxiety, and that are not out of the scholar environment, they regulate effectively the emotions mentioned previously, handling correctly their social environment, that is, the world that is surrounding them, they are able to express their intrapersonal perception relating to social context, transmitting ideas in a coherent and organised way, just as exposing any kind of story.

Generally, we can say that students emotionally intelligent adapts best to any circumstance, familiar, scholar or social, which determines completely the success through the circle of life, for it the teachers should understand the relevance that emotional intelligence has on life and well-being of their students, so they have to train specifically in this area to educate them emotionally and contribute to decrease significantly the early scholar abandonment rate.

Knowing that academic efficiency of Spanish and Andalusian students in our case, is linked closely to their emotional states, we should highlight that currently emotional learning is more urgent. Following Buitrago & Molina (2021) the health crisis lived because Covid-19 has not left any economic, political or social structure indifferent. So, the educational context has also been affected, teachers as well as students. It has to be clear that teachers have to know how to manage and regulate their emotions in order to teach how to do it, to obtain a completely significant learning. As it is fact of life, a lot of students have suffered through their lives the lost of a family member, so developing emotional adjustment skills is essential, because without a minimum of psychosocial and emotional well-being academic results worsen, nowadays this necessity acquire even more importance, keeping in mind the pandemic lived, which, has increased the possibilities that the students have suffered the lost of a family member in the last 3 years.

All around the world just how the UNESCO data shows around 168 millions of young people in age of studying could not keep going to classes in 2020, causing a great impact in education, since as we know school is a space that promotes social interaction, through which empathy can be learnt, regulate anxiety, control anger and tolerate frustration, a series of emotional abilities that they should keep learning and suddenly was blocked just how Buitrago & Molina (2021) points out. But a largest awareness about the positive repercussions that emotional learning has will currently help teachers to get over with a convulsive time where students had to deal with without teachers' help with fear of dying, fear of going out, fear of being in contact with people, anxiety of not knowing what will happen tomorrow or the stress generated by having to do activities without help.

X. Conclusions

Emotional education improves students' scholar efficiency, since it favours their self-esteem and facilitates a positive building of their self-concept, fundamental matters for the teacher to learn to be, an attitudinal competence that teachers should not neglect.

In fact, in light of the benefits that emotional education brings to the classroom, the order of May 30, 2023, states in Article 44 that teachers "will promote the personal development and emotional intelligence of students, fostering necessary elements such as self-concept, self-esteem, confidence, and self-assurance, in order to increase their level of autonomy" (*Orden de 30 de mayo de 2023, por la que se desarrolla el currículo correspondiente a la etapa de Educación Secundaria Obligatoria en la Comunidad Autónoma de Andalucía, se regulan determinados aspectos de la atención a la diversidad y a las diferencias individuales, se establece la ordenación de la evaluación del proceso de aprendizaje del alumnado y se determina el proceso de tránsito entre las diferentes etapas educativas.*, s. f.).

As teachers we have the responsibility to establish the connection between reason and feelings of our students, since the benefits that come from it will extrapolate to a bigger scale in our society. In conclusion, we encourage teachers to keep educating the mind and heart of teachers with patience, we do not know if with it we will achieve that they will give the Physics Nobel Prize to some of our students, but we will be able to save a lot of lives.

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Chapter 10. Transmedia narrative and literacy: an approach to university teaching in the digital age

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I. Introduction

This chapter aims to explore the evolution of the use of transmedia narrative in university teaching, with a particular focus on its role in the design of educational strategies adapted to the digital ecosystem. Through a methodological approach based on a scoping review, the objective is to understand how these tools have influenced pedagogical practices in higher education.

Transmedia narrative, defined as the creation of stories across multiple platforms and digital formats, emerges as a fundamental resource for fostering student engagement and enriching their learning experience. In parallel, transmedia literacy stands out as an essential competence for both educators and students to interact effectively with digital resources in multimedia educational environments. The importance of transmedia literacy is highlighted as a foundation for the development of teaching strategies that integrate Information and Communication Technologies (ICT). This approach enables the design of interactive, inclusive, and cross-platform educational environments, aligned with the needs and challenges of teaching in the digital context and in response to contemporary demands.

II. Transmedia Narrative and Literacy

The integration of platforms and media in transmedia narrative not only transforms storytelling methods but also reshapes the processes of knowledge acquisition and skill development within education. In this context, the concepts of learning and literacy take on renewed meanings: learning becomes more dynamic, interactive, and collaborative, while literacy expands to encompass digital and media competencies. From a pedagogical perspective, this transformation encourages the reimagining of teaching strategies by incorporating transmedia elements that enrich educational resources, enhance accessibility, and align with students' interests and interaction patterns in the contemporary digital environment.

Transmedia narrative is a communication strategy that involves developing and disseminating a story or content across multiple platforms and formats to foster audience engagement and participation in meaning-making. This approach integrates various media, such as videos, texts, social networks, and video games, to create an immersive and cohesive experience. Jenkins (2024) defines transmedia narrative as a process in which the fundamental elements of a fictional world are systematically distributed across different distribution channels to create a unified and coordinated entertainment experience. Ideally, each medium contributes uniquely to the story's development (p. X). In this way, transmedia narrative not only expands

audience interaction possibilities but also enables the exploration of new forms of creativity and connection within the digital ecosystem.

The link between transmedia narrative and transmedia learning is evident, as education, at its core, also involves storytelling. This narrative approach to teaching underscores the significance of stories and shared experiences in conveying knowledge, values, and skills—directly paralleling the immersive and participatory possibilities offered by transmedia narrative in educational contexts.

A key aspect of transmedia narrative in education is its ability to allow students to generate their own stories based on acquired knowledge and personal experiences. This process not only facilitates deeper learning but also promotes the development of essential competencies such as critical thinking, creativity, and reflective analysis. By constructing their own narratives, students actively reinterpret content, integrate diverse perspectives, and become agents of their own learning.

This pedagogical approach aligns with the principles of constructivism, which conceptualises learning as an active process of knowledge construction, grounded in students' interactions with their environment and prior experiences. Transforming students from passive recipients into active creators not only enriches participatory methodologies but also cultivates essential skills for today's digital world, such as creativity, communication, and the ability to synthesise information. Transmedia narrative, therefore, provides an innovative framework for connecting teaching processes with students' expressive abilities, fostering a dynamic and holistic approach to education.

III. Objectives

The overarching objective was to analyse the use of transmedia narrative through a scoping review to identify the strategic characteristics of transmedia literacy in the integration of ICT in higher education.

Based on this general objective, the specific objectives of the scoping review were as follows:

1. Are there systematic reviews that address the research objectives?
2. What time span does the review and mapping studies cover?
3. What are the key characteristics of transmedia narratives identified in systematic reviews related to this topic?

III. Methodology

3.1. Scoping Review

The scoping review is a type of exploratory literature review that provides an initial approach to the object of study and is useful for gaining a preliminary understanding of various scientific topics (Cobey et al., 2018; Wolfers & Schneider, 2020). However, any systematic review, regardless of its type, must be systematic, comprehensive, explicit, and reproducible (García-Peñalvo, 2022). To ensure these criteria were met, the following inclusion criteria were established: a) The article must describe a literature review focused on the use of transmedia narrative in teaching within the context of higher education. b) The article must be written in or

available in English or Spanish. c) The article must be published in indexed academic journals. Articles that did not meet these inclusion criteria were excluded from the review.

Academic databases were selected to encompass a broad range of document types and subject areas. The databases consulted included **Scopus, Web of Science (WoS), the digital library of the Institute of Electrical and Electronics Engineers (IEEE Xplore), EBSCOhost, Google Scholar, the Directory of Open Access Journals (DOAJ), Dialnet, the Scientific Electronic Library Online (SciELO), and ScienceDirect**. Search strings were developed for each of these databases by combining the following descriptors: **transmedia, education, teaching, active learning, blended learning, higher education, student, university, instruction, teaching, systematic literature review, systematic mapping, literature review**.

IV. Results

The PRISMA diagram (Figure 1) outlines the document selection process in the systematic review (Haddaway et al., 2022). Upon completing the review process, articles addressing systematic reviews on transmedia narrative and its application in teaching were identified (Table 1). The selected studies highlight the growing interest in the relationship between transmedia narrative and its use in higher education

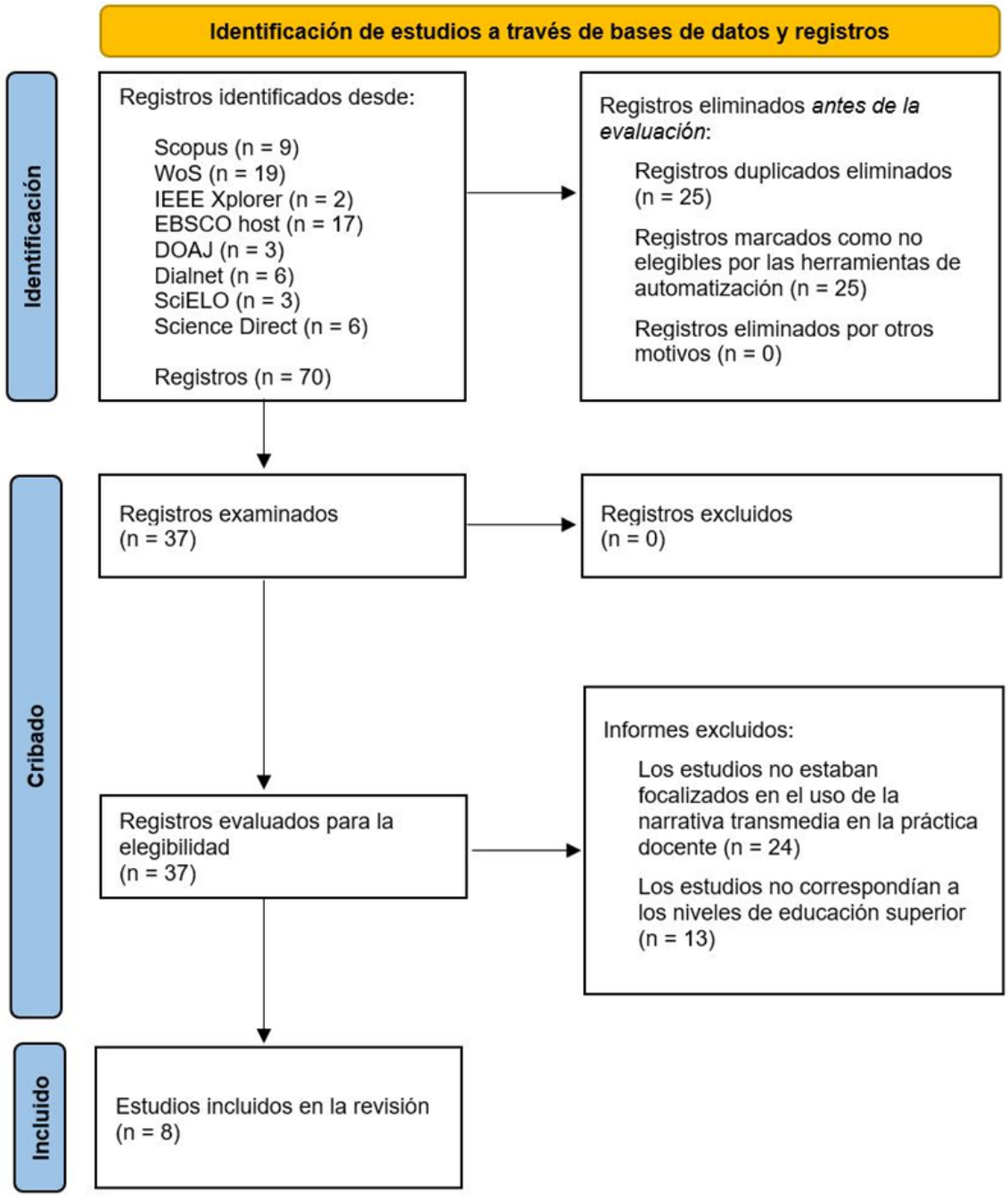
Table 1.
List of selected articles in the scoping review.

Author(s)	Year	Title of the Document	Period Covered
Tombleson	2024	*Transmedia Learning: A Literature Review*	2010-2023
Sánchez-Caballé & González-Martínez	2023	*Transmedia Learning: Fact or Fiction? A Systematic Review* (*Aprendizaje transmedia: ¿realidad o ficción? Una revisión sistemática*)	2013-2020
Acuy Rodríguez & Baca Cáceres	2022	*Benefits of Transmedia Narratives as Educational Strategies in Digital Contexts*	2010-2022
Sánchez-Caballé & González-Martínez	2021	*Teaching Maths Within a Transmedia Learning Approach: What Is It and How Sustainable Can It Be?*	2012-2020
González-Martínez et al.	2019	*What's Up with Transmedia and Education? A Literature Review*	No period specified
Hermann-Acosta & Pérez Garcías	2019	*Digital Narratives, Digital Stories, and Transmedia Narratives: Systematic Review of Literature in Education in the Ibero-American Context*	2012-2017
Vieira & Munaro	2019	*A Narrativa Transmídia no Processo de Ensino e Aprendizagem de Adolescentes*	Until 2019
González-Martínez et al.	2018	*About the Concept of Transmedia Literacy in the Educational Field: A Literature Review*	2013-2017

Source: own elaboration.

Figure 1.

PRISMA Flow Diagram of the Scoping Review.



Source: Own elaboration. The PRISMA 2020 flow diagram for updated systematic reviews, which included searches in databases and records only, was used as a template. This template is licensed under CC BY 4.0. License copy: https://creativecommons.org/licenses/by/4.0/ - (Haddaway et al., 2022).

V. Discussion

5.1. General Approach of the Reviews

A key contribution, due to the year of publication and the approach taken, was the systematic review conducted by Tombleson (2024), who carried out an analysis of the literature on transmedia learning and the models associated with this educational approach, covering a broad period (2010-2023). His research focused on understanding transmedia learning from a holistic perspective, excluding studies that focused solely on the use of a single platform. Tombleson defines the teaching of transmedia narrative as a process of *"learning across platforms"* and provides a comprehensive view of key concepts such as *"transmedia literacy," "social media for learning,"* and *"digital learning."*

In line with this, the systematic review carried out by Sánchez-Caballé and González-Martínez (2023) is noteworthy. They structured their analysis around three key research questions: 1) What is meant by transmedia learning?; 2) What opportunities does the integration of transmedia offer in teaching and learning processes?; and 3) What challenges does this integration pose in these processes? (p. 4).

Another general review was conducted by Vieira and Munaro (2019), whose aim was to analyse the impact of transmedia narrative on teaching and learning processes based on empirical studies published in the academic field. Similarly, Acuy Rodríguez and Baca Cáceres (2022) examined the contribution of transmedia narratives as learning tools, relying on scientific literature.

On the other hand, some studies adopted a more specific approach in their systematic reviews. González-Martínez et al. (2018) conducted an analysis aimed at *"providing a comprehensive overview of the educational uses of the term transmedia literacy"* (p. 19). Similarly, the study by Hermann-Acosta and Pérez Garcías (2019) gathered research on digital narratives applied to the educational field, although they highlighted that their *"analysis focused on understanding the object of study within the Ibero-American context"* (p. 1).

From a different perspective, the study by Sánchez-Caballé and González-Martínez (2021) focused on providing an overview of the use of transmedia learning in mathematics education, with a particular emphasis on sustainability. The research questions guiding their investigation were: 1) *How is transmedia learning applied in the teaching of mathematics?*; 2) *Is transmedia learning a real opportunity for sustainable education based on the practical experiences analysed?*; and 3) *Is transmedia learning a sustainable option from the perspective of technological use?*

5.2. Transmedia Narrative and Transmedia Literacy

According to the definition of transmedia narrative, this technique involves telling a single story or narrative experience across multiple platforms and formats, taking advantage of the possibilities offered by digital technologies. In the educational context, the concept of transmedia education refers to the integration of these narrative techniques to enrich learning experiences. In this setting, stories or narratives acquire a clearly didactic purpose, aimed at fostering the development of competencies and knowledge.

According to Sánchez-Caballé and González-Martínez (2021), there is a general consensus about the opportunities that transmedia narrative, when applied with a didactic approach, offers to enhance the teaching-learning process. This is largely attributed to its flexibility, adaptability, and the engagement it generates among students. Furthermore, the possibility that these narratives do not have a predefined ending —so-called *endless narratives*— allows for the exploration of open and potentially limitless learning paths, without the need for a determined conclusion (p. 3).

Stories, narratives, and transmedia narrative can result in greater student participation and involvement, promoting an enriching exchange of experiences in the educational context.

Digital narratives are characterised by being stories or anecdotes told through digital media. In the case of education, they enable the creation of flexible and dynamic educational models, which, through the use of visual, auditory, and hypermedia resources, generate participation, engagement, and the activation of emotional content in students. (Hermann-Acosta & Pérez Garcías, 2019, p. 11)

Carefully selected stories and strategically designed narratives significantly contribute to facilitating the teaching-learning process. According to González-Martínez et al. (2019), *"there are many didactic approaches that consciously use it, that is, it is the need to advance the narrative that drives learning"* (p. 216). Both stories based on real events and those resulting from fiction can be effective, depending on the established didactic objectives, which determine their relevance in the educational context. As the authors note, *"these narrative processes do not have to be commercial or fictional, although undoubtedly this increases motivation"* (pp. 216-217).

Systematic reviews have shown that the concept of transmedia narrative has evolved beyond its origin in the fields of Communication and the cultural industry, establishing itself as a relevant tool in the educational field. Some authors even consider it *"a new teaching methodology"* (Vieira & Munaro, 2019, p. 321), and its acceptance in the educational environment has been significant (Sánchez-Caballé & González-Martínez, 2023, p. 16).

In these reviews, transmedia narrative is directly linked to the theories of Henry Jenkins, who connects it to concepts such as digital narratives and storytelling, understood as the practical use of digital tools —including text, audio, video, and interactive elements— to tell stories. This approach forms a starting point toward a broader understanding of the concept, conceived as a form of storytelling that unfolds across multiple formats and media, promoting immersive and participatory experiences in the educational context.

When analysing transmedia narrative from Henry Jenkins' perspective, it is crucial to consider three key dimensions: *"media convergence, participatory culture, and collective intelligence"* (Sánchez-Caballé & González-Martínez, 2023, p. 16). However, this raises the question of whether it is feasible to adapt a concept originally developed in the fields of communication, cultural industry, imagery, and audiovisual production to the educational context.

In this regard, the reflections of González-Martínez et al. (2018) are particularly relevant: *"the concept has not been operationalised for educational purposes, nor has it been systematically explored what the most suitable pedagogical and didactic approaches might be for doing so"* (pp. 33-34). This underscores the need for further research to define how transmedia narrative

can be effectively integrated into educational practices, respecting both its potential and its limitations.

In this context, the integration of transmedia characteristics into the educational sphere has led to the development of an emerging concept: transmedia literacy. Although a definitive consensus on its definition has not yet been reached, González-Martínez et al. (2018) emphasize that, regardless of how it is conceptualized, it should involve the integration and harmonization of a broad and diverse set of prior competencies (p. 33). This reflection is based on the research gathered, with particular emphasis on the Transmedia Literacy project led by Carlos A. Scolari. In this line, transmedia literacy is framed as an opportunity for the *"exploitation of media platforms in a massive and intensive way, as optimal scenarios for community learning"* (González-Martínez et al., 2018, p. 33). This approach highlights the potential of transmedia narratives to transform teaching and learning processes, fostering participation, collaboration, and shared learning.

According to Acuy Rodríguez and Baca Cáceres (2022), transmedia literacy requires an educational proposal that enables students to process and collect information in order to identify *"new learning paths and track significant data across different technological platforms, encouraging students to continue discovering and sharing their knowledge on other platforms"* (p. 61). This approach promotes the adoption of immersive strategies and the leveraging of the continuous flow of content generated during learning processes. In this way, students' interest is effectively captured, enhancing their active involvement in activities that integrate various platforms and digital tools (González-Martínez et al., 2018, p. 33). This perspective underscores the central role of transmedia narrative in the construction of dynamic and collaborative educational environments.

5.3. Transmedia Learning

Another key line of research identified in the systematic reviews, after addressing transmedia narrative and transmedia literacy, is the concept of transmedia learning. Tombleson (2024) focused on this topic, defining it as learning that occurs *"across different platforms, both formally and informally, connecting and collaborating with peers and teachers"* (p. 1). While this initial definition serves as a valid starting point, the analysis conducted allowed for an expanded understanding, highlighting the evolution that the term has undergone since its early formulations linked to transmedia narrative. Through the systematic review, new nuances and applications of transmedia learning were identified, emphasizing its potential to integrate more dynamic, collaborative, and contextualized educational experiences within the contemporary digital ecosystem.

Tombleson (2024) describes transmedia learning as *"a holistic approach to multiplatform education"* (p. 3). This strategic approach integrates several dimensions, such as digital storytelling, teaching through social media, online learning, and technology-enhanced learning. Ultimately, this model promotes a more proactive attitude from students regarding their own learning. As González-Martínez et al. (2019) note, *"this idea of navigating through a series of media via storytelling fosters motivation and reflection on the student's learning in formal education"* (p. 219). Thus, transmedia learning not only enriches educational processes but also encourages active and critical participation from students in their own education.

In summary, transmedia learning can be considered a teaching method, as it is based on a series of strategically planned steps that employ multiple platforms and formats to tell a story, with the aim of engaging students in their learning process, always with active teacher support. This approach seeks to foster an engaged student body that is connected to their own learning. Moreover, this method allows for *"a deeper online experience that generates online communities and provides connectivity to students […] playing a key role in ensuring that learning is strategic and meaningful"* (Tombleson, 2024, pp. 12-13). In this way, transmedia learning not only expands pedagogical possibilities but also strengthens collaboration and cohesion within the educational environment.

In turn, Vieira and Munaro (2019) highlight, in relation to the scope of their systematic review, that:

> The study achieved its goal of verifying the effectiveness of using the transmedia narrative strategy for engaging adolescents in the teaching and learning process. The bibliographic research demonstrates that the use of transmedia narrative has generated very positive results for student learning and participation in the proposed topic, adopting a teaching method in which teachers provide students with various resources for task development, spreading knowledge, practices, and pathways for co-learning. In the end, knowledge must be creativity, innovation, and imagination (p. 333).

5.4. Culture of Media Convergence and Participatory Culture

Transmedia storytelling involves a culture of media convergence and a participatory culture. Essentially, it is the fusion of various forms of media and technologies, resulting in new ways of storytelling and content creation. As González-Martínez et al. (2019) state, "the collaborative dimension inherent in transmedia makes this shift between different media not only individual and local, but also something that must take place within social media environments" (p. 217). This approach highlights how transmedia fosters meaningful social interactions, expanding narrative experiences through collaboration within connected communities.

Media convergence has made it possible for a wide variety of media and platforms to be interconnected. Digital content can be easily accessed from virtually any online-connected device, and, if not, it can be consulted later after being downloaded. Furthermore, media convergence has transformed communication, shifting from a one-way model to a multidirectional one. This enables audiences to move from being passive receivers to active contributors, thus aiding in the construction of collective and interconnected knowledge (Hermann-Acosta and Pérez Garcias, 2019, p. 11).

These characteristics offer various possibilities for applying transmedia storytelling in education. The figure of the prosumer—one who not only consumes but also produces content—remains relevant and becomes increasingly significant within the context of participatory culture. In this sense, Sánchez-Caballé and González-Martínez (2021) suggest that "if we adapt this to the educational context, we start from constructivist approaches and, under the shadow of connectivism, we can think more in terms of a 'do it together' approach than a 'do it yourself' one" (p. 2). Meanwhile, Tombleson (2024) emphasizes that transmedia learning should result in tangible outcomes, which presents a significant advantage in the

educational process as it ensures that learning experiences are strategic, measurable, and meaningful.

The idea of this literacy means that transmedia learning cannot exist in a vacuum. Instead, it is a symbiotic process of dispersing learning material across platforms, where the learner is able to read a "transmedia narrative" (or learning experience) and also write a transmedia narrative, that is, write across platforms (Tombleson, 2024, p. 9).

The possibilities offered by transmedia storytelling are closely linked to active learning methodologies, which have emerged and evolved thanks to the technological development of recent decades. Among these methodologies, the use of games as a key educational tool stands out. In this regard, González-Martínez et al. (2019) note that "games are a way in which the narrative can progress and, therefore, contribute to the construction of the transmedia product" (p. 217).

In this context, participation takes on a new dimension, as learning is not only focused on the reception of information but also on the active creation of content. Through play, students not only explore and develop skills but also participate meaningfully in the narrative, collaboratively and immersively constructing knowledge. This approach fosters a more dynamic and engaged form of learning, aligned with the principles of participatory culture and constructivism.

The classical idea of multimedia led us to focus on the simultaneous concurrence of different media; however, with transmedia (and in particular its use in education), this barrier is broken, and we can suggest that the interaction between the different actors in the educational process (primarily, students and teachers, but also families) […] takes place not only in the virtual world but also in the physical world, and that some sequences are fed by this shift (González-Martínez et al., 2019, p. 218).

However, as Sánchez-Caballé and González-Martínez (2021) noted in their systematic review in the context of mathematics education: "both from the didactic mathematical perspective and from the perspective of universal design and personalised learning, there is still much ground to cover" (p. 10).

5.5. Transmedia Educational Strategies

There is consensus that technological transformation, the new characteristics of the media landscape, and changes in teaching have led to an era that offers "unprecedented possibilities for the development of learning and numerous ways to design learning experiences" (Vieira and Munaro, 2019, p. 318).

The idea of a transmedia pedagogy arises, though not without reservations. Sánchez-Caballé and González-Martínez (2023) note that while technological innovations and new media have generated significant transformations in education, they are not enough to justify the existence of a new pedagogy. According to the authors, these tools have the potential to enrich and diversify teaching methods, but they do not represent a paradigmatic shift that reconfigures the fundamental pedagogical principles. In their view, "we are facing a didactic umbrella that can guide the design of learning experiences based on the articulation of elements that now come from a different conception of cultural phenomena" (p. 28). They propose three

reference frameworks for approaching transmedia learning: participatory culture, media convergence (theories developed by Henry Jenkins), and connectivism, a learning theory developed by George Siemens and Stephen Downes. From this approach, learning situations emerge from each person's need to construct a narrative, using the resources available (both analog and digital) in a community context where collaboration is not an option but a necessity: "the combination of these elements, and the convergence of technology, transmedia, and a powerful narrative, form a potentially very interesting and uncommon didactic proposal (also, in fact, too broad)" (Sánchez-Caballé and González-Martínez, 2023, p. 28). However, articulating these ideas is complex, especially when seeking to make them motivating for the students.

In practical terms, the opportunities of Transmedia Learning (TL) arise precisely from its ability to concretise easily accepted but difficult-to-articulate pedagogical principles (constructivism, connectivism) into proposals that are motivating for learners (engagement), customisable and community-oriented (precisely because the narrative allows for layers, derivations, and successive points of encounter), harmonious with the digital context in which we live (but at the same time low-tech and compatible with the analogue world, which need not be avoided). Finally, these proposals allow for crossing, if desired, the boundaries of formal learning (in the broad sense) and educational institutions (specifically) and connecting with the everyday world of the learners (this point is crucial, as it breathes life into and offers real opportunities for TL that directly connect with the individual's personal learning) (Sánchez-Caballé and González-Martínez, 2023, p. 29).

However, teachers face the challenge of articulating the possibilities and characteristics of transmedia learning, which implies "teaching through stories across various digital media, activating emotional content and stimulating learning in students" (Hermann-Acosta and Pérez Garcias, 2019, p. 11). This challenge becomes more complicated when considering that current generations—such as Generation Y and Z, who have been shaped during a period of accelerated technological transformation—naturally embrace learning models that, in many cases, have not yet been validated nor systematically tested for their effectiveness. This raises the need to develop educational approaches that, in addition to leveraging technological tools and transmedia narratives, are rigorously evaluated to ensure their impact on learning and their sustainability over time. Additionally, each generation faces its own unique learning demands, corresponding with the reality of its environment.

This new Generation Z [...] is characterised by a desire for freedom in everything they do, personalising everything around them and considering research and access to information as natural. Since members of this generation have grown up immersed in interactive experiences, they are collaborative but seek instant answers (Vieira and Munaro, 2019, p. 324).

Fernández Manzano (2022) focuses on the natural adaptation of the Alpha and Zeta generations to transmedia stories. By introducing the university course "Transmedia Storytelling," students are given the opportunity to explore the possibilities of this format and apply transmedia principles to cultural products. He considers it feasible to integrate transmedia narratives into higher education, fostering both creativity and the understanding of narratives distributed across multiple channels.

Transmedia learning is closely related to active teaching methodologies, as its approach, based on storytelling and content distribution across multiple platforms, complements pedagogical practices that place the student at the centre of the learning process. These methodologies include cooperative learning, flipped classrooms, gamification, project-based learning, and design thinking.

As Acuy Rodríguez and Baca Cáceres (2022) point out, these strategies have the main objective of engaging students more proactively and collaboratively, encouraging their participation and promoting meaningful learning. When integrated with the transmedia approach, these methodologies not only diversify educational experiences but also enhance creativity, autonomy, and the development of transversal skills in students, adapting to the demands of an increasingly digital and interconnected educational environment. The transmedia game proposal put forward by Tombleson (2024) exemplifies how the integration of different platforms can foster student participation and engagement, both of which are fundamental elements in participatory culture. This approach promotes the immersion of students in an enriched learning environment that combines narratives, interactivity, and collaboration.

According to Tombleson (2024), transmedia approaches "can be applied to transmedia learning" (p. 8), showing that not only are they compatible, but they complement each other by enhancing the active involvement of students. This model allows students to explore, collaborate, and create content meaningfully in a multifaceted environment, where digital tools and connected narratives play a central role in building dynamic and motivating learning experiences.

5.6. Transmedia Competencies

Embracing the possibility of transmedia learning requires considering the development of transmedia competencies both in students and teachers. Tombleson (2024) underscores this need by stating that "transmedia learning focuses on both the teaching approach and the skills acquired by the students" (p. 9). This implies that educational practices must go beyond the mere incorporation of technologies and focus on developing specific abilities that allow for harnessing the potential of transmedia in teaching and learning contexts.

In this regard, Hermann-Acosta and Pérez Garcias (2019) reflect on four fundamental types of competencies associated with digital literacy: scientific, technological, narrative, and communicative. Furthermore, they propose "the creation of an open, flexible, interactive, and dialogical educational model" (p. 11). This model integrates the principles of transmedia learning, enabling both students and teachers to develop essential skills to navigate, create, and participate in educational environments characterised by technological convergence and collaborative interaction.

According to Djonov et al. (2021), exposing children to narratives such as *The Fantastic Flying Books of Mr Morris Lessmore* in its various formats (film, interactive app, and illustrated book) demonstrates how children can use digital tools and semiotic resources to construct their own narratives. The study revealed the potential of these media, while older children exhibited a more advanced understanding of narrative conventions and available semiotic resources. These observations are crucial for developing effective approaches to critical multimodal literacy in the digital age, enabling educators to adapt concepts and analytical frameworks for

the classroom, focusing on the continuity between old and new technologies and semiotic practices. It is feasible to maintain the idea of the importance of storytelling and educational narratives that incorporate transmedia techniques to fully exploit their potential.

Connectivity, participation, and the creation of a world of stories are fundamental elements that contribute to an indispensable competence in transmedia learning: collective intelligence. "Learning is not a passive activity, and collective intelligence is the foundation of the entire transmedia learning process" (Tombleson, 2024, p. 10).

It is necessary to delve deeper into collective intelligence, a concept that describes the capacity of a group of people to collaborate and generate knowledge, ideas, or solutions that surpass the individual capabilities of its members. This form of intelligence emerges from the interaction and exchange of information among group members and is enhanced by the diversity of perspectives, skills, and experiences of each individual. Through collaboration, groups can tackle problems more efficiently and creatively than if each member worked in isolation. This phenomenon is relevant in multiple fields, such as decision-making in organizations, the development of research projects, and communities of practice in educational environments.

This concept has gained particular relevance with the advancement of digital technologies and online platforms, which allow people from all over the world to contribute, share, and collaborate on collective projects. Collective intelligence is also linked to the idea that, in a network of connected individuals, information flows and combines in such a way that the result is more complete and profound knowledge, accessible to all participants in the network: "Collective 'intelligence' is considered important in transmedia learning, as it replicates the environment in the workplace, where often it is not the idea of one, but of many" (Tombleson, 2024, p. 10).

VI. Conclusions

The review allowed for the identification of several frameworks. First, it provided an overview of the evolution of the concept of transmedia storytelling into the concept of transmedia learning. Second, it highlighted the growing interest in transmedia storytelling as an object of study within the field of Education. Third, in agreement with González-Martínez et al. (2019), it affirmed that the interest in the educational possibilities of transmedia storytelling "ensures its future as a subject that deserves the attention of educators, teachers, and researchers in the coming years" (p. 218). The inclusion of systematic reviews as a type of documentary research reflected this evolution, showing how transmedia storytelling has progressively integrated into various educational aspects. Finally, we adopt the reflection of González-Martínez et al. (2018): "All of this constitutes a path that educational research must follow to harness all the potential that transmedia (and transmedia literacy) can offer in terms of learning" (pp. 33-34).

The goal of this exploratory review was to analyze the use of transmedia storytelling with the purpose of identifying the strategic characteristics of transmedia literacy in the integration of ICTs in higher education teaching. The findings demonstrate that transmedia storytelling is revolutionizing the teaching-learning process by integrating multiple platforms and media, generating more interactive, participatory, and immersive educational dynamics. We identified

systematic reviews that have conducted this analysis over an extended period (2010–2024), providing insights into the evolution of the concept and its use in education.

Transmedia storytelling, with its characteristics, allows students to take on an active role as creators and co-creators of content, which not only enriches their learning process but also strengthens essential skills such as digital and transmedia literacy, critical thinking, and collaboration.

Transmedia learning, conceived as a holistic approach to multiplatform education, fosters connection and collaboration in both formal and informal contexts. Open narratives, without a predefined ending, expand learning possibilities by allowing the personalization and extension of stories, stimulating creativity, motivation, and autonomy in students. This immersive strategy connects various platforms and media, facilitating meaningful learning that combines individual and collective experiences, while promoting critical understanding of content. This positions transmedia storytelling as a strategic resource in higher education, capable of adapting to the demands of an increasingly digital and interconnected educational environment.

Therefore, the incorporation of transmedia literacy and learning into higher education constitutes a valuable tool for effectively integrating ICTs, fostering student agency, developing key competencies, and building dynamic, meaningful, and motivating learning experiences.

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Chapter 11. Dynamizing online education in Master's Degree in Teaching Training program: the benefits of game-based learning with Edu.cerebriti

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I. Introduction

In recent decades, and particularly following the COVID-19 pandemic, online master's programs have experienced exponential growth due to their accessibility, adaptability, and flexibility in the learning process. This e-learning model holds significant potential for developing digital competencies and incorporating innovative educational technologies that facilitate ubiquitous learning, improving student access to education (Ong et al., 2023). However, e-learning in higher education currently faces a considerable challenge: maintaining the motivation, engagement, and interest of adult learners behind screens (Fernández et al., 2024). The lack of physical interaction often exacerbates students' passive roles during live sessions. This situation necessitates the incorporation of interactive dynamics that encourage student participation, foster more dynamic live sessions, and ensure meaningful and effective learning through methodological innovation (Balón Medina et al., 2024).

The dynamization of online classes has become essential to overcoming the barriers of e-learning, such as low participation, limited social interaction, and diminished motivation due to the absence of emotional connections. According to research by Ong et al. (2023), student engagement involves their cognitive immersion as well as emotional commitment to the learning process. To enhance this engagement, educators must apply diverse methodological strategies that provide active and appealing learning experiences. UNESCO (2021) adds that these strategies should be adaptive, exploring their potential to create mechanisms that foster the necessary engagement to prevent student withdrawal or passivity.

One such effective methodological strategy is **Game-Based Learning (GBL)**, which employs educational video games to actively and participatively consolidate and expand knowledge. Unlike gamification, which incorporates game elements into non-game contexts (Deterding, 2011; Navarro-Mateos et al., 2021), GBL involves the comprehensive use of games in classrooms designed explicitly for educational purposes. It guarantees incidental learning, allowing students to acquire knowledge and develop skills effortlessly while interacting with game-based educational platforms like Kahoot, Edu.cerebriti, or Educaplay.

This study aims to analyze the motivational and participatory potential of GBL using the Edu.cerebriti tool, designed for creating educational video games and tracking learning

analytics. By creating learning environments that facilitate active, incidental, and meaningful learning, this approach was implemented and analyzed with 36 students enrolled in the Master's in Secondary Education Teaching, Vocational Training, and Language Instruction, specializing in Technology and Informatics at the International University of La Rioja (UNIR). The implementation involved an innovative pedagogical strategy conducted over a week at the end of the semester. Students were asked to play three video games developed using the Edu.cerebriti tool and respond to a brief seven-question survey via Google Forms to evaluate their experience.

II. Game-Based Learning in Higher Education

Game-Based Learning (GBL) is an active methodology that integrates games or video games as a core element in the teaching-learning process, applied logically and contextually within the learning environment and on a continuous basis. This approach is rooted in pedagogical theories such as Vygotsky's constructivism, emphasizing the importance of active and social learning (Zhang et al., 2024), and Ausubel's meaningful learning theory, which highlights the need to connect new knowledge with students' pre-existing cognitive structures (Quiroz, 2019).

Games can be custom-created by educators to tailor content to classroom needs or utilize existing games to leverage their educational and entertainment value (Manzano et al., 2022). In this study, custom games were chosen to address specific topics from the course syllabus on Technology and Informatics Didactics. Regardless of the approach, it is essential to consider "serious games," first defined by Clark C. Abt (1970) as games designed to entertain players while achieving at least one additional objective, such as education, training, or raising awareness.

In online higher education contexts, GBL provides students with opportunities for experimentation and problem-solving in a safe environment controlled by the instructor. This approach includes learning analytics that enables personalized learning, promoting efficient, active, and autonomous knowledge acquisition (Plass et al., 2015). Studies such as those by Wouters et al. (2013) and Magadán Díaz et al. (2024) confirm that using serious games in classrooms improves students' academic outcomes compared to traditional methods.

Consequently, Game-Based Learning applied in higher education virtual classrooms is an excellent strategy to foster student engagement by enhancing motivation and achieving educational objectives (Ormazábal et al., 2023). Furthermore, it effectively energizes sessions and promotes incidental learning, a process in which students acquire knowledge effortlessly while engaging in meaningful, enjoyable, and challenging activities directly related to academic content.

II. The benefits of the Edu.cerebriti tool for creating educational video games

Edu.Cerebriti[18] is a paid online tool that allows both teachers and students to create simple educational video games. Its intuitive interface enables users to either utilize pre-designed games by other users or create their own educational games in just a few minutes. These games can include various formats such as word searches, blank maps, question carousels, identifying correct answers, grouping words or images, finding the secret word, and quizzes.

[18] https://edu.cerebriti.com/

Additionally, once these games are created, they can be grouped into a learning itinerary or game route, enhancing students' gamified experiences while providing comprehensive learning analytics in a single activity.

The platform allows educators to create different classes based on subjects and assign games specifically designed for each class group. Once students log in with their username and access code—without requiring an email registration—they can access the games the teacher has linked to their class group. During the gamified experience, the teacher can monitor individual results in the grades section. The platform provides the following learning analytics:

- The number of times a student has played the assigned games.
- Games created by the student.
- "Neuros" earned, representing points used for ranking purposes.
- Total time spent playing.

This information gives teachers valuable insights into the time students dedicate to educational games and their performance during these activities.

In higher education, and specifically in teacher training master's programs, tools like Edu.Cerebriti—which integrate both educational game design and gamification elements such as points—can be highly beneficial. Not only do they enhance the motivation and engagement discussed earlier, but they also promote the development of pedagogical competencies and mastery of digital skills. These competencies are essential for 21st-century educators to implement innovative strategies tailored to classroom realities and current student needs, as highlighted by the European Commission in the *European Framework for the Digital Competence of Educators* ("DigCompEdu," 2018) and the updated *Digital Competence Framework for Educators* (2022).

IV. Experience with Edu.Cerebriti in UNIR's Teacher Training Master's Program

The following details an innovative proposal implemented during the 2023–2024 academic year for a group of 36 students enrolled in the subject *Didactics of Technology and Informatics* within the Teacher Training Master's Program. This proposal involved the creation of three video games using the Edu.Cerebriti tool to cover three of the most theoretical topics in the syllabus: **Learning Theories, Gamifying Classrooms, and Learning Assessment.** These topics were selected for their theoretical density, with the aim of turning the review process into an engaging, active, and satisfying experience to solidify complex abstract concepts.

4.1. Methodology and educational innovation design

This methodological strategy was developed during the first semester and implemented during the final week of classes. The process was divided into the following phases.

4.1.1. Phase 1. Design

Creation and publication of three video games on Edu.Cerebriti, linked to theoretical topics in the syllabus for the subject *Didactics of Technology and Informatics.* The selected topics were **Learning Theories, Gamifying Classrooms,** and **Learning Assessment.**

Figure 1.
Video game designed on the Edu.Cerebriti platform, linking concepts related to learning theories through five brief questions.

Source: own elaboration.

Figure 2.
Video game designed with Edu.Cerebriti to select concepts and link them to gamification elements through 10 brief questions.

Source: own elaboration.

Figure 3.
Video game designed with Edu.Cerebriti to write key terms linked to learning assessment concepts through 5 brief questions.

Source: own elaboration.

4.1.2. Phase 2. Creation

Creation of profiles and access codes for each student on Edu.Cerebriti. Since this tool does not require students to register with their email addresses, the following credentials were provided to them: their "Nick" for identification on the platform, their "username" for access, and the access code, as follows:

Figure 4.
Spreadsheet with the creation of student access credentials for Edu.Cerebriti video games.

Nombre del estudiante	Nick o Nombre con el que apareces en Edu.cerebriti	Nick de acceso "username" (entrar en: https://edu.cerebriti.com/). En la parte superior derecha, pinchar "Iniciar sesión" y añadir en el primer hueco este nombre	**código de acceso "password" (introducir en la parte inferior)	Enlace al cuestionario de valoración, responder tras finalizar el juego de Edu.cerebriti	** Una vez metidas las credenciales, debemos acceder y crear nuestro avatar, después debemos ir a "retos" y empezar a jugar.
[illegible]	Alumn@1	alumn115	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@10	alumn116	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@11	alumn117	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@12	alumn118	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@13	alumn119	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@14	alumn120	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@15	alumn121	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@16	alumn122	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@17	alumn123	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@18	alumn124	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@19	alumn125	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@2	alumn212	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@20	alumn213	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@21	alumn214	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
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[illegible]	Alumn@27	alumn220	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
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[illegible]	Alumn@31	alumn313	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
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[illegible]	Alumn@4	alumn411	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
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[illegible]	Alumn@41	alumn413	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@42	alumn414	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@43	alumn415	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@44	alumn416	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@45	alumn417	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@46	alumn418	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@47	alumn419	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@48	alumn420	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@49	alumn421	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@5	alumn511	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@50	alumn512	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@51	alumn513	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@52	alumn514	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@53	alumn515	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@54	alumn516	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@55	alumn517	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@56	alumn518	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@57	alumn519	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@58	alumn520	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@59	alumn521	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@60	alumn611	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@61	alumn612	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@7	alumn711	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@8	alumn811	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	
[illegible]	Alumn@9	alumn911	[illegible]	https://forms.gle/cDZaAvUsDvZVV2o59	

Source: own elaboration.

4.1.3. Phase 3. Data collection

A brief seven-question survey was created using Google Forms to be completed after finishing the games. As shown in the previous figure, the survey link was included in the table for easy access upon completing the games.

4.1.4. Phase 4. Implementation

During the final week of class, part of the sessions was dedicated to explaining how the Edu.Cerebriti tool works and providing the spreadsheet with students' personal access codes for the video games. This marked the start of their interaction with the games, which continued for one week. Students were also reminded of the importance of completing the Google Forms questionnaire to share their feedback and impressions after the gamified experience.

4.1.5. Phase 5. Evaluation

An analysis was conducted based on the learning analytics provided by the Edu.Cerebriti platform and the information gathered through the Google Forms questionnaire. The details of this final phase are developed further below.

4.2. Analysis of the results

Regarding the results provided by the platform, the data visualization and learning analytics offer valuable insights into the time students dedicated to playing as well as the scores they achieved. This provides an approximation of the grades they might obtain in the evaluation of these topics during the final master's exam. Edu.Cerebriti reports the data in five columns:

Figure 5.
Example of data visualization obtained by students from the Edu.Cerebriti platform.

	Juegos JUGADOS	Juegos CREADOS	Total NEUROS	Nota MEDIA	Tiempo JUGANDO
Alumn@27	7	0	158	8.6	0:03:28
Alumn@43	4	0	140	10	0:02:14
Profe	4	3	140	4	0:00:48
Alumn@15	5	0	139	10	0:02:03
Alumn@16	7	0	132	5.06	0:05:05
Alumn@54	4	0	125	10	0:01:12
Alumn@4	3	0	124	10	0:01:18
Alumn@59	4	0	124	5	0:02:08
Alumn@9	2	0	115	10	0:00:34
Alumn@48	3	0	115	10	0:01:30
Alumn@50	2	0	113	6.5	0:01:04
Alumn@57	2	0	111	9	0:00:53
Alumn@13	1	0	109	9	0:00:24
Alumn@30	3	0	29	8.5	0:01:54
Alumn@12	3	0	24	9.5	0:01:36
Alumn@2	2	0	15	10	0:01:08
Alumn@56	6	0	15	10	0:02:29
Alumn@58	3	0	15	10	0:01:05

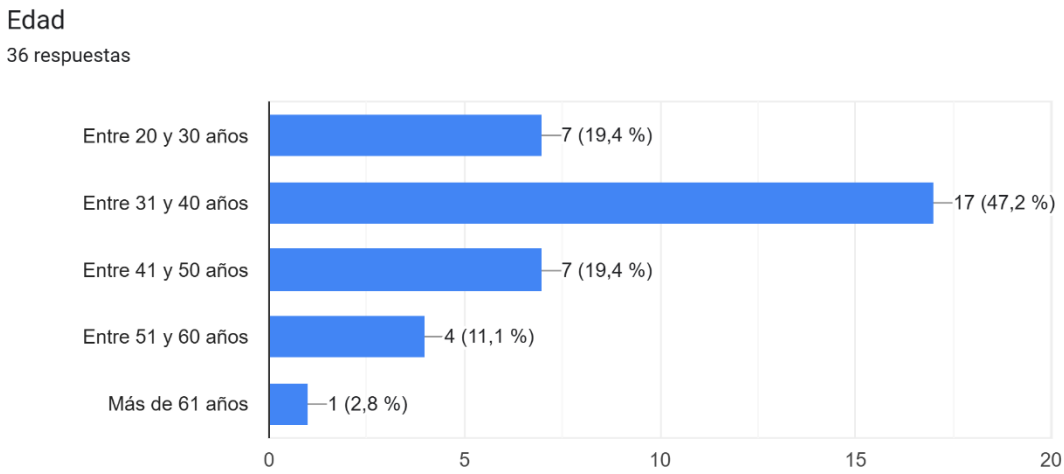
Source: https://edu.cerebriti.com/

The results from the previous figure are explained below:

- The first column indicates the number of "games played", which reveals how many attempts were made at the games. The average for this activity was 3.43, indicating that students played the same game more than once.
- The "games created" column was not considered in this implementation since students were not asked to create their own game.
- The "total neuros" column, representing the points accumulated as students correctly answered the game questions, was used solely to determine their ranking, serving as a motivational element for the students.
- The "average score" reported a mean of 7.64 points, reflecting a "good" level in knowledge acquisition.
- Lastly, the "time played" column reported an average of 0:01:33 (approximately 1 minute and 33 seconds). This indicates that students completed the games in less than two minutes, showing that the games were simple, easy, and intuitive, aligning with the dynamic and fast-paced nature of online classes.

The results from the Google Forms questionnaire are presented below:

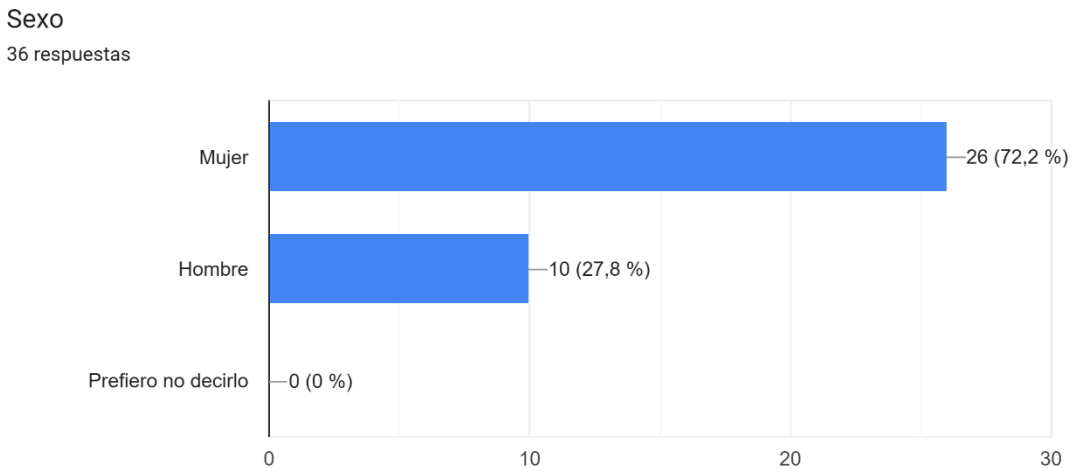
Figure 6.
Question 1: Results graph showing the participants' age.



Source: Google Forms “Valoración del aprendizaje con Edu.cerebriti”.

As is common in this type of online master’s program, the age of the students ranges between 31 and 40 years in 47.2% of cases. The typical profile consists of individuals preparing for teaching qualification exams who require the master’s degree to access teaching positions.

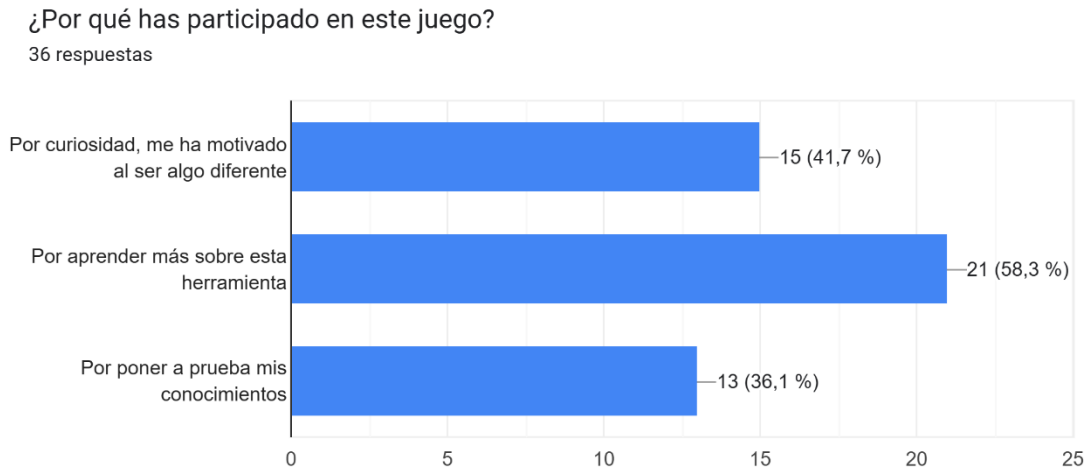
Figure 7.
Question 2: Results graph showing the gender of participants.



Source: Google Forms "Valoración del aprendizaje con Edu.cerebriti".

In this second question, gender was included to understand the demographic profile of the surveyed students. Female participation (72.2%) was notably higher than male participation (27.8%).

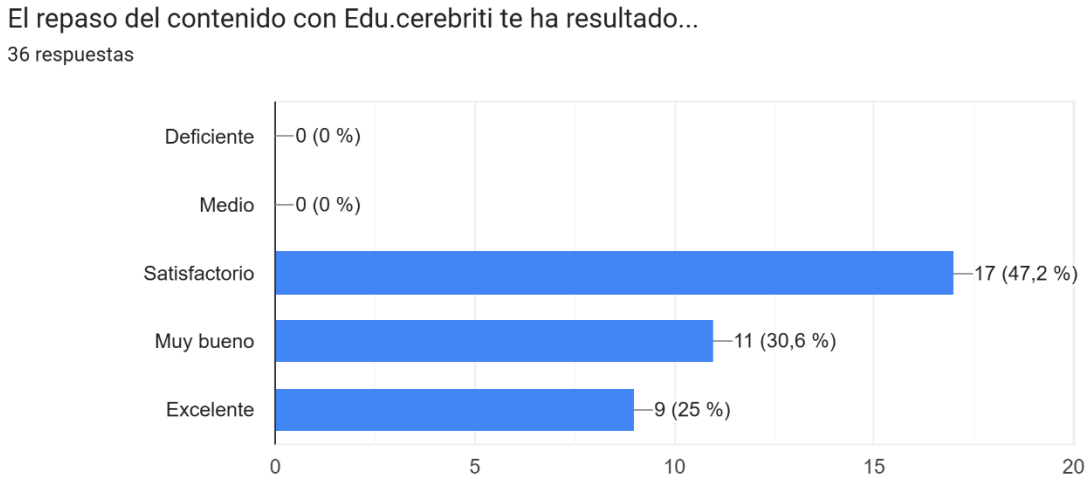
Figure 8.
Question 3: Results graph for the question, "Why did you participate in this game?".



Source: Google Forms "Valoración del aprendizaje con Edu.cerebriti".

The results from this question are significant, as more than half of the respondents (58.3%) reported accessing the games to learn more about the Edu.Cerebriti tool. As students in the teacher training master's program, it is logical to assume they found the tool appealing for potential use in their teaching practice. However, it is noteworthy that only 36.1% of the students stated they participated to test the knowledge acquired during the classes. Additionally, a significant 41.7% reported accessing the games out of curiosity and motivation, as it introduced a novel element into the dynamics of online sessions.

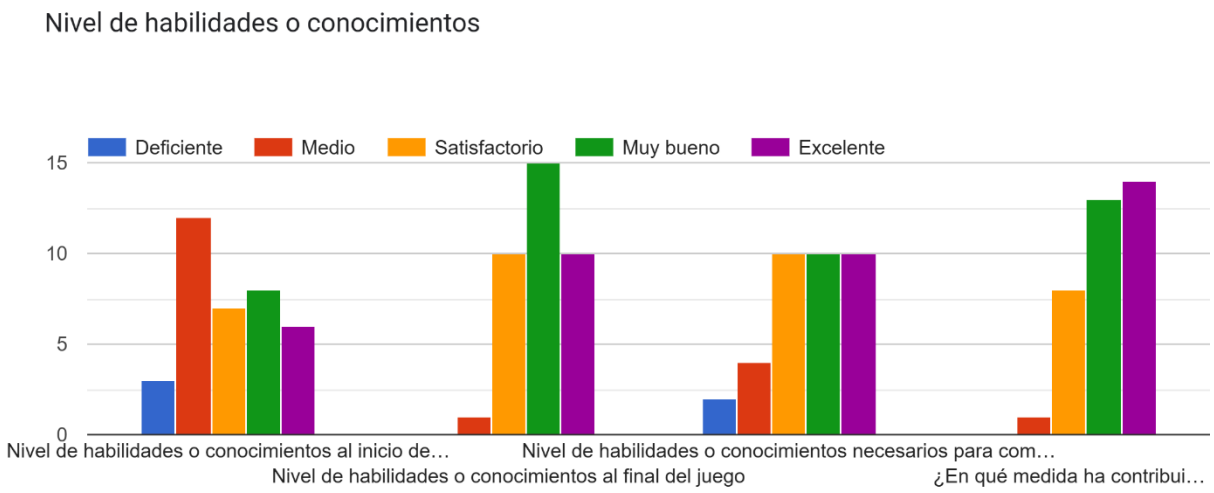
Figure 9.
Question 4: Results graph for the question about the effectiveness of the experience in reviewing content.



Source: Google Forms "Valoración del aprendizaje con Edu.cerebriti".

Regarding the effectiveness of the experience for reviewing topics, 47.2% found it satisfactory, 30.6% rated it as very good, and 25% rated it as excellent. This confirms that incorporating GBL into the classroom is an excellent strategy for energizing online classes and reviewing content in a gamified and incidental manner.

Figure 10.
Question 5: Results graph for the question about the level of knowledge.



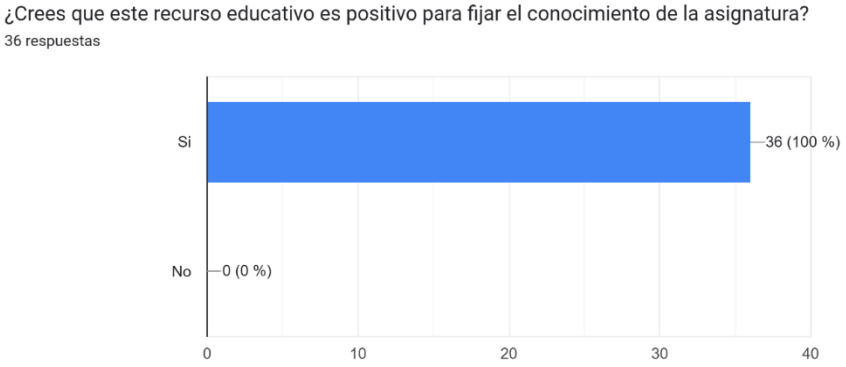
Source: Google Forms "Valoración del aprendizaje con Edu.cerebriti".

For this question, students were asked to rate their knowledge and skills on theoretical topics at various stages of the gamified experience using a Likert scale. The results showed an average level of knowledge at the beginning of the game, which improved to very good by the end. Additionally, two more questions were included: the level of knowledge needed to complete the game, which was rated very good, and the extent to which the game contributed to improving their knowledge and skills, which received an excellent rating. These results

again demonstrate that this gamified experience was highly satisfying for the group of students.

As shown in Figure 11, when asked if they believed this educational resource is effective for reinforcing knowledge, 100% of the participants responded affirmatively.

Figure 11.
Question 6: Results graph for the question about the effectiveness of this GBL strategy for reinforcing subject knowledge.



Source: Google Forms “Valoración del aprendizaje con Edu.cerebriti”.

Finally, an open-ended question was included to gather more detailed and personalized feedback on which aspects of the created games were most useful. The results are summarized in the following table:

Table 1.

Question 7 from the questionnaire: "Which aspects of these games did you find most useful?"

Students	Answers
1	I need to review more.
2	I love that we are motivated through a tool that measures our skills—I loved it.
3	The general review of the topics.
4	Refreshing my memory of the concepts.
5	It helps me work on visual memory.
6	Being able to review the studied material (I only managed to play one of the games. If I can access the others, I'll respond with more insight).
7	The different teaching methods that can be applied in the game.
8	Through the game, we can see people's knowledge and their ranking on the leaderboard.
11	Learning through games by applying gamification.
12	The curiosity, the challenge, and the ranking.
13	It's dynamic and provides instant scoring.
14	The game itself motivates us.
15	I loved this tool, and I'll use it with my students.
16	The interface is user-friendly and visually appealing. The game mechanics are not complex.
17	The game was a good idea for reviewing learning analytics and its different levels, as well as other concepts. The only thing is that I would have liked to do another activity with open-ended questions, perhaps to recall the steps for conducting learning analytics with a dashboard, especially for the exam. Perhaps suggesting which KPIs could be analyzed beyond what we've already done in our activity. Going deeper into the review would be helpful. Honestly, it felt quite simple, but I had never worked with Cerebriti before, so I really enjoyed it. It's a great way to introduce variety when creating digital educational games. Thank you for bringing these resources into our learning.
18	The interaction of the student with a simple yet attractive environment makes the student want to "play" this game.
19	I had heard of Cerebriti as an alternative to Kahoot, but I hadn't seen it in action. Thank you for showing it to us.
20	Being able to see the correct answers at the end.
21	It's true that we need new technologies to open new knowledge pathways for students so we can interact with this new platform.
22	**IMPROVE SKILLS**
23	It's a fun way to review and strengthen knowledge.
24	Remembering the topics covered.
25	Mixing concepts that I previously thought were the same—I'm still getting confused by some of them—but it helps clarify concepts.
26	The fun of the game itself.
27	It allows you to review and reflect on concepts or key terms that I had forgotten.
28	It shows me where I need to review the material in more detail.
29	It has motivated me a lot, and I've learned more than just listening in class.
30	Playing while learning content at the same time.
31	Reviewing in a simple and quick way.
32	It's fun, and I learn without much effort.
33	Its simplicity and usefulness.
34	Learning while entertaining myself playing—it goes by quickly.
35	The fun of the games and the easy review of the content.
36	It allows me to learn without relying solely on memory.

Source: own elaboration based on Google Forms "Valoración del aprendizaje con Edu.cerebriti".

In this final open-ended question, the responses are highly varied, as shown in the previous table. However, in most cases, it is confirmed that the experience with Edu.Cerebriti has facilitated learning in an effortless, fun, simple, and quick manner.

Additionally, its value in promoting self-directed learning among students is highlighted, emphasizing that the results obtained with Edu.Cerebriti help identify areas that require further review and contribute to the development of competencies.

Finally, positive aspects of the tool are also mentioned, such as the points, trophies, challenges, and rankings awarded after the gameplay experience. These elements underscore that this type of methodological strategy is highly effective for enhancing student participation and learning in virtual education contexts.

IV. Conclusions

The dynamization of online master's programs has become a fundamental element in ensuring not only meaningful learning for students but also increased participation and motivation in their educational experience. By employing innovative methodological strategies, such as the use of educational video games created with tools like Edu.cerebriti, learning is enriched across multiple dimensions. Video games provide an innovative solution to the challenges of online teaching.

This approach is particularly impactful when applied to teacher training master's programs. Not only does it motivate students by introducing tools they can later use in their own classrooms, but it also fosters the development of transversal competencies, such as digital skills, which are essential for educational innovation. Furthermore, this method promotes a more interactive, inclusive, and meaningful education, addressing the needs and demands of 21st-century learning.

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The Educational Revolution: New Perspectives and Innovative Practices offers a comprehensive and multidimensional exploration of the innovations that are reshaping the current educational landscape. Coordinated and directed by a distinguished team of international experts, this book addresses the most advanced pedagogical, methodological, and technological practices, providing an integrated and accessible view for all those seeking to transform teaching and learning in diverse educational contexts.

The book is organised into several key chapters, each dedicated to a fundamental aspect of modern education. Its introduction provides a detailed analysis of emerging technological tools, with a particular focus on the use of digital badges in platforms such as Moodle, highlighting how these tools can foster motivation, creativity, and engagement in online learning environments. Throughout the subsequent chapters, the book delves into the use of systematic reviews in early childhood and primary education, as well as innovative projects that integrate interdisciplinary approaches, the use of advanced technology, and constructivist principles, aiming to meet the demands of 21st-century learners.

A significant portion of the book is dedicated to exploring practices in higher education, addressing key strategies to maintain academic integrity in the face of artificial intelligence, and how to promote deep learning through Immediate Response Systems (IRS). These studies emphasise the crucial role of technology in creating active, reflective, and student-centred learning environments.

Additionally, the book offers perspectives on intercultural competencies in secondary education, with practical examples and testimonies from high school students in Barcelona, as well as the development of sustainable educational projects in global contexts such as Antioquia, Colombia. Through these case studies, the book highlights the universal applicability of innovative methodologies, transcending geographical and cultural boundaries, and promoting inclusive and accessible education.

At the heart of the book, a balance between technological integration and pedagogical depth is advocated, also addressing the ethical dimensions of education in a rapidly changing digital world. Strategies are proposed that emphasise collaboration, creativity, and inclusion, urging educators to rethink traditional teaching models, embrace technological advancements, and commit to lifelong learning.

This book stands as an indispensable resource for educators, policymakers, and researchers, providing tools and practices that inspire transformation in classrooms worldwide. It is a call to action to reimagine education as a dynamic, equitable, and forward-looking endeavour, capable of responding to the challenges of an interconnected and constantly changing world.