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Lifelong Digital Learning and Education: promoting flexibility, inclusion, critical thinking and international exchange

BOOK OF ABSTRACTS

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ID 103

Enhancing Teacher Training for Spanish Foreign Language Education with Artificial Intelligence: a Study of Practical Tools

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Abstract

In today's ever-changing landscape of language education, the rise of generative artificial intelligence (AI), represented by advanced technologies like ChatGPT, is causing a significant shift in how languages are learned. This study explores various practical tools aimed at improving language skills in foreign languages, with AI playing a central role in facilitating learning.

Beyond the impressive capabilities of ChatGPT, we delve into a range of innovative tools, each offering unique functionalities. For instance, Grammarly and ChatGPT, as studied by (Barrot, 2022, 2023), uses cutting-edge technology to enhance writing skills in English as a second language or foreign language (ESL/EFL), giving immediate feedback on grammar, spelling, and style. Additionally, chatbots, examined by (Belda-Medina & Calvo-Ferrer, 2022), use interactive interfaces to improve communication skills. Furthermore, Zhang & Huang (2024)have conducted and study that explores the impact of artificial intelligence (AI) and machine learning (ML) on personalized language learning (PLL). It focuses on the use of large language models (LLMs), such as chatbots, to enhance vocabulary learning. In the study, 52 language students were divided into two groups: one using a chatbot based on LLMs and one without it. Both groups learned the same words over eight weeks, and they were assessed immediately after and two weeks later.

The results show that the use of chatbots based on LLMs significantly improves receptive and productive vocabulary learning, as well as its long-term retention and incidental learning. This study highlights the practical value of LLM-based tools in language teaching, especially in vocabulary development, and emphasizes the importance of educators understanding the potential of these technologies in second language vocabulary instruction.

This study identifies specific generative AI tools that tailor learning experiences to individual preferences, offering interactive exercises to improve language proficiency in areas like vocabulary, grammar, reading, and communication skills.

Moreover, we explore the challenges of integrating AI into foreign language curricula, emphasizing the need for customization to meet learning objectives while ensuring cultural and linguistic relevance. We highlight the importance of a robust pedagogical framework that seamlessly integrates AI with traditional teaching methods (Chicaiza et al., 2023; Esnaola, 2023; Jeon et al., 2023; Kohnke et al., 2023; Monferrer Palmer, 2024; VVAA, 2023).

Additionally, we stress the significance of teacher training in AI to maximize its potential in language education, fostering innovation in the classroom and preparing educators for a technology-driven educational environment.

Investing in AI training enhances language instruction quality and effectiveness, driving innovation in education. It is crucial to start training future teachers at the undergraduate level, integrating AI into the curricular content. By incorporating AI literacy into teacher education programs, we ensure that emerging educators are well-equipped to leverage these technologies from the outset of their careers. This proactive approach prepares future educators to embrace the rapid advancements in AI and technology, enabling them to effectively incorporate innovative tools into their teaching practices. Equipping teacher candidates with the skills to navigate and apply AI-driven resources will empower them to create dynamic, engaging, and personalized learning experiences, ultimately enhancing the overall quality of language education.

By showcasing the merits of these tools and their effectiveness in real-world language learning settings, this study equips educators with resources to improve language instruction quality. It underscores AI's transformative potential in language education and sets a path for future research and educational practices, leading to better learning outcomes and enriched experiences.

Keywords: Generative AI, Foreign Language Learning, Educational Technology, Linguistic Competencies, Teacher Training.

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Removing Barriers from Learning

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Abstract

Disability is a conflict between someone's functional capability and the world we have constructed - be it the physical or digital world. Looking through the lens of the social view of disability, it is therefore the product, the online course, course content and the user workflows in the course and platform that creates the barriers, not the person accessing the content. ("A web for everyone" by Sarah Horton and Whitney Quesenbery). Removing barriers from digital content can often end up benefiting a much broader population this is often referred to as the curb cause effect.

There are many examples of barriers being removed by solutions in digital content which have this curb cut effect. The original purpose of closed captioning also assistant visuals were hearing impairments to be able to understand video content like the TV however now captions are used by people listening two and watching videos in noisy environments or quiet environments people learning new languages or learning in a new language or just wanting to follow along with content while they are doing something else like having a conversation with friends.

Another example of this effect would be screen readers the original and intended purpose of screen readers was to help visually impaired users navigate and interact with digital content under devices however nowadays this is used by people who prefer listening to content or needs to multitask our wish to reduce eye strain from prolonged screen use are people who are on the go I want to listen rather than read content.

Removal or avoidance of these barriers can be crucial for online learning and the content used in online learning.

So, if you want to create truly inclusive courses, we need to take three steps, firstly to avoid creating new barriers, and remove the existing ones that are there and lastly adopt the practice of baked in accessibility - putting people and their needs first. However, without understanding what the barriers are, this can be this is a tall ask.

This session will look at some of the common barriers that get created in online content and how to avoid building them.

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Keywords: enter up to 5 keywords separated by commas

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Math and Physics Education in the Chatgpt Era: the Art of Asking Questions

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Abstract

Could conversational generative artificial intelligence truly have an impact on the teaching of mathematics and physics? The discussion is open. To address this question, during the academic year 23-24, I experimented with a didactic approach using ChatGPT that involved approximately 100 students from 3rd and 4th year of high school for a total of 8 hours of curriculum. The goal was to integrate ChatGPT into traditional teaching and consider it as a tool for skill development. Students posed verbal, algebraic, and arithmetic math problems to ChatGPT, as well as a questionnaire prepared to assess misconceptions in physics. These were valid examples to encourage metacognitive questioning (asking "why"), interpreting ChatGPT's responses, and guiding the bot to formulate the correct answer after its errors. These metacognitive dialogues shifted students' focus towards reflecting on the meanings of mathematical and physical terms proposed by ChatGPT and the necessity to explain "why" rather than settling for "how." Given the wide availability of chatbots, it will be interesting in the future to implement experimentation using other chatbots (such as Claude2, Gemini and Mistral) to compare responses provided on specific items.

Keywords: Math Education, Physics Education, ChatGPT, AI in High School, Metacognitive teaching

Cantor argued that in mathematics, the art of posing problems should be given greater consideration than that of solving them. This quote seems to encapsulate well the situation that mathematics and physics teachers must confront with the advent of ChatGPT, especially because in today's society, the role of scientific education goes far beyond the mere learning of formulas and their subsequent trivial application. ChatGPT, and more generally, generative artificial intelligence (GAI), represent an opportunity to address the many challenges present today in the field of education. Specifically, I believe that ChatGPT can facilitate students' intrinsic motivation and active engagement during learning, a factor crucially demonstrated to be fundamental for an efficient and enjoyable learning experience, thereby reinstating the central role of metacognitive reasoning and the ability to formulate well-posed questions in mathematics and physics.

The goal of every teacher (especially mathematics and physics teachers) is to cultivate effective learners who, to be such, must be able to develop skills in formulating precise and pointed questions and consequently receiving appropriate answers. For this reason, for ChatGPT to be an efficient "learning companion", it must be used in education in a way that transforms students into active agents who control their learning, helping them implement that capacity not possessed by ChatGPT: the ability to ask "why". On the other hand, an unconditional, unmediated, and thus uncritical use of ChatGPT by students leads to a progressive increase in their trust in it (they will tend to systematically trust the system's behaviors) and consequently to an excessive dependence on GAI, but above all to the progressive loss of the critical-analytical instinct typical of a correct and effective education process.

To address this problem, in the academic year 2023-24, I designed an educational path on GAI (particularly on ChatGPT) and its applications to the teaching of mathematics and physics. The educational path was first proposed to some teachers (with a 2-hour format on GAI fundamentals and 3 hours of "on-field" experimentation with ChatGPT) at my own institution and then tested in class by them, involving approximately 100 students in the second biennium of the high school for a total of 6 curriculum hours. The educational path aimed to integrate ChatGPT into traditional teaching and to consider it as a tool for the consolidation and development of higher-level skills

such as metacognition, critical thinking, and intellectual vigilance, considered fundamental components during learning.

Metacognition, in fact, is essential for undertaking active knowledge acquisition behaviors: numerous studies have shown that students with standard-level performance or particularly low mathematical performance benefit substantially from metacognitive teaching procedures. In the context of the educational path, a central topic was to put students in a position to develop the ability to ask for additional information if they were surprised by ChatGPT's responses. At the same time, the teacher's centrality is maintained, as they have the task of guiding students in developing metacognitive skills such as the ability to ask scientifically deep and meaningful questions. The idea was to sensitize mathematics and physics teachers to a more pronounced use of metacognitive teaching with the awareness that students cannot develop mathematical skills if they cannot examine problems from different perspectives, or if they cannot compare their solutions with other solutions or other structurally similar problems. Explicitly setting the goal of metacognitive scientific education means not settling for posing standard exercises or shared definitions to ChatGPT, but rather posing problems in which the personal intervention of the ChatGPT user, the student, is necessary because as Polya said, "solving problems is a specific task of intelligence, and intelligence is the specific gift of humankind".

The educational path involved students submitting verbal, algebraic, and arithmetic problems to ChatGPT, as well as a physics questionnaire prepared to assess students' misconceptions in physics between the ages of 11 and 14 (known as CEF, Elementary Physics Knowledge), presented in another article (Torre et al., 2024). The questions taken from standardized tests (such as INVALSI and OCSE-PISA) and the items in the CEF questionnaire are excellent examples to work on because they require the development of metacognitive questions (asking why) by students to interpret the responses given by ChatGPT, but above all to lead the bot to formulate the correct answer. As mentioned earlier, ChatGPT was not created to explain why, but to generate immediate responses. The educational proposal asked students to use the described item types to engage in metacognitive dialogues with ChatGPT about mathematics and physics with the aim of correcting mistakes and becoming "teachers" of the chatbot. These metacognitive dialogues shifted students' focus toward reflecting on the meanings of mathematical and physical terms progressively proposed by ChatGPT, on the critical approach to study, on the need to explain why, and not to settle for how.

Today more than ever, mathematics teachers, and schools in general, need to cultivate a "culture of doubt" through metacognitive teaching to view AI not as sophisticated crisis tools, but as valuable companions in the search for new pedagogical opportunities.

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Misconceptions in Physics Education at The Lower Secondary School Level: an Initial Experimentation

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Abstract

Achieving an adequate level of scientific knowledge is recognized as an important milestone not only for training future scientists, but above all to enable new generations to possess skills for responsible and critically informed citizenship. Regarding Italy, international comparisons highlight the increasing prevalence of specific critical issues in this area. As for research into educational actions aimed at improving the understanding of physical phenomena, it remains crucial to understand the preconceptions from which students move and the cognitive obstacles they entail. We have developed and validated a questionnaire to highlight the most common critical elements in the explanation of physical phenomena by students aged 11-14. The collected data confirm the presence of widespread misconceptions already reported in the literature, which it is important to bring to the attention of teachers. The questionnaire is complemented by formative feedback intended to provide initial indications for their revision.

Keywords: Science Teaching, Elementary knowledge of physics, Assessment, Foreknowledge, Cognitive change

The issue of science education has a long history in Italy (Israel, 2008). Since the post-war period and more recently, there have been and continue to be active local or regional initiatives in its various articulations (physical sciences, life sciences, earth sciences), characterized by didactic research activities often carried out in collaboration by university professors and school teachers. However, in light of international comparisons (OECD-PISA), the situation has worsened between 2012 and 2018 without the problem currently being the subject of adequate debate and significant institutional interventions (Calvani et al., 2022).

We have prepared and validated a questionnaire that highlights the most common critical elements in the explanations of physical phenomena by students aged 11-14. The hypothesis is that identifying the major misconceptions can be particularly useful because it enables teachers to immediately understand the points of greatest criticality in students' understanding of physical phenomena, which should be addressed as a priority. It is assumed in particular that the history of science offers specific indications for diagnosing and anticipating the mental representations of primary or secondary school students (Leone, 2014; Rinaudo & Leone, 2024).

Based on existing literature (Leone, 2020; Allen, 2014) and examples drawn from TIMSS and PISA, we have developed a tool to provide an overview of misconceptions presented by students aged 11 to 14 when faced with questions requiring the application of basic concepts and principles of elementary physics (CEF, Elementary Physics Knowledge). The hypothesis is that identifying these problematic situations provides useful signals and reference points for targeted interventions on the most common misunderstandings about basic scientific concepts, which can and should be challenged with students. The questionnaire presents common physical phenomena to the subject and requires explanations with typical questions: "Why does it happen?" "What happens if?" with four alternative answers, which usually include the most common naive knowledge. The first version of the questionnaire consists of 52 items to be applied in two sessions of 26 items each[1]. The application takes place as a collective test with sequential projection of the items on the interactive whiteboard. After the overall application, a didactic feedback follows, which the teacher can further enrich. The questionnaire can be defined as "didactic" in the sense that it does not only administer the questions to evaluate how the student addresses them. Once the

[1] The complete version of the questionnaire can be found at the following address https://sapie.it/wp/wp-content/uploads/2023/03/CEF_PRESENTAZIONE_20-11-1.pdf

questionnaire has been applied, feedback is provided with a brief explanation. For the validation of the test, a non-probabilistic sample consisting of students from the first, second, and third classes of lower secondary school was used, selected based on the availability given by the school principal and teachers. The administration of the instrument involved 235 students from the provinces of Pesaro-Urbino and Naples.

The collected data show that there are statistically significant differences between the students of the 1st classes, who have lower performance, compared to those of the 2nd and 3rd classes of lower secondary school. It is also noted that the difference in performance between males and females who participated is not statistically significant, although statistically significant differences exist between the group of males in the 1st classes and the group of males in the other classes. Furthermore, limiting ourselves to a quick review and deferring for further investigation to another work, we can observe that:

- students perform better on items related to changes in state; the behavior of air and gases; sound; and electric energy.
- a lot of misconceptions are found around concepts analyzed and discussed in the literature. At first glance, the major criticisms are on items related to the conservation of volume and weight; the concept of force (particularly, on the principle of inertia and lifting of weight); buoyancy; electricity (particularly, on the distinction between electrical and magnetic phenomena of attraction); light (particularly, on the length of shadows); the apparent movement of the Sun; and the rotation of the Earth around its axis.

The hypothesis is that highlighting the major misconceptions from a broad spectrum perspective can be particularly useful because it enables teachers to immediately understand the points of greatest criticality in students' understanding of physical phenomena, on which it is advisable to intervene. Although in some cases a wrong idea may be only the surface of a more complex iceberg, corrective information, even with targeted information or small examples, may already shed a different light on the issue at hand, or generate a form of conflict that can lead to further revision of naive explanations. The subsequent development of the work involves strengthening the didactic part, with the development of a kit of short interventions, especially in the form of simulations or videos, aimed at promoting students' awareness of the need to restructure their schemes on the identified critical points.

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Exploring Syllabus Design in Higher Education. Perspectives, Practices, and Implications in Blended Learning Environments

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Extended Abstract

The evolution of higher education has undergone a profound transformation fueled by the convergence of technology and pedagogy, leading to the emergence of blended learning environments. Within this dynamic landscape, syllabus design plays a pivotal role, acting as the cornerstone that shapes the structure, content, and delivery of courses. This study offers a comprehensive exploration of syllabus design in higher education, aiming to illuminate the intricacies underlying effective instructional design within blended learning contexts.

The exploration begins by elucidating the foundational theoretical frameworks that underpin syllabus design. The constructivist approach highlights the importance of active engagement and knowledge construction, advocating for environments that foster inquiry, collaboration, and critical thinking (Serbati et al., 2021). Concurrently, the learner-centered perspective prioritizes individual learner needs, interests, and learning styles in course development. Additionally, the outcome-based approach emphasizes clearly defined learning objectives and competencies, guiding the design process toward measurable goals (Ludy et al., 2016). The contribution scrutinizes the interplay between course objectives, content selection, assessment methods, and instructional strategies, illustrating their integration into effective instructional design. Moreover, the study accentuates the dynamic essence inherent in syllabus design, shedding light on its iterative and adaptive characteristics in alignment with the evolving educational paradigms and learner requisites (Chung & Kim, 2016). This comprehensive investigation delves into the interconnectedness of theory, practice, and technology within syllabus design, providing valuable perspectives and recommendations for educators navigating blended learning settings. Additionally, innovative strategies aimed at augmenting coherence, engagement, and efficacy within these environments are scrutinized (Thompson, 2007).

The analysis also delves into the implications of syllabus design on student learning outcomes, academic performance, and overall satisfaction, unveiling the transformative potential of well-crafted syllabi in shaping students' educational journeys (Emanuel, 2022). A thoughtfully designed syllabus catalyzes active learning, stimulating curiosity, and promoting deeper engagement with course materials. It empowers students by delineating clear objectives, assessment criteria, and expectations, fostering autonomy and critical thinking within a supportive environment. By embracing a learner-centered approach, educators can tailor syllabi to accommodate individual differences, promoting inclusivity and equity (Nasrallah, 2014). The contribution also emphasizes the role of feedback in nurturing student growth and development. Timely and constructive feedback scaffolds learning experiences, guiding students toward mastery and excellence (Wheeler et al., 2019). Additionally, the syllabus fosters transparency and communication, enhancing student-teacher relationships and collaboration. Furthermore, instructional roles in syllabus design and implementation will be considered, particularly in blended learning environments (Stein et al., 2019). Educators are recognized as architects of learning experiences, tasked with integrating online and face-to-face components to optimize engagement and achievement. It highlights the multifaceted competencies required of instructors and the transformative potential of innovative pedagogical approaches, such as

flipped classrooms and active learning strategies, in optimizing faculty time management and job satisfaction (Stanny et al., 2015).

In this scenario, a case study was conducted within the one-year course on *Didactics and Media Education* within the blended master's degree in Media Education, where the syllabus served as a focal point for investigation. The blended format of the course integrated online modules with face-to-face sessions, providing students with flexibility and opportunities for collaborative learning experiences. The research question pertains to understanding the influence of the syllabus on students' perceptions and its potential to facilitate widespread teaching and assessment.

In the pursuit of this investigation, a questionnaire was disseminated among students, incorporating a scale designed to measure their levels of satisfaction and impressions. Additionally, interviews were carried out with a selected sample to assess the effectiveness of the syllabus. Following descriptive analyses, the results revealed that students generally articulated differing levels of satisfaction with the syllabus. The questionnaire responses indicated that while some students found the syllabus to be informative and helpful in guiding their learning journey, others perceived it as lacking in clarity or relevance to their educational needs. Furthermore, the interviews provided valuable insights into the specific aspects of the syllabus that students found most beneficial or challenging. Quantitative data from surveys were analyzed to identify patterns and trends in students' satisfaction levels and perceptions of the syllabus, while qualitative data from interviews provided deeper insights into their experiences and suggestions for improvement.

Overall, the descriptive analyses shed light on the multifaceted nature of students' perceptions of the syllabus and its impact on their learning experiences. These findings provide valuable insights for educators seeking to optimize syllabus design to enhance student engagement and support effective teaching and assessment practices.

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Blending and Flipping Preservice Teacher Education: a Phenomenological Study

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The integration of technology into education has the potential to reshape instructional practices, merging traditional and digital landscapes to foster interactive, personalized learning experiences (De Rossi & Trevisan, 2023). Hybrid/blended learning, characterized by the fusion of online and face-to-face modalities, has proven particularly effective in preservice teacher education, enhancing flexibility, diversity, and engagement (Alammary et al., 2014; De Rossi & Trevisan, 2023; Perry et al., 2021). Active learning emerges as pivotal in this educational evolution, focusing on student engagement in constructing knowledge, and fostering a shift from traditional lecture-based approaches (Garcia-Ponce & Mora-Pablo, 2020; Li et al., 2023). This paradigm, within hybrid blended solutions, prioritizes learner-centered instruction and embedded assessment to promote innovative and meaningful learning practices (Trentin & Bocconi, 2015). The flipped classroom model further exemplifies this by inverting traditional teaching methods (Han & Røkenes, 2020) to prioritize active learning and higher-order cognitive skills development, aligning with Bloom's taxonomy for a structured cognitive skill progression (Li et al., 2023). This approach not only facilitates student-centered learning but also integrates technology effectively, preparing preservice teachers for diverse, technology-infused educational settings (Perry et al., 2021). However, merging blended active learning with flipped classroom strategies necessitates educators to design experiences that are engaging, coherent, and contextually relevant, capitalizing on their multifaceted knowledge in crafting effective learning environments (De Rossi & Trevisan, 2023; Garcia- Ponce & Mora-Pablo, 2020).

The context to the present phenomenological study (Creswell & Creswell, 2018) is a higher education blended learning course aimed at fostering digital professional competence among preservice teachers learning about instructional technologies during the 2023-2024 academic year in a mid-sized European university. The course integrated elements of the flipped classroom model within a blended learning setting, to encourage active learning and engagement with course materials before and in parallel to class meetings. This approach allowed for in-class time to be dedicated to discussions, collaborative projects, and practical applications of instructional technologies.

The phenomenological study explored the students' perceptions on the following issues:

1. Effectiveness of the course's blended structure in facilitating course objectives.
2. Effectiveness of the course's flipped approach in promoting deep learning.
3. Coherence between the processes activated during and the outcome expected at the end of the course.

Participants were the preservice teachers enrolled in the course for Educational Technology at the University of Padova (2023-2024) in the fall semester. They were invited to complete an online survey at the end of the course, on a voluntary basis (convenience sample). The completion and content of said survey was in no way or measure used in relation to the assessment of students on the course. Participants were made fully aware of the aims of the survey. Almost the totality (99%) were second year preservice teachers, on average 18-20 years old, 97% female. Course attendance is elective, but 75% of the respondents attended more than 75% of the sessions – be they face-to-face or remote.

The survey structure is summarized in Tab. 1. Due to limited space, further details on both the course structure and the survey will be disclosed at the conference.

Area of inquiry	Survey items (type and number)	Survey items (example)
Demographics/ background	Six, multiple choice	How often did you attend synchronous online sessions?
Effectiveness blended course structure	Six, 5-point Likert (1: not at all effective; 5: fully effective)	How effective did you find asynchronous debate peer-reviews (thinking of the course objectives)?
	Bloom's taxonomy, six 5-point Likert items (1: never; 5: always)	How often did you feel engaged in applying ideas and concepts in different contexts?

Effectiveness flipped course structure	Four, 5-point Likert (1: not at all effective; 5: fully effective) Four, open ended	How effective did you find group debates (thinking of your learning)? Would you like to elaborate on your answer?
	Triple E checklist (Kolb, 2020), seven items for Engagement; three items for Enrichment and Extension. All items were 3-point Likert (1: not at all; 3: definitely)	Did the suggested activities promote active content-focused discussions between students and/or the teacher? (Engagement) Were the contents and activities relevant to your future profession? (Extension)

Table 1 – Survey structure.

Coherence among processes and products was indirectly measured considering the paired scores for each of the four items about course objectives and learning: digital agenda/book of the course; strategies in synchronous face-to-face lessons; online-based debates; online-based debates peer-review.

The main results are summarized in Tab. 2. Due to limited space, further details will be disclosed at the conference.

Dimensions of inquiry		Scale range	Scale average	dev.st	mode
Effectiveness Blended course structure	1. Strategies and activities	1-5	4,35	0,79	5
	2. Bloom-remember	1-5	2,72	1,30	1
	3. Bloom-understand	1-5	3,18	1,41	2
	4. Bloom-apply	1-5	3,88	0,94	3
	5. Bloom-analyze	1-5	4,13	0,78	4
	6. Bloom-evaluate	1-5	4,54	0,61	5
	7. Bloom-create	1-5	2,77	1,40	1
Effectiveness flipped learning	8. Strategies and activities	1-5	4,30	0,79	5
	9. EEE-Engage	1-3	2,65	0,49	3
	10. EEE-Enhance	1-3	2,83	0,40	3
	11. EEE-Extend	1-3	2,63	0,50	3

Table 1 – Survey scale results (average and mode).

The results of the study were primarily positive, indicating perceived significant benefits for active learning, higher order thinking, reflection, and critical thinking among the participants. The participants recognized a variety of cognitive processes being activated through the course, but notably the lower side of Bloom's taxonomy was less perceived than higher levels like "analyze" and "evaluate". The flipped approach was perceived to engage, enhance and extend learning as well. Notably, the perceived effectiveness of processes activated during the course (aimed at deep learning – scale 8) and the ones needed for the final product (course objectiveness – scale 1) are extremely close both in average, standard deviation and modes. Hence, we can infer coherence between course structure and goal, along with quality in implementation.

The findings suggest that the blended learning model, combined with the flipped classroom approach, effectively supported preservice teachers in engaging deeply with the content, applying critical thinking skills, and reflecting on their learning processes and future teaching practices. These findings underscore the potential of innovative pedagogical models to enhance learning outcomes in initial teacher education programs. However, some challenges emerged too, predominantly due to the participants' unfamiliarity with the flipped approach and their ingrained experiences with traditional teaching methods. To illustrate, the lowest score was attributed to the item "How effective did you find the flipped strategies during face-to-face lessons (thinking of your learning)?" (M= 3.85, SD=0.8). These results underscored the demands of the flipped approach for greater responsibility, organization, autonomy, and self-direction on the side of the students (Garcia-Ponce & Mora-Pablo, 2020).

This research underscores the transformative potential of integrating technology and innovative teaching methods within teacher education. By adopting these models, programs can equip future educators with the necessary skills to create engaging, effective learning environments (Li et al., 2023; Perry et al., 2021). However, the transition to these innovative pedagogical models presented hurdles, requiring learners to adopt greater autonomy and organizational skills. Overcoming these challenges necessitates a supportive "flipped learning continuum" to gradually acclimate students to this new learning paradigm, enhancing their readiness for the demands of contemporary educational settings (Tomas et al., 2019).

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ID 110

When Do We Learn How to Speak "Whatsapp"? Theory of Mind's Predictivity of Emoji Comprehension is Moderated by Social Media Use

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While there's ongoing debate about whether social media benefits the development and education of youth (Marciano & Viswanath, 2023), in Italy, young people, especially (pre)adolescents, heavily engage with social media, which are deeply integrated into their online experiences (Bozzola et al., 2022; Statista, 2024). According to the 2016 OssCom survey, 86.5% of adolescents in Italy have at least one social media profile, with WhatsApp (37.3%), Facebook (36.5%), and Instagram (18.8%) being the most popular platforms (Mascheroni & Ólafsson, 2018). Social media serve various purposes, including information sharing, peer interaction, and self-expression (Uhls, 2017). Thus, the ability to use them critically and mindfully is essential for fostering positive social relationships (Baron-Cohen et al., 2001). Theory of Mind (ToM) is the skill that lets us understand and connect with others (Baron-Cohen et al., 2000). Specifically, it allows to decode other people's thoughts (cognitive ToM) and emotions (affective ToM). ToM plays a crucial role in face-to-face communication but its role in understanding digital messages, including emojis, is underexplored (Cherbonnier & Michinov, 2022). On the other hand, adolescents' levels of social media engagement are related to their familiarity with emojis (Zilka, 2021), even if more familiarity not necessarily equals better communication skills. Based on initial findings from small-scale research (Bisagno & Cadamuro, 2023), in the present correlational study, we explored how the performance in two affective ToM tasks predict the comprehension of emojis, particularly among preadolescents with differing levels of social media use (SMU). Drawing from existing research, we proposed that:

- H1: Both ToM tasks would be associated with emoji comprehension.
- H2: The relationship between ToM tasks and emoji comprehension would be influenced by SMU, with stronger associations expected among participants with low-to-medium SMU due to an "exposition" effect.

Three-hundred-and-three adolescents (F=134; M_{age}=12.37 ± 1.09) completed an online questionnaire administered collectively to the class during a school hour. Below the scales included in the questionnaire are listed.

- *Theory of Mind*. We utilized two measures to assess affective ToM. Firstly, we administered the Children's version of the "Reading the Mind in the Eyes" questionnaire (Baron-Cohen et al., 2001). This questionnaire consists of 28 items, each presenting a picture of a gaze. Participants are required to select the correct emotion corresponding to the depicted gaze from four options. Scores on this questionnaire can range from 0 to 28. Secondly, we employed an adapted version of the "Real/Apparent Emotions" task (Sidera et al., 2011; 2013). In this task, children are presented with four scenarios in which the

protagonist is feigning their emotions. Participants are asked to identify the genuine emotion experienced by the character and provide a justification for their choice. For each scenario, participants receive one point for correctly identifying the emotion and up to two additional points based on the complexity of their explanation and reference to mental states. Scores on this task can range from 0 to 24.

- *Social Media Use.* We adapted the questions of the Experience Sampling Method (ESM) Social Media Use Questionnaire (E-SMUQ: Beyens et al., 2021) to gather the frequency of use of a series of social media (WhatsApp, Telegram, Facebook, Instagram and TikTok) based on a Likert scale (from 0 = Never to 4 = More than four hours per day). Scores for each social media were averaged and then summed in a final SMU score.
- *Emoji Comprehension.* Based on the secondary and tertiary emotions identified by Plutchik (2003), we selected 35 emojis conveying those emotions according to the Unicode classification. Participants had to select the correct emotions the emoji expressed among four alternatives. Scores ranged between 0 and 35.

Both the Eyes task (r=.204, $p<.001$) and the "Real/Apparent Emotions" task (r=.533, $p<.001$) are correlated to the emoji comprehension task, while they are marginally correlated to one another (r=.097, $p=.07$). Based on this premises, we proceeded to test our moderation model. The moderation analysis (PROCESS macro by Hayes, 2016; Model 1) revealed that the Eyes test (B=.50, SE=.16, p<.01) and the Real/pretend task (B=.59, SE=.05, p<.001) positively predicted emoji comprehension (R2=.61). The interaction of SMU with both ToM tasks was significant, with stronger relationships for low-to-medium SMU.

The results highlight the significant role of Theory of Mind (ToM) in understanding emojis as emotional signals in digital communication. This aligns with previous research emphasizing the importance of ToM in fostering positive social interactions overall (Baron-Cohen et al., 2001). Interestingly, the "Real/Apparent Emotions" task demonstrated slightly stronger predictive compared to the Eyes test in the regression analysis. This could be attributed to the fact that it not only involves recognizing emotions but also requires a more nuanced ability to interpret emotions within specific contexts, which is a crucial skill for accurately deciphering emojis. The moderating effect of SMU suggests that, while ToM is a necessary precondition to decode emojis, being exposed to social media can facilitate the task due to acquired familiarity with emojis themselves. In other words, preadolescents who engage with social media rely on their individual psychological competencies to interpret emotions during typed conversations and decode digital messages. Over time, this skill becomes more automatic. Nevertheless, ToM remains a fundamental prerequisite. Practically, these findings imply that providing training in Theory of Mind could significantly improve youngsters' communication skills in digital messaging, especially for those who engage in it for the first time.

Keywords: Theory of Mind; Emoji Comprehension; Social Media Use; Adolescence; Moderation Analysis

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ID 111

CodeTutor: Personalized Programming Learning through Automated Feedback and Clustering

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Abstract

First-year Computer Science students often struggle to learn Java programming, and this condition can have a negative impact on their academic progress. Recently, an online tutoring system has been developed to help students learn Java programming.
It allows students to execute and check Java code, making the learning process easier. Although the use of this tool has led to improvements in learning, it has been observed that the system has some weaknesses that need to be improved. The gap consists in the lack of specific and personalised feedback for the students. Therefore, a specific software has been developed, with an innovative approach based on machine learning using auto-clustering and neural networks.
The new online tutoring system offers a better personalisation thanks to a graph model which personalises the study plan based on individual performance, optimising educational effectiveness through video tutorials and Java code evaluations. This system aims not only to increase the academic success of the students, but also to provide professors with a more precise assessment tool during exams.

Keywords: Machine learning, Education, Moodle, Tutoring, CodeRunner

During the first year of the Computer Science degree program, students often encounter difficulties in acquiring Java programming skills during the course. Research shows that many students find learning to program from scratch extremely challenging, leading them to believe they are unable to continue with their studies, potentially resulting in dropout (Robins et al., 2010).
For effective and meaningful learning to occur during the programming course, it is important for students to have the opportunity not only to learn theoretical concepts but also to interpret their mistakes, find examples, and seek solutions to known problems.
To this end, in 2023, the University of Camerino developed an online tutoring system (Tutoring System) that allows students to both execute and verify Java code (Nalli et al., 2023). The analysis of the results reported in the study shows that students who actively used the online tutoring system (Cluster 0) achieved a pass rate of 69%, compared to 55% of students with average activity (Cluster 1) and 22% of less active students (Cluster 2).
Despite the significant progress made in computer science education through the implementation of the Tutoring System, further advancements are necessary. Developing tutoring systems that support students in improving their code through specific and personalized feedback is essential (Hegarty-Kelly and Mooney, 2021).
To personalize the feedback system, we have enhanced the system developed and implemented in 2023 with a new tutoring system called CodeTutor.
This new system supports students by providing specific feedback and guiding them towards

compensatory strategies (additional exercises) tailored to their needs. Once the development phase of the system is complete, we will move to the experimental phase with students to test its effectiveness through the analysis of their behavior on the platform, the learning outcomes achieved at the end of the programming course, and lastly, their perceptions. The new tutoring system, CodeTutor, that we are developing involves associating new software with the CodeRunner plugin, implemented on the Moodle e-learning platform. Upon entering the Moodle platform, students find open-ended quizzes where they can insert Java code. After writing the code, they must press the execute button.

The CodeRunner plugin then compiles the code, running a series of automated tests. These tests compare the student's program output with the expected output to verify correctness. At this point, the new software intervenes, regardless of the code's correctness, by calling an API that populates the database with the student's response after each execution. The set of responses serves to create a model for determining the feedback to be returned to the student.

Once the database is sufficiently populated, machine learning techniques will be used to train the system to recognize and categorize clusters, thereby facilitating the assignment of specific and targeted feedback. We plan to use three clusters: one for incorrect responses (0), another for partially correct responses (1), and a third one for fully correct responses (2).

This mechanism will determine the severity of the errors made by students compared to the error "x," which represents the most common one among all. This approach will allow for the identification and clustering of all possible types of mistakes, enabling a more in-depth and detailed analysis of the difficulties encountered by students.

In the quizzes, each question will have a relative weight that will determine the difficulty of the next one based on the student's response.

If the student answers correctly, the system will propose a more difficult question; if they answer incorrectly, the system will offer a simpler question, providing feedback in each situation. Moreover, the Moodle platform will direct students to video tutorials and teaching materials related to the topic covered whenever they encounter difficulties during the quizzes.

This adaptive approach ensures that the learning path is personalized for each student. Once the development phase is complete, we will move on to the implementation phase with first-year programming course students in the Computer Science degree program at the University of Camerino. To verify the effectiveness of the new Tutoring System, we will analyze students' behavior on the platform, the learning outcomes achieved at the end of the programming course, and their perceptions.

As previously demonstrated by Nalli et al. (2023), preliminary clustering results have shown a positive correlation between student activity and exam pass rates, with more active students displaying significantly better performances.

With the implementation of the new tutoring system, which not only evaluates code but also supports students in their learning journey by providing targeted and personalized feedback, we expect even better learning outcomes compared to the previous system.

In the future, we aim to collect more data from students to further improve the precision and effectiveness of the machine learning system. A larger and more diverse database will allow a refinement of clustering and feedback models.

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ID 112

Are Video Games Capable of Empowering General Cognitive Resources in Typical and Atypical Samples? A Systematic Review

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Extended Abstract

Technological advancements have become integral to young people's daily lives, influencing both their leisure and educational experiences. Notably, video games play a significant role in their lives (Ceccherelli, 2012). Over the past fifty years, scientific research has increasingly focused on understanding the patterns and impacts of video games use during childhood and adolescence.

Numerous studies concentrated on the negative implications of video games on academic performance. Research indicates that increased hours spent on gaming often correlate with poorer academic outcomes, primarily due to decreased motivation (Łuniewska et al., 2018; Böö, 2014; Weaver et al., 2013). Other studies have identified beneficial effects, such as a positive link between strategies learned in gaming and those applied in studying, leading to improved academic performance and higher grades for gamers compared to non-gamers (Conception et al., 2016; Drummond & Sauer, 2014; Ku et al., 2014).

Importantly, some studies showed positive correlations between video game-like activities and executive functioning in both adults (Choi et al., 2020) and youngsters (Chen et al., 2023; Puccio et al., 2023). For this reason, some researchers have begun to test video games as potential tools for enhancing working memory (WM) and executive functions (EFs), cognitive resources predictive of academic success in both typical and atypical neurodevelopment (Diamond, 2013).

This review investigates which types of video games are most suitable and effective in enhancing WM capacity and EFs among primary school children. A systematic search following the PRISMA guidelines was conducted across three databases: PsycInfo, PubMed, Scopus and Web of Science. The review included studies which met the following inclusion criteria: 1) experimental, pilot, or case studies featuring both pre- and post-test measurements to evaluate the role of video games in enhancing WM capacity and EFs; 2) focus on primary school children; 3) both typical and atypical development, namely Attention-Deficit/Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD), or Specific Learning Disorders (SLDs); 4) peer-reviewed journal articles; 5) English language. Only articles

published between 2013 and 2024 were selected. Studies involving children with pathologies not mentioned in the third criterion, such as traumatic brain injuries, were not included in this review. Originally, 132 studies were identified from the databases; after screening, 127 were excluded for not meeting the criteria. An additional 26 studies were identified through other systematic reviews, resulting in a total of 31 relevant studies that were examined in detail.

The studies primarily focused on various types of video game training, including a) exergames (ExGs), which require physical movement (e.g., Wii or Kinect); b) serious games (SGs), specifically designed for educational purposes; c) action video games (AVGs), characterized by unpredictable stimuli, high speed, and a high cognitive load, often involving combat scenarios; and d) structured video games (e.g., Rodrigo-Yanguas et al., 2023), specifically used as training tools to target EFs or WM capacity in various typical and atypical populations.

The review's main finding is that different typologies of games show a differential impact on EFs and WM capacity. Specifically, ExGs and AVGs were shown to have the most substantial impact on EFs. This effect can be attributed to the high levels of physical engagement and cognitive demands inherent in these games. Exergames, which combine physical exercise with game play, may enhance cognitive flexibility and inhibitory control through the integration of physical and cognitive challenges. Studies, such as Flynn et al. (2014) and Kolovelonis et al. (2023), have demonstrated that exergames can improve core EFs in children. Similarly, Bediou et al. (2018) showed that AVGs, with their fast-paced and unpredictable environments, can lead to improvements in various components of EF, especially task-switching.

On the other hand, SGs and structured programs with educational objectives are more effective in enhancing WM capacity. These games often include tasks that require the manipulation and storage of information, directly targeting WM capacity, which can result in long-lasting enhancement of WM (Melby-Lervåg & Hulme, 2013). Structured programs (e.g., Rodrigo-Yanguas et al., 2023) typically offer repetitive and progressive tasks that are structured to increase in complexity, thus continually increasing cognitive load and leading to incremental improvements in WM.

Despite the promising findings, the review highlights the need for further research, particularly focusing on atypical populations such as children with Specific Learning Disorders (SLDs). The effectiveness of video games' interventions in these groups remains underexplored. Future studies should aim to assess the long-term benefits of such interventions.

In conclusion, this review underscores the potential of video games as valuable tools for enhancing cognitive functions, particularly EFs and WM. While ExGs and AVGs show promise in improving EFs, SGs and structured programs appear more effective for WM enhancement. Future research should continue to explore these relationships, particularly in atypical populations, to fully harness the educational potential of video game-based interventions.

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Soft Skills for Green Transition

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Abstract

Climate change is progressively changing the nature of work in various occupations and the skills required of many workers even in the STEM fields. Education at all levels, including higher education, should face with these changes, adapt to new challenges and conditions, and change its approach to teaching. Traditionally, hard skills have been considered essential, yet several studies highlight the crucial role of soft skills in rapidly changing working environments. Therefore, the ability to develop these skills as part of a holistic approach to the 'greening' of the economy is essential for educators, as their students are future workers and potential change agents in the green industry. At the same time, more knowledge about the context in which soft skills are used is of great interest.

The findings of this research provide some interesting insights for STEM educators: soft skills are widely recognised, but some of them, such as communication, empathy, problem solving, and metacognition are particularly useful as the green transition essentially involves changing mindsets, working in multidisciplinary environments and influencing employees and customers. The connection with industry stakeholders as codesigner or simply contributors of the learning experience, and collaboration between faculties, fostering transdisciplinarity, can be a laverage to develop such skills.

Keywords: Green transition skills, STEM education, Soft skills in green transition, Green transition skills gaps, Sustainable development

Extended Abstract

The research conducted within the SOFTEN project (‘Embedding SOFt skills in sTem academic curricula for the transition to sustainable grEeN economy’ www.softenproject.eu - an international educational project co-financed by the European Union under the ERASMUS+) recognized that one of the major challenges our society must face is to adapt to climate change, meeting the requirements of the ‘green transformation’, intended as the transition of the economy and society towards achieving climate and environmental goals, primarily through policies and investments, and striving to develop the so-called 'green economy', described as management that helps improve human well-being and reach social equality, while reducing or eliminating environmental risks and ecological deficiencies.

In such conditions, 'green jobs' are also created, which include occupations that facilitate the achievement of net zero emissions goals and other environmental goals (e.g. restoring the balance in nature, adapting to climate change, caring for biodiversity, etc.). In this context, the concept of "green soft skills" becomes relevant, covering knowledge, skills, values, and attitudes important for human existence and social development, and consistent with sustainable development (Galani et al. 2023; Rieckmann 2018). This is not about special new soft skills, but rather about their adaptation and “interpretation” in a direction useful for implementing the principles of sustainable development in practice and building a greener economy.

Based on this research, green soft skills include teamwork, adaptability, communication, collaboration, open-mindedness, empathy, critical thinking, and problem-solving complementary to environmental awareness and social consciousness. The evidence obtained from the green industry shows that in various practical contexts, soft skills have a potential leverage effect, proposing them as an element of success in green transition. They enhance the ability to communicate, collaborate, innovate, and lead effectively in the pursuit of a more sustainable future. As the world increasingly recognizes the importance of

environmental sustainability, the value of these skills will continue to grow.

In the frame of the project, a university teacher-centered strategy has been formulated to address all the obstacles to the widespread adoption of green soft skills, such as the low importance attributed to soft skills by STEM university students, the reluctance of STEM university teachers to include these skills in their courses, and the lack of those skills among new young employees. One of the pillars of this strategy is teacher training.

"Green Soft Skills for Transition" is a Massive Online Open Course for STEM university teachers and educators. It aims at creating awareness of the importance of soft skills for students, not only during university years, but, in particular, when they start working. It offers an overview of those skills that can be useful in green industries or in green processes and describes techniques and methodologies that teachers can adopt in their courses, to let students develop soft skills.

The adopted soft skills classification is that elaborated by Schleutker, 2016, so the MOOC is organised in 5 weeks: the first one is a general introduction to soft skills for the green transition, then creativity, communication, team Working, and self-management are presented through methodologies and techniques that teachers can adopt during their lessons, to engage students and let them also acquire transversal skills.

So, the general objective of the MOOC is to present a set of tips and tools, applicable both in large and small classrooms, both with students in 1st university year and with students at the end of their curriculum, both in traditional context with static tables and chairs and with movable furniture. In this way, the MOOC is more focused on "how" to stimulate soft skills in students during university years, than on "what" soft skills and, in particular, green soft skills are.

The secret ingredient of "Green Soft Skills for Transition" is metacognition: starting from the beginning of the learning path, MOOC participants are involved in activities that gradually make them reflect about their learning choices, their learning styles, the level of comprehension of the topics; only at the end metacognition is revealed and explained - through a metacognitive process.

For each skill, participants pass through:
- a level of self-awareness, because talking about soft skills concerns everyone and sometimes one is very condescending towards oneself, convinced that it is not necessary to be trained;
- a level of awareness, about the real willingness to putting into practice and experimenting but also about the specific context assets;
- a level of knowledge, with the possibility to go deeper if they prefer to read some detailed explanation, and
- a level of action, thanks to some activities oriented to let instructors apply the concept in their specific context and design their new courses.

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Automating the Analysis of Social Interactions in Educational Settings: a Review

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Social interactions play a central role in children's development (Casotti, 2022). For this reason, professionals in the educational field have adopted observational practices that allow them to track relational and social dynamics (Altman et al., 2020). However, human perception is limited and cannot capture all the relevant information in noisy environments like classrooms and schoolyards (Chun et al., 2011). Moreover, even professional observers may have personal or cultural biases (Pronin et al., 2023; Stubbersfield, 2022), and high-quality observation requires significant resources in terms of training and time. A relatively recent movement in the educational field advocates for using quantitative data (Evidence-based Education; EBE) to guide the actions of professionals (Bonaiuti, 2014). However, challenges have arisen in collecting quantitative data on social interactions, especially with young children. Current Information and Communication Technology devices allow to obtain large amounts of data from the educational context and, along with suitable methods of analysis (e.g., SNA: social network analysis), can allow innovation. SNA is an analytic approach to study social relationships that could uncover patterns hidden from professional observers (Felaco, 2019). In this sense, it could be beneficial to automatise methods of analysis in support of observation, allowing educators to more accurately and efficiently assess students' needs, social dynamics, and inclusion. This systematic review aims to identify studies that employed sensor devices and/or SNA in educational settings to capture social interactions among children.

On January 17th, 2024, four databases were inquired. The inclusion criteria were: (1) automatic tool for data collection of social interaction; (2) simultaneous involvement of at least two children; (3) educational setting; (4) age range 0-12 years; (5) type of publication: peer-reviewed journal; (6) language: English; (7) research studies. Overall, we found 21 results that matched the purpose of the review. All the included papers used data gathered from sensor devices. The explored topics included mapping social interactions among children, studying the spread of infectious diseases, examining homophily, and identifying play types. Only one of the studies was experimental and implemented an intervention to promote inclusion; the others were observational or descriptive.

The selected studies were grouped into three categories which employed the devices-gathered data within increasing levels of ecological complexity: (1) studies aimed at validating sensor devices; (2) studies analysing interaction as a predictor of diseases' spread and vocabulary expansion; (3) studies scrutinizing children's social dynamics.

In the first category we collected studies in which a relevant aim was validating devices-gathered data in comparison to "traditional" techniques (i.e., professional observation) that are considered the 'gold standard' in assessing social interaction. Sensor devices emerged as reliable tools, with various studies finding convergent validity with data from "traditional" techniques (e.g., Altman et al., 2020; Duan et al., 2017; Grantz et al., 2021).

In the second category, we included studies that, rather than looking at specific features of the social relationship, examined how physical or verbal interaction can be seen as reliable predictors of the potential spread of infectious diseases (e.g., Stehlé et al., 2011; Leoni et al., 2022), or to measure the acquisition of language skills through the interaction with other individuals (e.g., Perry et al., 2022).

In the last category, we included studies that explored social dynamics between children by focusing on specific psychosocial dimensions of their relationships (e.g., social status, social competence). Sensor devices have enabled a more precise analysis of social dynamics by automatically combining digital data with personal data (e.g., sex) or specific time/environment of the interaction (e.g., Messinger et al., 2019). For instance, researchers explored the differences in social interaction between and within social groups (e.g., boys and girls or typically and atypically developing children) (e.g., Veiga et al., 2017; Banarjee et al., 2023). The studies also examined social status, peer connections and location-based interaction, showing how these factors affect children's relationships (e.g., Cocco et al., 2022; Nasri et al., 2023).

The data collected by sensor devices are particularly functional in studies where SNA is used as the main conceptual framework. The students in the classroom are treated as nodes, and the connections between them as edges. SNA enables researchers to analyse the interactions among a whole population of students, ranging from specific classrooms to whole schools, and to identify patterns such as centrality, density, or modularity. Also, SNA allows the precise depiction of the gathered data, resulting in aggregated network representation.

Although various technologies and methods have been validated for automatically analysing social networks, their application in psycho-educational contexts remains limited. Quantitative social interaction data can be very helpful for professionals in locating children who may be experiencing exclusion or social marginalisation; with this information, educators could implement targeted actions to encourage their participation and inclusion. Data of social interaction together with temporal and spatial coordinates could give them a valuable overview of the areas, activities and tools mostly used by students; with this insight, professionals could design spaces and materials (e.g. toys and educational resources) to calibrate learning and encourage the engagement of all children.

Keywords:
Social network analysis; Sensor technologies; Children; Educational setting; Social interaction

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E-tutoring and Digital Education: Towards New Identities

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Abstract

The role of the e-tutor, considered strategically important in distance digital education, has taken on over the years multiple characteristics and roles, both due to the need to adapt to innovative and emerging technologies and to effectively integrate with evolving learning modalities and styles. The professional identity and competencies of the e-tutor are, to date, very fluid and still evolving. In the perspective of a strong push towards the digitalization of training processes, bearing in mind the functions and roles of the last two decades, what new identities might the e-tutor assume? The article aims to provide a narrative literature review, starting from Salmon's seminal text in 2000 up to the most recent scientific contributions on the topic, focusing on the evolution of this figure in a university context, with the intent of identifying new areas of study and exploration, especially considering recent applications of generative AI to automated tutoring systems and the significant European investments in the field of digital education.

Keywords: E-tutoring, Higher education, AI, Literature review.

During the 2000s, the e-tutoring landscape was significantly shaped by the pioneering work of Gilly Salmon, who brought to light the importance of e-moderating practices. Similarly, Canadian scholars, through their *Community of Inquiry* model, underscored the significance of ensuring forms of presence in distance learning contexts, leaving a lasting impact on the field. The development of new digital technologies, the increasingly widespread diffusion of e- learning in several forms adaptable to different contexts, and the evolution of learning methods and environments pose, today more than ever, a challenge for e-tutors.

The identity of the e-tutor has always been fluid and subject to changes; the terminology used to refer to those who perform online tutoring functions is varied: e-moderator/online moderator, e-instructor/online instructor, distance education instructor, e-teacher/online teacher, teacher assistant, online facilitator, e-mediator, e-coach, online mentor, online leader, e-trainer, online consultant, online adjunct faculty member, collaborating faculty member.

The application of generative AI systems to learning environments seems capable of eroding some specific functions of e-tutors, which inevitably leads to the modification of their identity: there will be functions assigned to AI tools (strategic for efficiency and costs) and functions assigned to professionals (central are the themes of motivation, mentoring, and the well-being of the learner). Therefore, a narrative review of the scientific literature in the field was conducted to evaluate the directions in which the functions of e-tutoring are evolving and, consequently, the role and identity of e-tutors, with a focus on the university context.

The research questions that guided the study are as follows: RQ1: How has the identity of the e-tutor in higher education evolved over the past 20 years? RQ2: What prospects are opening up? The research was conducted on the Scopus, WoS, and Eric databases using the following search string: “E-tutor*” OR “E-moderator*” AND “Higher education” OR “University”. During the research phase on the databases, the following inclusion criteria were adopted: papers from 2000 to 2024, in English, peer-reviewed, and available in open access. The search yielded 117 studies; 61 were excluded based on exclusion criteria (not relevant to the research questions, not in English, not open access), while 23 significant contributions meeting the inclusion criteria were added. Overall, 79 papers were reviewed, with different typologies emerging from the data set. The prevailing methodology is qualitative research, with quantitative research being the least used;

some studies were conducted with mixed methods, and there are numerous theoretical contributions; there are 4 systematic reviews, plus a scoping review.
An initial critical analysis of the papers, aimed at evaluating the evolution of e-tutoring, showed that these functions have remained essentially constant over time. The functions described in the first four stages of the *Five Stage Model* are confirmed, while the reference to Garrison's theoretical framework on "presence" is central in many contributions from universities located in Australia and South Africa, particularly concerning the effectiveness of the conceptual and pedagogical functions. On the other hand, the articulated role distribution devised by Denis has been revisited in research, including Italian studies, investigating the relationship between the skills required of e-tutors and their perception. Regarding the automation of some traditional e-tutor functions, some studies at the University of Dresden suggest the possible erosion of the technical and organizational/administrative functions.
In light of these findings, it is plausible to imagine new identities for e-tutors. Experimentation with the introduction, especially during self-assessment, of advanced conversational chatbots is underway in Italian and European universities: we must wait for the first results to make judgments. Experiments are also ongoing regarding the emotional recognition capabilities of automated interaction agents. Certainly, the use of AI tools for learning analytics will be increasingly useful in e-tutoring, evaluating student interactions in forum groups, and optimizing management strategies for virtual communities. A qualified human presence remains indispensable in learning processes and online university education pathways, assuming roles of support, mediation, and facilitation in the construction of knowledge and the social dimension of the university journey. However, the figure of the e-tutor could be directly replaced by teachers supported by AI on the one hand, and on the other hand, could evolve towards identities similar to those of a coach and mentor, serving both teachers and students. Hypothesizing these transformations is very important for structuring training itineraries suitable for the new needs of university study paths and the lifelong learning needs typical of post-modern societies, but particularly urgent today and dictated by digital education strategies and new recommendations on key strategic skills in the 21st century. The choice to reconstruct approximately 25 years of the tutor's roles and functions may have the merit of monitoring how major progressive revolutions and challenges shape the context in which we live. The mismatch of skills is more strategic today than ever, as it also emerges transversally from the studies analyzed in the review.

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Designing Inclusive Mathematics Story-Problems Using Artificial Intelligence: A Study Involving Prospective Support Teachers

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In this century, the educational practices landscape is rapidly changing, largely due to technological progress: one need only think of the central role played by artificial intelligence (AI) in educational contexts. The acronym AIED (Artificial Intelligence in Education) refers to the field of international research dealing with AI in education. The latest frontier is generative AI (Hu, 2023) which can generate text, images, video, music or other media, in response to user requests called prompts. Notable generative AI systems include ChatGPT, a chatbot created by OpenAI, which can engage customers in human-like conversations (Aydin & Karaarslan, 2022; Jovanović & Campbell, 2022; Pavlik, 2023). In the multiplicity of functions that such a conversational agent proposes, an interesting aspect could be to consider it as support for teachers or prospective teachers in the process of designing inclusive and accessible teaching activities. Indeed, we know how important it is to develop skills in prospective teachers concerning the design of inclusive teaching activities responsive to diverse educational needs (Laurillard, 2012; Scherer, 2021). Concurrently, prospective teachers, who work as co-teachers in the classroom and who are also called upon to co-design teaching activities in mathematics, do not seem to have sufficient training in understanding mathematical problems (Scherer et al., 2022). In this regard, ChatGPT could be a valuable tool to support teachers in designing inclusive teaching activities in mathematics.

From this perspective, the following research questions were framed: (i) How is the support offered by ChatGPT perceived by future support teachers? (ii) Can using ChatGPT impact positively the design of inclusive teaching activities in mathematics? (iii) What are the risks of using ChatGPT as a support in designing teaching activities in mathematics?

To answer the research questions, we carried out an experimentation with 175 prospective secondary school support teachers (112 first-grade and 63 second-grade teachers) attending the 8th Cycle of the Specialisation Course for Support Activities at the University of Molise (Italy). The choice to focus on the secondary school order is linked to the fact that support teachers, usually not trained in mathematics, may perceive this teaching as more complex than the lower orders. This could generate anxieties and fears in them (Coppola et al., 2012). In this regard, digital technologies could be an appropriate tool for prospective teachers to address and overcome such anxieties and fears, providing them with valuable support in the designing phase.

Participants attending the "Special Education: codes of logical and mathematical language" workshop were asked, in subgroups, to design story-problems (Zan, 2012) and make them inclusive, as per the first principle of Universal Design for Learning (CAST, 2018), that is, the principle of representation. Designing activities employing multiple and multimodal representations (Arzarello & Robutti, 2008) can allow easier access to information and make mathematics education more inclusive. Participants

were asked to carry out this task first without using ChatGPT and then using the chatbot.From a methodological viewpoint, a qualitative-quantitative method was used, involving a semi-structured instrument, administered in presence using Google Forms, to collect the students' answers and perceptions. In particular, a questionnaire was administered to the participants consisting of 16 items with closed questions for exploring the participants' background and 10 closed and open questions to garner the participants' perceptions on the use of AI, in particular, ChatGPT, in the design of inclusive teaching activities in mathematics.

The results reveal that 58% of the respondents perceived ChatGPT as a fairly useful tool, capable of freeing up energy for higher levels of creative production by speeding up design time. The tool proved effective in providing didactic insights, but these needed further elaboration by the participants. *"Undoubtedly, the use of AI helps to reduce reformulation time, but it still requires personal reworking by the teacher, both in terms of the questions asked and the reworking of the answer"* (cod. 72). Further, participants needed to check the correctness of what the chatbot proposed from a mathematical viewpoint, e.g. relating to the graphical representations generated by the system. *"ChatGPT proved to be a useful tool; however, great care must be taken with the results it shows, also from a graphical point of view"* (cod. 106).

The use of AI had a positive impact on the design of inclusive teaching activities in mathematics for 64% of the respondents. It remains a useful starting point, a versatile tool that can be consulted according to one's needs, but the mediation and experience of the teacher are always necessary: *"The tool could be used to promote inclusion, but it depends on the skills and abilities of the teacher who uses it"* (cod. 97). Although the chatbot is of immediate use, it is important to ask the system *"the right questions"* (cod. 105); otherwise, the full potential of the system cannot be exploited.

Finally, concerning the critical elements that emerged from using ChatGPT in the design of mathematics teaching activities, this system works best in well-defined and stable situations. It also responds correctly, but in a 'standardized' manner, that is without being able, as is the case with human intelligence, to manage uncertainty regardless of the amount of input available: *"ChatGPT processes stories, mathematical problems, etc. but the result remains 'standardized'; the readjustment and control always lie with the teacher"* (cod. 160).

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ID 117

Project For “License For Digital Citizens” By Umbria Regional School Office

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Abstract

This contribution presents the "License for digital citizens" training course, promoted and coordinated by Umbria Regional School Office
The project has been implemented and managed by a working group: it is aimed to students of primary, first and second level secondary schools, and is accomplished by teachers who make use of a free kit of materials prepared by experts and designed for each school level.
The project involves the parents with appropriately chosen materials and with the sharing of an educational pact between parents and children. The project supports schools in responding to the regulatory dictate of essential tasks such as digital civic education (L. 92/19), the prevention and fight against cyberbullying (L.71/17), digital skills (European Recommendation 2018, 2.2.2, European Recommendation 23.11. 2023 European Year of Skills). The proposed topics were chosen taking into account these regulations.
Overall, the project constitutes a vertical journey. Each segment, independent from others, includes specific topics suited to the age group of the recipients, organized into modules, each of which is autonomous and complete.
At the end of the course, students who have passed the test, participate in person or online in a regional or local event to receive the license.

Key words: digital competence, driving licence, school project, digital citizenship, ICT

Introduction

In the latest years, the concept of digital competence has established itself and found a specific definition in the Recommendation expressed by the Council of Europe regarding key skills for lifelong learning. A framework has been identified, DigComp (https://ec.europa.eu), currently DigComp 2.2, which identifies the key elements of digital competence in 5 areas. This means that the school must build specific learning paths aimed at developing these skills in students.

Against this background takes place the “License for digital citizens project” which aims to support schools in responding to the regulatory dictate of indispensable tasks such as digital civic education (L. 92/19), prevention and contrast of the cyberbullying (L.71 /17), digital skills (European Recommendation 23 November 2023 European Year of Skills).

Resources, methods and development of the “License for digital citizens” project
The License for digital citizens is a training course aimed at primary, first and second level secondary schools, carried out by teachers using a kit of materials prepared by experts and designed for each individual school level (patentinocittadinidigitali.it). It is not proposed as certification with respect to shared standards, but as training.
The initiative aims to attract younger people from the age group in which independent use of the internet is widespread (9-15 years). Promoted and coordinated by the USR for Umbria, it is implemented and managed by a stable working group. It aims at prevention through training and awareness of multiple social actors.

The choice of the title comes from the metaphor of the driving licence: it provides, in fact, a training course, a test, a sign of the acquired knowledge and skills.
Its strong points are that it is free, replicable, widespread throughout the territory, always updated and rich in content, the variety and richness of the resources provided, the quality of the sources, the flexibility of the activities, the full compliance of the topics with the provisions by the L.92/19, by L.71/17 and by the DigComp 2.2 framework.
It offers a self-training path for teachers, work with students, assessment through tests, delivery of the license and final monitoring. All this through the kit that USR Umbria has made available to participating schools in which, for each topic, resources are provided for teachers, students and parents involved by the schools. At the end of the course, the students who passed the test participate in a regional event to receive the license. A Vademecum is given to Primary parents, while for secondary schools the signing of a parent-child pact is proposed with the logic that they become guardians and support for them, rather than guardians of the rules or censors.
The resources are divided into modules to ensure maximum flexibility: the teacher can decide when to carry out each one and the resources to use according to the teaching needs of the class.
Specifically, two modules are offered in Primary School: "We know the web"; “Digital resources for studying”. The course proposed in lower secondary school is developed in four modules: "How I use my device"; “Digital well-being”; “I protect myself”; “My devices”. For the first two years of secondary school the course offers four modules; “I write, post, share and create to feel good: How I use my device”; “I protect myself online”; “I watch over”; “I write, I post, I share, I create: I become the protagonist!”.
The modules are structured according to the didactic work, therefore they explain the didactic and educational objectives, suggest questions, propose gaming activities, ready/modifiable slides to structure the lessons, and, then, provide resources for the training of teachers, to work with students and to involve parents.

Respecting the teaching autonomy of teachers, multiple resources are provided for each topic, leaving each teacher to organize individual activities in an inclusive and subsidiarity logic. The resources offered are all free.
The sources of resources are specialized: Telefono Azzurro, Save the children, Generations connected, Postal Police, Google, Facebook, Digital Wellbeing and other dedicated sites. Some resources are original, produced with experts or by the Working Group.
The project lasts a school year, starting in October with its presentation and accompanying the teachers in the various stages up to the test and the final event for handing over the licenses.
The test is offered in a standard version and one for students with SEN.

The final event of the process is public: representatives of students, teachers and parents participate in person, actively involved in short interviews. All other classes participate in connection.
The presence of witnesses allows students to encounter significant experiences.
The event concludes with the delivery of licenses to some children in the presence of the educating community, an official sign of the successful completion of the process.
In the 2023/24 156 schools of the three orders from Umbria and six other Italian regions participated; 11,956 students took the final test

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ID 118

Exploring Retrieval Augmented Generation to Build a Secure and Effective Teaching Assistant in Learning Environments

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Extended Abstract

In Digital Learning, the integration of Language Model-based approaches (LLM) and Retrieval Augmented Generation (RAG) presents a promising avenue for developing intelligent teaching assistants. This research endeavors to experimentally explore the construction of a Teaching Assistant leveraging these technologies. The primary focus lies in identifying the optimal architecture and technologies to create an efficient and secure Teaching Assistant Framework trusted by teachers and students.

The public release of ChatGPT made it seem like endless possibilities were suddenly within reach, but issues in LLMs application became clear soon: their factual and temporal limitation to their training data, hallucinations, and lack of explainability. Therefore, the Retrieval-Augmented Generation (RAG) technique emerged as a promising solution to address these challenges. In RAG, an LLM is paired with an embedding model, enabling it to retrieve context from external sources. This contextual information enriches the LLM's understanding and enhances its ability to generate more accurate and relevant responses.

However, the primary concern lies in the practical utility of these advancements. We firmly believe that a virtual teaching assistant's value lies in its ability to offer comprehensive subject knowledge, deliver accurate responses, and importantly, afford the teacher control over its interactions. Moreover, it should adhere to pedagogical guidelines and earn the trust of both educators and learners. Within Retrieval-Augmented Generation (RAG), we perceive the potential to develop such a teaching assistant.

We have outlined a structured plan comprising three distinct phases. Currently, our exploration and findings are confined to the initial phase, aptly named the 'Student' phase. Here, our primary aim is to develop a foundational tool capable of delivering accurate responses sourced from appropriate materials. Moving forward, our plan unfolds into the 'Collaborator' phase, where our focus shifts towards empowering teachers with granular control over the assistant's responses. This phase involves implementing mechanisms to align closely with the instructor's preferences and the educational guardrails. Finally, our vision extends to the 'Assistant' phase, where the objective is to evolve the tool into a comprehensive learning companion for students. In this phase, we aim to also provide valuable insights, tips, and resource recommendations to enhance students' understanding and learning experience.

In our initial phase, guided by the principle of 'garbage in, garbage out,' we prioritize ensuring the suitability of our teaching materials for Language Models (LLMs). Recognizing the limitations of visual-centric resources like slides, we opt for a more text-based approach. Our selection—a machine learning manual—provides a comprehensive blend of textual explanations, graphics, and formulas. To ensure seamless integration with LLMs, we preprocess the manual to render implicit meaning explicit. This involves transforming visual cues, such as titles and formulas, into clear textual representations.

As we embark on the development of a teaching assistant framework, our initial approach starts with a naive RAG model. However, our journey towards creating an effective system is characterized by iterative refinement, particularly through close collaboration and feedback

from educators. We prioritize teacher evaluation and involvement, recognizing their invaluable insights into the practical utility and effectiveness of the system. Through this iterative process, we evolve from basic components to more sophisticated RAG architectures, continually refining our methodologies based on teacher feedback. This iterative approach ensures that our teaching assistant framework not only meets the evolving technological and pedagogical needs but also gains the trust and confidence of educators.

In summary, integrating LLM and RAG technologies for developing intelligent teaching assistants can create secure, efficient, explainable, and adaptable educational tools. By involving educators throughout the development process, we establish a reliable bridge between educational institutions and generative AI. Our phased plan emphasizes practical goals, rigorous evaluation, and adaptability, ensuring that virtual assistants are effective in various teaching environments. Through this research, we aim to advance the field of intelligent teaching assistants, providing learners worldwide with impactful and engaging educational experiences.

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ID 119

Changing Paradigms in Media Education: from Literacy Towards an Environmental Approach?

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Abstract

The aim of this paper is to propose a theoretical reflection on the relevance of the construct of "media literacy". Over the last few decades, it has come to dominate and has become synonymous with "media education" and "digital education". We know, however, that it is only a partial synonym, since it expresses only one specific way of understanding media education. Therefore, we will show that current media education is no longer represented by this term, as the words and concepts of both media and media education have changed in the last decade. Finally, we will show how another paradigm, based on the metaphors of environment and environmental education, can better explain today's media literacy phenomena than "literacy".

Keywords: media literacy, media education, change of paradigms, media as environment.

The development of science, as we all know, is not linear, not a progressive increase of knowledge. On the contrary, the history and sociology of science teach us that it is a process with stops and goes, twists and turns, deviations, fights, and revolutions (Kuhn, 1962). So, why should it be different in the field of media education?

Examining the history of media education, in fact, we find a multiplicity of approaches from the 1930s onwards (Felini, 2015). A unifying paradigm emerges only in the 1960s, influenced by the semiological and structuralist currents. This paradigm, based on the concept of "literacy", gradually establishes itself and becomes the dominant approach in the 1990s. Conceived as media "literacy," media education takes on specific features: (1) media messages are seen as texts, expressed in specific languages; (2) the skills of reading and writing prevail over others; (3) media education is regarded as communication education, specifically shaped for a mediatized society; and (4) the conception of literacy is "expanded" as it comes to include all textual forms: print literacy, screen literacy, television literacy, network literacy, information literacy, and so on. Several authors in the 1990s support the concept of "expanded literacy", such as Bazalgette (1991), the New London Group (1996), Tyner (1998), and many others.

The reasons for the long-lasting success of the literacy paradigm in the field of media education can be found, in my opinion, on three levels. The first reason lies at the theoretical level and consists in the strength of the theory, i.e., its rationale rooted in the semiotics and sociology of popular culture, and its capacity to clearly explain the foundations, the purpose, and the methods of media education. Secondly, at the didactic and organizational level, the literacy paradigm was successful because it allowed teachers, especially those teaching languages and literature, to reuse the knowledge, skills, and methods they had acquired and applied before. This prevented them from feeling unprepared for the new tasks that media education required. Thirdly, thanks to its focus on literacy, the paradigm had a political advantage in claiming a place for media education at schools. Given the past resistance of the educational systems to introducing media, and popular culture more generally, into the school curricula, transforming media into "languages", and media education into media

"literacy", proved very powerful in overcoming such obstacles, since nobody could claim that teaching languages and advancing literacy were not worthy tasks for every school.

In the 2020s, however, the scene appears to be evolving. In fact, the media have changed, and media education has changed.

Regarding the change of media, we can observe four interconnected phenomena:

1) Media are no longer screens (or texts) to look at. Nowadays, media are tools to be used, tools we carry with us or integrate in our homes and workplaces. Importantly, they are tools with which we manage connections in social networks that *we* create, not they.
2) Media messages are no longer "closed" messages, created by an author to be broadcast in their integrity. Nowadays, any single message can be split or mashed by the audience, complemented with comments and reactions, contextualized, parodied, etc. In this realm of "open" messages, reading is no longer the only activity media consumers perform. They also need moral character, understanding of others, relational skills, attention to the consequences of what they do, consciousness of their own needs, and so on. All these skills are not strictly related to literacy – not even in its expanded form.
3) As a consequence, media users have more than one, strictly defined role: they are not only readers, but also writers, broadcasters, photographers, video makers, editors, reporters, critics, fans, friends, and citizens.
4) Lastly, as media have changed, so have the metaphors used to describe or think of them: they are no longer considered books or texts to read, but tools we use, water where fish can swim, dirty mirrors, prostheses that enlarge the radius of our senses, or cities in which we live. It remains to be seen if new metaphors can help us generate new visions for media education, replacing that of media literacy.

Apart from the transformation of media, media education has changed as well over the past twenty years, as is demonstrated by ever-new sets of literacy skills being theorized. These have passed from «decode, evaluate, analyze and produce both print and electronic media» (Aufderheide, 1993, p. 1) to «play, simulation, performance, multitasking, negotiation (Jenkins et al., 2009, pp. 35–104) and to «technological skills, cognitive, and ethical skills (Calvani et al., 2010, p. 51; Tulodziecki & Grafe, 2019). Looking at how media education practices have developed over the decades is not easy. Therefore, we must settle for the literature review compiled by Fugalli (2021), which takes into consideration a corpus of 22 documented projects, spread across all Italian regions and targeted at adolescents. Unsurprisingly, only 7 out of 22 projects state specific objectives related to the language of social media (understanding media languages, experimenting new languages for social networks, creating messages of different kinds, sharing contents, etc.), while 11 have goals related to the use of social media (exploring why teenagers use social networks, developing awareness about media consumption, learning how to make correct use of mobile tools, reducing the extreme use of digital devices, etc.), 8 are focused on teaching teenagers the risks of ICTs (sexualization, cyberbullying, gambling, addiction, loss of privacy, identity theft, etc.), and 3 aim to develop the relational skills of adolescents in a networked society. In conclusion, this research shows that, in the analyzed corpus of recent media education practices, the goal of teaching media *literacy* is of less importance, while new goals – related to consumption, active use, and relationships – have acquired more space.

Today more than ever, a renewed look at metaphors can be valuable as "literacy" is no longer capable of explaining the whole field (if it ever was). Instead, I propose the ecologic metaphors of "environment" and "environmental education". So, following this line of thinking, what goals could media education have if we think of it as the preparation for a journey into the wild? Below some preliminary answers.

1	Equipping oneself	Be aware that living in a mediatized world requires new and updated basic knowledge.
2	Exploring	Foster the ability to explore the media world, with a curious and critical mind vis-à-vis its developments.
3	Observing	Learn to observe carefully and critically the media landscape, understanding its characteristics and operating logics.
4	Meeting	Recognize the role of others in the media world and communicate through the media in appropriate and respectful ways.

5	Deciding	Learn to orientate oneself in the media world, being aware of one's priorities and knowing how to make adequate choices in terms of effectiveness and moral sense.
6	Admiring	Develop an aesthetic sense regarding the media, learning to recognize and enjoy the beauty they can convey.
7	Taking care	Recognize that, both in the online and offline world, communicating is an act that has value in itself: it must be respected and safeguarded.

In conclusion: Can this be a generative approach? Could it spark a new paradigm?

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ID 120

The University Climate in Distance Education Classes. Empirical Research on Students' Perceptions

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Abstract

University climate is a complex of «rules, trust, academic supports, personal and social relationships among classmates and between professors and students, and academic connectedness» (Sánchez et al., 2015). It is also the way in which «university students perceive and feel about the social relations that occur in and out of the classroom» (Souza et al., 2018), and it is important for the general development of students, impacting academic achievements, wellbeing, self-esteem, sense of community, and the development of an adequate professional identity (Machado et al., 2002; Rovai, 2002; Rania et al., 2014).

But what happens to the university climate when all activities are online? Can we still speak of a "climate" when students never meet in person?

To answer questions like these, during the 2020-21 Covid-19 pandemic – when we had to teach our lessons using screens instead of classrooms – empirical research was conducted to measure students' perceptions of the university climate in distance education. Therefore, we developed and validated the UClinQ-DE, a questionnaire composed by 22 items, which we administered to a population of freshman in an Italian BA program in Educational Sciences (Felini, Zobbi, 2022). Data analysis shows the existence of four clusters among the students: the optimists, the stiffs, the flexibles, and the disappointed.

Keywords: University Climate, Distance Education, E-Learning, Classroom Relationships.

Long Abstract

The university climate is a complex of «rules, trust, academic support, personal and social relationships among classmates and between professors and students, and academic connectedness» (Sánchez et al., 2015). It is also the way in which university students perceive and feel about the social relationships that take place inside and outside the classroom (Souza et al., 2018). The research views university climate as the interplay of several dimensions, including the university's historical legacy of inclusion/exclusion, its ability to integrate students from diverse groups, the psychological climate – which includes inter and intra-group perceptions and attitudes – and the behavioral climate, which encompasses the formal or informal interactions between groups (Souza et al., 2018, p. 2073). University climate is a significant factor in the overall growth of students and the development of both positive and negative behaviors. Research has demonstrated the impact of university climate on academic achievement, students' well-being, self-esteem, sense of community, engagement, and the development of an appropriate professional identity (Gunuc et al., 2022; Kurt et al., 2022; Machado et al., 2002; McMillan & Chavis, 1986; Rania et al., 2014; Rovai, 2002; Sánchez et al., 2015). Furthermore, research on international students shows that their positive perception of the university climate promotes their social integration and enables them to overcome «challenges related to discrimination, stereotypes, and language barriers» (Jean-Francois, 2019, p. 1071). Conversely, university climate has been shown to influence the development of inappropriate or dysfunctional behaviors, such as internet addiction, aggressive conduct, bullying, psychological distress, and academic dropout associated with feelings of isolation (Casas et al., 2013; Conley et al., 2013; Li et al., 2016; Rovai, 2002).

But what happens to the university climate when all activities are online? Can we still speak of

"climate" when students never meet in person?

To answer questions like these, during the 2020-21 Covid-19 pandemic – when we had to teach our lessons using screens instead of classrooms – empirical research was conducted to measure students' perceptions of the university climate in distance education. Therefore, we developed and validated the UClinQ-DE, a questionnaire composed by 22 items, which we administered to a population of freshman in an Italian BA program in Educational Sciences (Felini, Zobbi, 2022). UClinQ-DE measures perception of five dimensions, such as perception of the social interactions among peers (Scale 1), sense of belonging the academic community (Scale 2), initial expectations about climate (Scale 3), perception of social interactions between students and teachers (scale 4), and awareness of the potential limits that online interactions have (Scale 5).

A cluster analysis carried out on the basis of the data collected revealed the existence of four groups among the students: the Optimists, the Stiffs, The Flexibles and the Disappointed.

The first group, the Optimists (N=67), have a positive perception towards their relationships with their fellow students and the possibility of maintaining these relationships over a longer period. They feel supported by their peers and have a good relationship with them. They also feel included and know that they can rely on a peer if they have difficulties. Furthermore, they believe that they communicate effectively online and are proud to be part of the Italian BA program in Education Sciences. In terms of relationships with lecturers, the group expresses a generally positive perception, and believes that these relationships are indeed accessible and high quality. Among the causes that could affect the climate, they include the lack of shared physical spaces and the lack of opportunities for informal communication. Finally, Optimists state that they have positive expectations, although they express feelings of confidence and apprehension at the same time.

The second group, the Stiffs (N=37), have a generally negative perception of the university climate in terms of relationships with their classmates. In fact, the Stiffs believe that there is minimal opportunity to build and maintain relationships with their fellow students over an extended period. Furthermore, these relationships do not seem to be of high quality because they do not feel able to understand when a colleague is in trouble and because they believe that they cannot rely on others. As for relationships with teachers, they find it difficult to build an important relationship with them online; however, they believe they can rely on faculty. Causes that could affect the climate include the lack of shared physical spaces and the lack of opportunities for informal communication, both of which are rated more critically compared to the optimists. Overall, the Stiffs are proud to be part of the Italian BA programme in Education Sciences and are open to collaboration. The Stiffs state that they are curious, but generally have a negative attitude towards expectations of the future.

The third group, The Flexibles (N=47), shows a positive perception of the university climate and relationships with their fellow students. In general, they believe that relationships can be built and maintained over time; furthermore, these relationships are perceived to be of high quality, as evidenced by above-average scores for both the ability to rely on others and the ability to understand and intervene when a fellow student is in trouble. They are quite proud to be part of the Italian BA programme in Education and are open to collaboration with their classmates. As for relationships with lecturers, the Flexibles report difficulties in building them, although they believe they can rely on their professors. Among the causes that could affect the climate, they also mention the lack of shared physical spaces and the lack of opportunities for informal communication. Finally, they report feeling generally anxious and pessimistic and resigned to spending a semester in solitude.

The last group, the Disappointed (N=22), shows a very negative perception and scores less than satisfactory in terms of relationships with their peers (highest score 5). They have a negative view of the opportunity to build and maintain relationships with their peers. They also believe that they

cannot rely on others, that they cannot understand when a peer is in trouble, and that they can help them even less. Finally, they report that they are unable to communicate effectively online and feel uncomfortable. As for relationships with faculty, they indicate that they are difficult to build, but acknowledge that they can rely on their professors. Among the causes that could affect the climate, the Disappointed, like the other groups, mention the lack of shared physical spaces and the lack of opportunities for informal communication. Moreover, like the other groups, they are proud to be part of the Italian BA program in Education and are open to collaborating with their classmates. Finally, they express moderate confidence in the future and a desire to build relationships with their fellow students.

The results we have obtained allow us to assert that the university climate in terms of peer relationships, relationships with lecturers, sense of belonging and expectations is palpable even in remote learning contexts, as we have experienced during the Covid-19 pandemic. This confirms the hypothesis that university climate is an important component in the practise of higher education.

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ID 121

Analysis of the Appropriateness of the Blended Learning Model Adopted in a Bachelor's Degree Program in Philosophy

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Abstract

The contribution is made with the aim of analyzing the validity of the blended learning model proposed to students of the Philosophy degree program at the University of Milan. During the current a.y. 2023-24, the 4 mandatory courses of the first year are delivered both in-presence (A-K; L-Z editions) and blended learning (blended learning edition). The blended learning edition model is based on 3 in-presence lectures (6/8 hours), 20 hours of asynchronous lectures, and the remaining in synchronous videoconferencing. With a view to understanding the levels of adequacy of the model for the categories of students who have chosen to participate in this specific edition and its possibilities for expansion to other teaching or degree courses, a mixed method survey was implemented according to the Explanatory Sequential Mixed Methods Design QUANT->Qual model. Specifically through the administration of a questionnaire to all students (about 100) who have taken at least one blended learning course with a participation rate of more than 50%, a focus group to a sample of them, and 6 interviews with students representative of clusters. To select clusters of students, course participation data, exam results (learning analytics), and questionnaires responses will be analyzed.

Keywords: blended learning; higher education; mixed methods; blended learning model; didactic innovation

Introduction

The blended learning model is emerging in the context of higher education as an interesting solution to contemporary educational challenges (Garavaglia & Petti, 2022; Rasheed et al., 2020; Castro, 2019). Combining elements of traditional face-to-face teaching and online learning modes (Garavaglia & Triacca, 2021), blended learning offers flexibility that adapts to the diverse needs of students (Boelens et al., 2018). This approach is particularly beneficial for working students, as it allows them to balance work and academic responsibilities while ensuring equitable and inclusive access to educational resources (Allan, 2007). In addition, blended learning is critical for engaging students who are caregivers or have specific difficulties attending face-to-face classes (Garavaglia & Terrenghi, 2022). The ability to attend and complete coursework both asynchronously and synchronously creates a dynamic and interactive learning environment that fosters greater participation and engagement for all students (Fisher et al., 2021; Sahni, 2019; Tay, 2016).

During the academic year 2023-24, the compulsory courses of the Bachelor of Philosophy (University of Milan) included an edition delivered in blended learning. These courses were based on 3 face-to-face lectures (6/8 hours), 20 hours of asynchronous lectures and the rest in synchronous videoconferencing and had a total of about 100 students participating. To explore the adequacy of this proposal and the perceptions of the participants, a mixed methods survey was conducted according to the Explanatory Sequential Mixed Methods Design QUANT->Qual model (Creswell & Plano Clark, 2007). The main purpose of this paper is to share some preliminary data from the questionnaire.

The survey is still in progress. The results were derived from the initial phase, which included responses from approximately one-third of the total sample size. The majority of respondents (85%) indicated that they are over the age of 30, while 76% reported that they are employed full-time (62%) or part-time (15%).

Furthermore, the results indicate the presence of a small percentage of students who self-identify

as caregivers or as having a specific difficulty that may significantly impair their participation in teaching and training activities. Indeed, 18% of the students surveyed indicated that they fell into one of these categories.

It is of paramount importance to highlight that the respondents were almost equally distributed between those who pursued the course of study in a conventional manner (48%) and those who claimed to be enrolled part-time (52%). Furthermore, the sample is notable for its high proportion of part-time students, which represents 5.19% of the total.

Focusing specifically on the questions related to the students' evaluation of the proposed blended learning facility for the courses, there was a very good response. In general, students were positive about the communications published by professors on the channels of each blended learning course: they found the information easy to find, as well as complete, clear and coherent.

The survey also revealed that students believe blended learning courses are more adaptable to their schedules and personal needs than face-to-face courses. Approximately 97% of respondents indicated that the courses were completely or almost completely tailored to their needs, especially with regard to live streaming. This is also supported by the students' statements in the qualitative questions. For example, one respondent stated that "*the organisation of the Blended Learning facility is great for working students, because it allows them to access the lectures and materials provided by professors and to have direct contact with them. I believe that this mode allows those who cannot attend in person to reach a higher level of preparation than those who do not attend, precisely because of the possibility of receiving training from the teachers"* (F, >30, L); someone else insists not only on the courses' adaptability but also on its effectiveness with respect to learning outcomes: "*blended courses offer the possibility to better organize the study of one's teaching and repeat lessons where concepts are unclear better consolidating concepts over time*" (M, >30, L).

This specific issue of learning benefits was explored through an ad hoc question in the questionnaire that asked respondents to select from several items what they believed to be the most important benefits from a learning perspective resulting from taking blended courses. Students rated the ability to review lectures as particularly beneficial (about 97%), the ability to deepen knowledge (about 79%), and the ability to follow and learn at their own pace (67%).

The last part of the questionnaire aimed to investigate the replicability desired by students regarding the blended edition. Again, the responses collected show a trend of willingness to replicate the experience, even increased. 39 % of students say they would like to see an entire degree course delivered in blended learning mode; while about 54 % would like to see an increase in the number of courses delivered in this mode.

Focusing instead specifically on the distribution of hours, nearly half the students say they like the current one (48 % of cases), while a good share suggests increasing asynchronous hours of video lectures (about 21 %). The analysis of the qualitative responses also reveals a few voices suggesting an intensive solution, with the proposal of an in-person day involving more hours and more meaningful activities from the point of view of interaction and reworking of disciplinary content: "I *find that coming to the university on Saturdays for only two hours -which then becomes an hour and a half of lecture time- is not very useful for a worker who is busy all week. I would opt for more hours, a kind of intensive Saturday. Coming to the university is a cost and is also a not inconsiderable effort after a work week. I would like the time in attendance to be more meaningful*" (M, >30, L).

The results are important in defining the model to be adopted for future editions of the degree course delivered in blended learning.

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ID 122

AI at School for Promoting Critical Thinking And Digital Humanities

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Abstract

Lifelong Digital Learning and Education: promoting flexibility, inclusion, critical thinking.

Keywords: Generative AI, Critical Thinking, Digital Humanities, STEM, Sustainable Development.

Introduction

The issuance of the Operating Instructions on "STEM and Multilingual Skills Enhancement Actions" (Ministerial Decree 65/2023) directs the long term and daily work of teachers towards active teaching linked to disciplinary content, within a STEAM-type model. The use of AI can effectively support the implementation of educational, training and guidance paths for students within the curricula of all school cycles of activities. AI is particularly useful in promoting the integration of activities, methodologies and content aimed at developing STEM, digital and innovation skills. In addition, artificial intelligences, particularly generative one, are powerful tools with pros and cons relevant to the world of learning at school. They may strongly support integration of skills.

This paper presents an interactive Project implemented on LMS Moodle as part of a Scientific High School's Digital Citizenship Education.

Materials and Methods

The project involved two third-grade scientific high school classes through workshops based on the critical thinking approach. The process was developed in the stages described below.

- Critical reflection on "Does ChatGPT know math?": critical group observations on some math lessons created by chat GPT. Discussion on the pros and cons of this use of ChatGPT
- Introduction to AI by an interactive branching scenario created on Moodle class with H5P activity.
- In-depth study of how AI works by using Leonardo Steam Labs Videos [1].
- Online research by groups on examples of risks and opportunities.
- Reflection on how multiple opportunities open for humanities studies are "contaminated" by digital and IT knowledge (Digital Humanities). Then the reverse: how STEM contexts can only be enhanced by hybrid knowledge, soft skills, creativity (World Economic Forum's Future of Jobs Report 2020).

Results

The students showed great interest in the topic and participated with curiosity and creativity in the proposed activities, leading to a greater awareness of the challenges and opportunities related to the use of AI. Below are some of the main conclusions that emerged.

Through the analysis of the concrete case of the use of ChatGPT in mathematics lessons, the students immediately critically evaluated the accuracy of AI in providing information and its ability to understand and adequately answer questions in a field in which they are experts. And they immediately identified the need to be cautious about the uncritical application of AI in school

contexts and, in any case, when searching for information in fields unknown to us.

The subsequent phase of delving into the workings of AI, from Machine learning to Deep learning to Adversarial Generative Networks (GANs) and Autonomous Systems, provided the foundations and keys to understanding for further investigation...

Exploring some of the benefits of using AI such as the automation of repetitive tasks, large-scale data analysis, support in medical diagnosis, and statistical processing of Open Data led students to gain awareness of the positive potential of AI in improving human life and solving complex problems.

In the phase of analyzing the challenges related to the widespread adoption of AI, on the other hand, students expressed ethical concerns about some of the potential negative impacts on society and the individual, such as data privacy, algorithmic discrimination, labour automation and the social implication of AI. In particular, the discussion focused on the fact that some jobs are destined to disappear in the near future. Their future. The conclusion was reached that AI, particularly generative AI, has truly revolutionary power, to which we humans must give direction and rules!

Afterwards, the students reflected on the insights suggested by the World Economic Forum. It emerged how the integration of skills is a crucial aspect of preparing for the complex challenges of the future: many of today's global challenges require an in-depth synergy between scientific and humanistic disciplines. For example, solving environmental problems requires not only scientific knowledge about sustainability and ecology, but also an understanding of the socio-cultural and economic dynamics that influence environmental policies.

The integration of humanities and science skills fosters the development of critical and creative thinking. Indeed, it has been pointed out that the ability to critically analyze complex information and examine issues from multiple perspectives is necessary to generate innovative sustainable solutions in accordance with the 17 UN Goals 2030. For instance, technological innovation in green energy certainly requires collaboration between engineers and environmental scientists, but also economists and public policy experts to develop sustainable and socially acceptable solutions.

In all these aspects, the conscious use of AI proves to be a powerful support to broaden the horizons of practitioners, to show aspects that the individual might ignore, to complete the overview, to propose and generate original solutions, which will then be critically examined by human expert teams.

Conclusions

The project proposed the following learning objectives:

- Increased critical awareness: Students developed a greater awareness of the benefits and challenges related to the use of AI, learning to critically evaluate its applications.
- Stimulation of research and reflection: Online research and peer discussions encouraged students to independently explore further topics related to AI and the risks and opportunities it presents.
- Integration of skills: Students realized the importance of integrating humanities and scientific knowledge to address the challenges of the future, as suggested by the World Economic Forum and called for by the realization of the UN 2030 sustainable development.
- Educational potential of AI: Students gained ideas on how AI could be used effectively in education to improve learning processes and in the world of work to generate creative contributions in the search for optimal solutions.

Overall, the project aimed to provide students with an in-depth overview of AI, encouraging critical thinking, reflection, flexible approaches and the integration of multidisciplinary knowledge.

Acknowledgements

[1] Leonardo Stem Labs, https://www.educazionedigitale.it/stem-leonardo/ .

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Blended Learning for Teacher Development: transforming Educational Practices by Harmonising Tradition and Innovation

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Keywords:

1. Blended Learning models
2. Academic Staff Development projects
3. Universal Design for Learning (UDL)
4. Integration of Educational Technology
5. Communities of Practice

Extended abstract:

The emergence of universities was propelled by medieval scholars who traversed Europe in pursuit of knowledge, as highlighted by *amor sciendi* (Grundmann, 1957), fostering the establishment of educational communities that reshaped society (Le Goff, 1965). In today's globalized landscape, where students and educators are connected via the World Wide Web and engage through digital technologies, academic institutions must remain dynamic. The onset of the pandemic compelled educational institutions to transition lessons to online platforms for nearly two years. However, rather than embracing innovative pedagogical models, there has been a tendency to adhere to the traditional distance learning (FAD) model, grounded in a transmissive approach. Consequently, there has been a predominant utilization of online learning resources in a transmissive manner, neglecting the

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relational, creative, and connective potential offered by Web 2.0 and crucial to contemporary online learning paradigms. Furthermore, the social, communicative, and cognitive advancement of new generations, spurred by the omnipresence of technology in daily life, necessitates a seamless integration of digital technologies in educational settings (Calvani, 2001; Bocca, 2003; Rivoltella, 2003; Trentin, 2004; Ferri, 2005; Ranieri, 2005; Bonaiuti, 2006).

Within the Teaching and Learning Centre at Insubria University (Bonometti, Ferri, 2024), a blended learning model (Ligorio, Cacciamani, Cesareni 2021) has been conceptualized to seamlessly integrate face-to-face teaching activities with the potential afforded by digital platforms, transcending the dichotomy between physical and virtual realms and refraining from regarding e-learning as a mere substitution for in-person instruction. The study delved into the dissemination of a digital culture in academic teaching, addressing both faculty resistance and the efficacy of online learning environments. The project aims to promote innovative blended models through the Faculty Development Programme, with a focus on both the teaching area dedicated to the DSA world, with a focus on Universal Design for Learning (UDL) and teaching methodologies based on interactivity and problem solving.

Universal Design (UD) emerged from the field of architecture with the goal of developing products and environments accessible to all individuals without necessitating special modifications (Center for Universal Design, 1997). Universal Design for Learning (UDL) extends these principles to education, advocating for the creation of inclusive and personalized learning experiences. These concepts have been championed notably by the Center for Applied Specialized Technology (CAST) and are gaining traction globally (Rose & Meyer, 2002).

The course on teaching methodologies will adhere to the classification proposed by Bonaiuti (2014), supplemented by recent contributions from Castoldi (2024). The blended structure of the course entails the dissemination of content via the University platform, with the curriculum divided into modules delivered through concise video lectures and pertinent resources. Following each module, participants engage in practical tasks, such as implementing small changes in their teaching practices, accompanied by personalized coaching to review and refine their approaches. Upon completion of all modules, participants have the option to join a community of practice (Wenger, 1999) focused on either Universal Design for Learning (UDL) or teaching methodologies. This community facilitates ongoing dialogue, knowledge sharing, and the exchange of experiences regarding the various innovations implemented in participants' own teaching contexts.

Our project endeavors to advance Universal Design for Learning (UDL) and enhance the understanding of teaching methodologies within the University of Insubria by establishing a "UDL Community of Practice" (CdP) alongside one focused on "Teaching Methodologies." Both

experiments are based on the pedagogical principles guiding adult transformative learning (Mezirow, 2016), i.e. through collaborative, participatory and experiential methodologies (Jonassen, 2000; Comoglio, 2000; Kolb, 2014). The research framework will follow the methodological approach of action research (Eliot at c. 1993; Nigris, 1998; Barbier 2007), i.e. the continuous recursiveness between moments of research and moments of action. The research part will make use of qualitative-quantitative data collection, according to the triangulation principles of Mixed Method Research, using MaxQda (Creswell, 2024).

The creation of a hybrid learning culture aims to improve educational practices while preserving the intellectual vitality of the university experience.

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ID 125

Learning Physics by Playing: an AI-Guided Escape Room Adventure in Unreal Engine

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Abstract

This project integrates game design and problem-solving education via an escape room game in Unreal Engine. Beyond just gamifying problem solving, it establishes an immersive realm where players intuitively absorb principles using machine learning to identify learning patterns and enhance the game.
The objective is to gauge the game's impact on problem-solving understanding, contrasting in-game metrics with traditional exam scores, advocating for hands-on, immersive learning.
Serious Games" have risen from simple diversions to potent educational tools. Emphasized by research, particularly Menon & Romero's 2019 insights, Game-based Learning (GBL) significantly bolsters retention and engagement. Building on this foundation, this project blends the realms of virtual laboratories and gaming. Gunawan et al. (2018) elucidated the positive impacts of virtual laboratories on students' conceptual understanding in physics, highlighting that students engaged with virtual labs demonstrated superior learning outcomes.
We will develop a distinctive escape-room game, where puzzles symbolize distinct problem solving games, urging students to transition from passive lectures to active exploration.
Within this environment, every action, choice, and interaction is meticulously recorded, then analyzed through machine learning to ascertain learning trends and obstacles. Our core mission is to unify digital laboratories with the escape room model to improve student learning.

Keywords: Serious game, Tutoring AI, Game based learning, Physics, Escape Room

The project aims to enhance the quality, flexibility, and effectiveness of teaching in the scientific degree programs at the University of Camerino by offering students innovative online learning activities. In this context, we are designing a Serious Game based on physics experiments to support theoretical classroom lessons.
This educational game provides a learning environment where students immerse themselves in a virtual journey that combines a virtual laboratory and Game-Based Learning (GBL). The escape room-style video game simulates a series of virtual physics laboratories where students engage by solving problems. The goal is to offer an integrated learning system that connects theoretical lessons and practical activities typically conducted in a laboratory (Amendola & Miceli, 2016).
Several factors are behind this chosen direction. Firstly, scientific degree programs often lack practical laboratory activities or include very few hours of such activities.
Secondly, there is a growing gap between traditional teaching methods and the learning and communication tools which are typical of the new generations (Oblinger, 2005).
The choice to create a Serious Game originates from evidence that game-based learning (GBL) improves both student learning and understanding, interest, and motivation for the subject matter (Manon & Romero, 2019). GBL, when integrated with digital tools, constitutes a teaching strategy that uses games to teach specific content or achieve a particular learning outcome.
The game itself facilitates the acquisition of knowledge. While playing, students learn the knowledge

targeted by the game. Game-based learning uses disciplinary content and makes it challenging and enjoyable, resulting in immediate and meaningful learning (Camacho-Sánchez et al., 2022).
This method, which is profoundly different from passive learning through frontal lessons, allows students to be actively involved and engaged with the subject in a manner that aligns more closely with their current educational expectations.
The Serious Game is developed on the Unreal Engine 5 platform, which enables the creation of highly detailed and interactive game environments suitable for the educational needs of an escape room-based approach. The virtual structure of the escape room consists of a series of interconnected rooms containing challenges based on simulations of physics experiments.
Progression through the rooms is achieved by students successively solving the problems presented in the game.
To facilitate problem-solving, each room contains an AI-powered tutor that provides students with the necessary assistance to solve the puzzles through hints and help, which always refer back to the examined physics topic.
The tutor simulates human behavior through realistic movements and dialogues to make the gaming experience more captivating and immersive for the student.
Within the escape room, to contribute to the project's scientific specificity, every action, choice, and interaction made by students is meticulously recorded. These data, analyzed using machine learning techniques, will help codify learning patterns and identify challenging situations. The monitored parameters include:

- The time taken to complete the challenge;
- The number of attempts necessary to solve the challenge;
- The number and type of help requests;
- The sequence of actions taken to solve the challenge.

The results of this analysis will form the basis for evaluating the effectiveness of the GBL approach, particularly how the escape room-based Serious Game, composed of challenges which simulate physics experiments, can enhance students' understanding of physics principles and their practical applications compared to traditional teaching methods.
Pilot tests will be conducted with groups of students from various degree programs to validate the specificity and relevance of the results.
The findings will be used iteratively to refine both the design of the puzzles and the effectiveness of the virtual tutor. Before and after experience questionnaires will be administered to gather student feedback, which will lead to adjustments and improvements to the game.
The development of this project not only serves as an academic tool but also as an educational method that enables students to revise, understand and apply physics principles through gameplay.

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ID 126

Reality Vs. Perception: Exploring the Dunning-Kruger Effect on Literacy and Numeracy Skills in University Students

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Keywords: Dunning-Kruger; Literacy; Numeracy; University Students

The present research aims to explore the Dunning-Kruger (DKE) effect on literacy and numeracy skills among university students just enrolled in the first year of the Digital Education degree course at the University of Modena and Reggio Emilia.
Also called “unskilled and unaware” the effect studied by the authors shows that incompetent individuals have more difficulty recognizing their true level of ability than more competent individuals (Kruger & Dunning, 2009) generating estimation errors in performance by both.
We explore these effects in our study, investigating a sample of students who assessed their ability in literacy and numeracy skills, according to ISFOL definition (2014), through an incoming skills assessment tests on basic knowledge to verify that there are no significant deficiencies in particular disciplines.
Statistical methods of analysis will be used to process the results of a questionnaire on metacognition awareness (MAI) and put in relation literacy and numeracy tests results to the student’s perception of performance, expressed through a range of choice from -10 to 30 (literacy test) and 10 e 30 (numeracy test).
In line with DKE, it is hypothesized that students with lower performance may show a tendency to overestimate their abilities, while those with higher performance may have a more accurate perception of their skills.
The results of this research aim to contribute to the lack of research studies on the impact of the Dunning-Kruger effect on literacy and numeracy skills, besides having important implications for the educational practice and skill development of university students.

ID 127

Implementation of a Virtual Tutor, Based on Generative AI, to Enrich the Training Experience

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1

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Extended Abstract

In the ever-evolving landscape of corporate training, ongoing employee training has become a cornerstone for maintaining competitiveness and innovation. The rapid obsolescence of knowledge, both technical-specialist and transversal, the growing demand for cross-functional skills combined with the need for training that is increasingly personalized and relevant to the needs and roles of individuals, requires an adaptive learning environment. This environment must integrate perfectly and seamlessly with daily work environments, such as the company intranet, and overcome the typical obstacles of change management such as habits, routines, cognitive technical barriers to accessing services. The advent of generative artificial intelligence technologies offers a promising avenue to revolutionize this sector. This article discusses the implementation of a generative virtual tutor based on artificial intelligence within the Moodle platform integrated with Giacomo Mason's Intranet 80.20, with the aim of enriching the training experience for employees, focusing in particular on online training for sales staff.

The implementation of the AI virtual tutor consists of three key phases:

1) **Integration of AI into the Learning Management System (LMS) accessible by Intranet:** this phase involves several critical steps designed to lay a robust foundation for AI-enhanced learning. This phase is fundamental because it ensures that the AI functionalities are deeply embedded into the existing learning management system and intranet, allowing for seamless interactions between the AI and the learners. Here is a breakdown list of the actvities in this phase: System Assessment and Requirements Gathering, AI integration planning, API development and integration, implementation and testing;
2) **Training on Specific Course Content:** this phase focuses on the specialization of the AI-based virtual tutor to handle specific course content effectively. This phase is crucial for ensuring that the AI can deliver highly relevant and context-aware assistance tailored to the particular needs of the sales training courses offered by the company. RAG and prompt engeenering are primary processes for this activity. Here's breakdown list of the activities in this phase: Analysis of the existing course materials, Dataset creation, Tutor customization, Validation;
3) **Introduction of a Virtual Avatar for Voice Interactions**: The final phase adds a human-like interaction layer by integrating a virtual avatar that engages with learners through voice commands, further humanizing the learning experience.Here's a breakdown list of the activities in this phase: Avatar design, Voice technology integration, Integration with AI model, integration of multimodal learning strategies (text + voice).

The introduction of a virtual tutor in a learning environment brings numerous advantages that significantly enhance the educational experience. Here are the main advantages:

1) **Personalized Support 24/7:** The virtual tutor is available anytime, which is crucial for learners who may be working odd hours or in different time zones. This availability ensures that help is just a query away, regardless of the hour, making learning more flexible and accessible. Moreover AI-powered tutors can process and respond to queries instantly. This immediacy not only saves time but also helps

maintain the learner's flow and concentration, preventing frustration and disengagement that can occur due to waiting for assistance;

2) **Detailed Explanations**: The AI tutor provides customized, in-depth explanations based on the learner's specific needs and difficulties. For complex concepts, it offers detailed breakdowns and examples for clarification. By addressing individual learning gaps and reinforcing concepts through targeted explanations, the virtual tutor enhances understanding and retention, as new knowledge can be effectively connected to existing knowledge frameworks;
3) **Interactive Quizzes:** The virtual tutor's interactive quizzes adapt their complexity and focus based on the learner's performance, escalating difficulty for proficient learners or reinforcing basics for struggling ones. Quizzes make learning interactive, breaking monotony, and serve as self-assessment tools, allowing learners to gauge their understanding and progress, which can be highly motivating and engaging;
4) **Multilingual Support:** In global companies, the workforce often comprises employees from various linguistic backgrounds. A multilingual virtual tutor ensures that language barriers do not hinder an employee's ability to learn, thereby promoting inclusivity. Moreover being able to interact with the learning material in one's native language can make learning more accessible and less intimidating. This comfort can lead to better engagement and deeper comprehension of the subject matter;
5) **Integration of External Resources**: The virtual tutor integrates external resources like videos, case studies, research papers, and real-world examples into the learning path, enriching the material and illustrating complex concepts more vividly. Furthermore, by incorporating relevant resources, it offers contextualized learning experiences applicable to the learner's real-world professional scenarios, enhancing the practical value of the content and bridging the gap between theory and practice.

Evaluating the effectiveness of a virtual tutor powered by AI involves a combination of quantitative and qualitative methods. Quantitative metrics include user engagement (average interaction time), frequency of use, and course/module completion rates with the virtual tutor compared to without it. Qualitative evaluation comes from user satisfaction surveys, focus groups, and interviews. Employing these quantitative metrics and qualitative methods allows for assessing the current performance of the virtual tutor, as well as gaining insights to drive ongoing improvements. This ensures the educational AI tool evolves to meet the changing needs and preferences of its users over time.

The integration of AI, specifically GPT-4 generative AI, into employee training programs through platforms like Moodle represents a major advancement in educational approaches. It enables a more engaging, personalized, and efficient learning experience. The paper highlights the importance of technologies like Retrieval Augmented Generation (RAG) for providing accurate and contextually relevant responses, which are key for effective learning. The ongoing experimentation demonstrates a model that could potentially be adopted by various industries for similar training needs.

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ID 129

The World of Artificial Intelligence in Higher Education: a Systematic Review about the Ethical Challenges. A Foundation for Action

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Abstract

Artificial intelligence (AI) is becoming part of our daily lives. The educational field is not immune to this change, coming to terms with new tools and technologies more and more introduced into learning and teaching processes. Higher Education (HE) is currently facing interesting and controversial challenges. Potential for AI applications is noted, but deep concerns related to the ethical dimension are also raised. Given the necessary urgency of responding appropriately to a revolution already underway, a systematic review is conducted starting from the question "What ethical concerns emerge from recent research related to the use of AI in Higher Education?". Materials are analyzed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) drawing from Scopus, ERIC and Web of Science databases. Preliminary findings reveal that internal problems of AI influence and threaten academic integrity in its different domains: plagiarism, authorship, cheating, development of holistic competences, originality, creativity, critical thinking, equity and privacy. A demand for more care and awareness in the research in this field emerge. Manifolds are the possible solutions that can address the various ethical challenges: the proposal for AI literacy programs, AI best practices guidelines and regulatory policies using technology in HE are emphasized. The study provides an overview of ethical issues discussed up to date in the world of practice and research. It becomes an opportunity to open spaces for reflection that can be a significant starting point for evaluating the implementation of AI, to design and take wise and innovative actions within education.

Keywords: Al Ethics, Al Literacy, Higher Education, Academic lntegrity

Artificial intelligence (AI) is becoming part of our daily lives as people and as professionals. Especially the educational field is not immune to this change and must come to terms with the new tools and technologies that are being introduced into teaching and learning processes. Higher Education (HE) is currently facing interesting and controversial challenges involving both teachers and students (Aler et al., 2024). AI is already being used in the academic context with multiple purposes and functions. Great potential is noted, but deep concerns related to the ethical dimension are also raised (Vetter et al., 2024, Zeb et al., 2024). Given the necessary attention to this issue and the urgency of responding appropriately to a revolution already underway, a systematic review is conducted starting from the question "What ethical concerns emerge from recent research related to the use of AI in Higher Education?". Selected materials are being analyzed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA, Page et al., 2021) drawing from Scopus, ERIC and Web of Science databases. Using the string ("artificial intelligence" OR "artificial intelligences") AND "higher education" AND "ethic* yields numerous results related to systematic reviews already conducted on the topic of interest. Hence, this study exclusively considers primary research, with meta-analyses serving as foundational material to construct theoretical and methodological frameworks. This approach enables a holistic understanding of the subject and by identifying the emerging literature gaps the study tries to leverage and cover them giving some possible perspectives, new directions to the future research and educational practice. Stemming from the preferred documents, preliminary findings and reflections are developed. The research under consideration was conducted globally, without any notable prevalence of one geographical area over others. In the research, there is a strong emphasis on Generative Artificial Intelligence (GenAI), particularly highlighting ChatGPT and its different versions. The focus is on the

HE context, with both students and teachers considered as key stakeholders users (Hasanein & Sobaih, 2023). The research includes a mix of qualitative, quantitative, and mixed-method studies. A balance is struck between studies examining AI applications and those analyzing the stakeholders' perspectives. To delineate the ethical concerns identified in the research, the teleological perspective of Ricoeur (1990) is embraced. Ethical considerations revolve around the evaluation of what constitutes goodness, as well as the pursuit of a flourishing life. The direction is a fulfilling existence. This perspective is adopted to transcend mere moral considerations, which primarily consist of adhering to rules and codes (Mortari et al., 2023), and instead, to recognize in ethics the potential for cultivating heightened awareness. Preliminary evidence points to ethical concerns being influenced by the nature, the construction and the functioning of AI when used by humans. Most of the internal problems are identified as biases and incorrect information (Currie, 2023). These problems underscore the non- neutrality of AI and its lack of objectivity (Farrelly & Baker, 2023). The challenges originating within the system have ethical connections. In this study they relate to academic integrity. The interdisciplinary concept refers to a commitment to honesty, trust, fairness, respect, and responsibility in the academic setting (Macfarlane et al., 2014). Different domain spheres of academic integrity affected by emerging ethical concerns are presented. The use of AI in HE raises some remarkable and predominant reflections due to plagiarism and authorship (Williams, 2024). They underline the difficulty of recognizing the contribution of students and faculty members in products made with AI support. These two elements intricately intertwine with matters of transparency and accountability (Jarrah, 2023), foundational principles in upholding and honoring academic integrity. Important issues of cheating emerge (Malik et al., 2023). Furthermore, ethical concerns are connected to the development or improvement of competences (Pisica et al., 2023). The widespread over-reliance in Al tools may hinder people's skills over time, putting in risk academic integrity. Particular attention is dedicated to originality, creativity, and critical thinking (Chan, 2023). For the ideation and realization of certain tasks, people in HE increasingly uses AI as an assistant to design thoughts and expand concepts. Some processes are not activated anymore, and the effect is an impact on the content quality of AI-generated products. Delegating tasks to machines undermines critical thinking and reflection skills (Özdemir-çagatay, 2023), facilitates the lack of a personal perspective, and contributes to a deficiency in accuracy thereby algorithmic biases prevail (Alqahtani et al., 2023). The problem of assessment is broadly addressed across/throughout the articles (Crawford, 2023). Finally, equity is one of the ethical factors to consider when opting for AI-integrated teaching and learning because it has an important impact on opportunities offered to students, teachers, and faculty members (Killian et al., 2023). In connection with equity there are issues linked to the present and the future of education and of the whole society. A reflection about social asymmetry, social injustice, discrimination, socialization, the revolution of the job market because of AI is a priority for the academic world. There are complexities related to privacy as well. User data and their management, protection, and breach is one of the main issues reported in the recent research (Ivanov, 2023; Pechenkina, 2023). It remains a sensitive problem and one to which professionals are called upon to find appropriate behaviors and policies. To remember is the demand for more care and awareness of the methods and tools used by researchers who are undertaking studies in this field (Bond et al., 2024). More attention is needed to ethical considerations during the research process and at the end of it, particularly in collecting data, in ethical and legal issues in connection with premature procedures (Zawacki-Richter et al., 2019). In conclusion, interesting and manifold are the possible solutions hypothesized by researchers that can address the various ethical challenges posed by AI in HE. The proposal for AI literacy paths (Song, 2024), application and study of the best practices in using AI, drafting guidelines and policies that can regulate the use of this technology in HE is emphasized (Amato & Schoettle, 2023; Yusuf et al., 2024). The study provides an overview of ethical issues discussed up to date in the world of practice and research. It becomes an opportunity to open spaces for reflection that can be a significant starting point for evaluating what has already been implemented with AI, to design and take wise and innovative actions within education.

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ID 130

Fostering Metacognition through Musical Activity: a Pilot Study of Novel Experiences in Primary Education

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Abstract

Preliminary findings from the literature suggest a positive correlation between engagement in musical activities and improvement in metacognition among students in the primary education cycle (Incognito, Scaccioni & Pinto, 2022). Furthermore, qualitative insights reveal an increase in intrinsic motivation, pleasure, and sense of achievement experienced by participants during their involvement in musical activities (Joseph, 2020; Saarikallio, 2019). This pilot study investigates the relationship between engagement in musical activities and the development of metacognition in the primary education cycle. Recognizing the critical role of metacognition in educational development, especially in the early years, this research explores the potential of innovative musical activities in fostering creative thinking among young students (Kwidura, Utomo & Wadiyo, 2021). By implementing new musical activities into school curricula, this research aims to uncover potential benefits in promoting metacognition among students. Metacognition is fundamental for effective learning, as it enables students to monitor, evaluate, and regulate their thinking processes, thus promoting autonomy, self-regulation, and self-efficacy.

Drawing on theories of creativity pedagogy (Wilson, 2014) and experiential learning, the study examines how music stimulates cognitive processes associated with metacognition, such as divergent thinking, imaginative expression (Fritz et al., 2020), and problem-solving. A cohort of primary education cycle students participates in this study, engaging in a series of musical activities specifically designed for their stage of development and learning needs. A mixed-method approach of qualitative and quantitative assessments has been adopted before and after the intervention. This pilot study provides valuable insights into the potential of integrating music into education to foster metacognition and cognitive development among young students.

In particular, this intervention is situated within an environmental education project mediated by the use of music as a communicative code. Music is utilized not only as an educational tool but also as a means to raise awareness among students about environmental issues, promoting a multidisciplinary approach to learning. Music education combined with environmental education not only offers opportunities for the development of metacognition and divergent thinking but also for the promotion of mutual understanding and empathy among students. These skills are fundamental for the personal and professional success of students in the current world, emphasizing lifelong learning.

Further research is recommended to explore the long-term effects and optimal strategies for incorporating musical experiences into the educational curriculum. The aim of this research is to investigate whether, through music (especially that derived from the natural world), students can explore and reflect on environmental issues, thus developing greater awareness and understanding of these topics, and above all, improving intrapersonal and interpersonal skills.

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Keywords: inclusion; metacognition; music; education

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ID 131

Gamification in Workplaces: mapping the Landscape

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Abstract

Gamification originated in marketing as a tactic by marketers and consultants to influence user behavior for profit, leveraging game-like elements such as flow, dopamine loops, and engagement (Bogost, 2015). Initially applied simplistically without deep understanding of games, gamification has since expanded into various fields, including organizational training, and is now supported by several theories. This evolution has led to a more comprehensive definition focusing on human-centric goals. In fact, Kapp (2012) defines gamification as using game mechanics, aesthetics, and thinking to engage people, motivate action, promote learning, and solve problems, emphasizing engagement, motivation and learning, underling the relevance of three different dimensions: engagement, motivation and learning. In this connection, the COVID-19 pandemic forced a shift to online work and training, accelerating existing trends and highlighting challenges in maintaining engagement, motivation, and worker identity (OECD, 2021; INAPP, 2022; Pellerey, 2021). According to INAPP (2023), new learning methodologies, including gamification, can be effectively useful in online corporate training in order to enhance motivation (Deci & Ryan, 1985), engagement (Whitton, 2011), and meaningful learning (Nicholson, 2015). The main purpose of this research is to obtain a general map on the gamification practices used already in corporate training and their purpose in order to discover a lack in the literature taking into account the gamification processes and the new educational needs (Alioto & Persico, 2024). The paper search in May 2023 focused on Scopus and Web of Science databases using specific research strings. The initial screening excluded articles related to teacher training and the education sector (elementary, secondary, university), retaining only those relevant to corporate contexts. This process eliminated 253 articles, leaving 25 for full reading, including two literature reviews (Larson, 2020; Mahat et al., 2022). The remaining 25 articles were coded into two macro categories: study characteristics (e.g., training model, purpose of learning) and gamification features (purpose, game elements, technologies) (Alioto & Persico, 2024).

The results underline that the predominant training model identified was online training, with face-to-face training being less common. While in Mahat et al. (2022) there was a small but not insignificant proportion of studies regarding blended training, in our sample no study was carried out in a blended context. This difference may be due to two factors: firstly, Mahat's paper includes teacher training interventions, secondly, our study covers the pandemic years, where all training was forcefully moved online.

The purpose of learning was categorized into three areas: know-what (knowledge), know-how (skills), and know-why (competence), reflecting the European Qualifications Framework for Lifelong Learning and Bloom's taxonomy. The studies predominantly focused on know-how, with know-what and know-why. This suggests a corporate preference for skills over higher-level competencies.

To determine the purpose of gamification, Krath et al.'s (2021) classification was used, identifying principles guiding behavioral outcomes, fostering individual relevance, and enabling social interaction. The primary purpose combined behavioral outcomes and positive social effects, with fewer studies focusing solely on behavioral outcomes. The findings indicate a lesser focus on individual relevance, essential for intrinsic motivation.

The gamification designs predominantly utilized the Points, Badges, Leaderboards (PBL) structure, with a minor percentage using tangible approaches like cards, Lego Serious Play, or physical escape rooms. This PBL structure often lacked narrative elements fundamental to meaningful gamification as described by Nicholson (2015). At last, where mentioned, we can see the use of Quizzis & Kahoot!; various plug-ins for Moocs or for Learning Management Systems (LMS) (for example, Moodle); and apps for Self-

Regulated Learning (SRL).
In summary, gamification in corporate training mainly aims at behavioral outcomes and positive social effects. This is justified by the use of PBL, also called *pointsification* (Hellberg & Moll, 2023), which is based on behavioral theories and acting in the short term. Moreover, the lack of a design tailored on the sample does not allow to adapt the game elements to educational needs, becoming difficult to achieve a meaningful experience, oriented by reflexibility (Nicholson, 2015)

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ID 132

Enhancing Biotechnology Learning Outcomes through the Integration of Immersive Virtual Reality Laboratory Simulations with Traditional Teaching Methods

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Abstract

Virtual reality (VR) simulations are increasingly utilized in various educational and training settings to complement conventional learning approaches. The adaptable nature of virtual laboratories provides students with numerous advantages, such as exposure to hazardous reactions, complex procedures, or costly equipment, without the need for a physical science lab. Despite this, there is a scarcity of research supporting the effectiveness and efficiency of this innovative learning tool. Hence, this study aimed to evaluate the impact of biotechnology training using immersive VR technologies on students' motivation and learning outcomes compared to conventional methods alone. To achieve this goal, two distinct strategies were tested, respectively VR simulations were used "in place of" or "in addition to" the teacher's introductory lesson of a hands-on laboratory experience. Pre- and post-activity questionnaires were administered to measure the participants' theoretical knowledge, self-efficacy, interest in biotechnology, and engagement levels. Results indicated that replacing the introductory lesson with an immersive VR simulation led to lower learning outcomes compared to the traditional approach. Conversely, integrating VR simulations alongside existing methods resulted in higher learning outcomes, signifying a deeper comprehension of the subject matter. Additionally, the study revealed that learning through immersive VR simulations fosters greater student motivation than traditional methods. Thus, incorporating this technology alongside the established educational approaches in biotechnology could be considered a beneficial strategy to enhance student engagement while elevating learning outcomes.

Keywords: Immersive virtual reality, laboratory simulations, learning outcomes, biotechnology

During the COVID-19 pandemic, educational institutions have embraced technology to overcome challenges like in-person class restrictions. This has led to the increased use of virtual learning laboratory simulations across various fields, offering cost-effective access to state-of-the-art equipment and enabling students to engage in realistic scenarios (Thisgaard and Makransky 2017). While desktop virtual reality (VR) provides visual experiences, immersive VR simulations accessed through head- mounted displays offer more realistic sensations (Bodekaer 2016). Despite the growing interest in these immersive technologies, there's a lack of research on their effectiveness, especially in biotechnology education (Radianti et al. 2020).

To address this gap, the authors conducted two studies: in Study 1 replacing traditional lessons with VR simulations and in Study 2 integrating VR simulations with traditional teaching methods. They aimed to assess the impact on students' motivation and learning outcomes. The studies focused on theoretical knowledge, self-efficacy, interest in biotechnology, and engagement before and after VR activities. Overall, the hypothesis was that using immersive VR could enhance student motivation without compromising learning outcomes or potentially improve both motivation and learning when combined with traditional methods.

In Study 1, 92 students from four high schools in north-western Italy participated. The students were primarily in their third to fifth years of high school, with an average age of 17.6 years. They were divided into two groups: traditional and virtual reality (VR). The traditional group received a conventional lesson, while the VR group experienced a VR laboratory simulation. Both groups then participated in a hands-on laboratory session. In Study 2, 94 students from the Organic Chemistry course in the first year of the Biological Sciences B.S. degree at the University of Insubria took part. The participants underwent a conventional introductory lesson, followed by a hands-on laboratory session. Some participants also experienced a VR laboratory simulation before the hands-on session. Immersive VR laboratory simulations were developed by OpenLab and administered using Oculus Quest 2 headsets. These

simulations provided realistic interactions with laboratory equipment and solvents, guided by voice instructions. The simulations matched the subsequent hands-on laboratory experiences. Multiple-choice questions assessed theoretical knowledge, while Likert scales measured interest in biotechnology and self-efficacy. Additional questions explored perceived learning and engagement. Statistical analysis was conducted using SPSS Statistics 25.0, including post hoc Dunnett's test and independent samples Student's t-test.

In Study 1, the participants who received the traditional lesson showed a significant increase in theoretical knowledge from the Pre-test to the Mid-test. However, no further increase was observed during the hands-on session. Conversely, participants exposed to virtual reality (VR) laboratory simulations showed a slight, non-significant increase in knowledge from the Pre-test to the Mid-test, followed by a slight increase during the hands-on session. Comparison between the two approaches revealed significantly higher theoretical knowledge levels in the traditional group at both the Mid-test and Post-test stages. Female students assimilated significantly more information than males from the VR simulations during the Mid-test. However, no differences were observed between genders in the traditional group. Regarding interest in biotechnology and self-efficacy, no significant differences were found between the two groups. However, participants in the VR group reported higher enjoyment and lower boredom during the introductory lesson compared to the traditional group. While traditional lesson attendees felt they better understood the concepts explained, VR simulation participants expressed a desire for more frequent use of immersive VR for school learning.

In Study 2, the participants who experienced the VR simulation showed a significant increase in theoretical knowledge from the Pre-test to the Post-test. This increase was maintained after 30 days, as demonstrated by the retention test. Participants in the traditional program also reported a significant increase in knowledge, with no significant drop after 30 days. Comparison between the two approaches revealed a significantly higher knowledge level in the Post-test for the VR simulation group. Gender did not significantly influence the knowledge gained in either approach. Interest in biotechnology and self-efficacy showed no significant differences between the two groups. Participants in both groups reported an increase in perceived ability to perform laboratory tasks and explain procedures to classmates from the Pre-test to the Post-test, with a subsequent decrease after 30 days. Participants who underwent the VR simulation felt they better grasped the concepts needed for the hands-on experience compared to those in the traditional group. Additionally, they expressed less need for additional teaching tools and perceived the VR simulation as useful preparation for the hands-on experience. The majority of the VR simulation participants supported the idea of more frequent use of immersive VR for teaching laboratory techniques.

Overall, it can be concluded that immersive virtual reality (VR) laboratory simulations hold promise for enhancing traditional educational methods. However, the integration of these technologies must be carefully considered, as outcomes vary depending on the approach. This study revealed that replacing the introductory lesson with a VR simulation for a biotechnology hands-on laboratory resulted in lower learning outcomes compared to the traditional method. Conversely, integrating VR simulations as an additional tool alongside existing methods led to higher learning outcomes and a deeper understanding of the content. Moreover, learning with immersive VR simulations motivated students more than traditional methods, suggesting that combining VR with traditional approaches could be advantageous for both student engagement and learning outcomes. As software continues to improve, VR simulations tailored to students' learning needs are expected to further revolutionize educational programs. Future research should explore new strategies for integrating immersive VR simulations with existing methods and evaluate their effectiveness and limitations. Additionally, this study's limitation in accurately assessing participants' practical and manual skills highlights the need for further research in this area. Evaluating how students' practical skills benefit from immersive VR simulations can provide valuable insights into the technology's impact on skill development.

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Etwinning for Future Teachers: Innovating Teacher Education through the Digital European Education Area

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Abstract

eTwinning is a prominent initiative in teacher education, fostering collaboration and exchange among teachers across various countries through technology and online platforms. Since its experimental phase in 2012, eTwinning ITE has become a staple in the European teacher education landscape. In Italy, a pioneer of ITE experimentation, eTwinning ITE has significantly impacted teacher education, with 28 universities participating actively. The initiative emphasizes integrating eTwinning modules into curricula and encouraging student engagement in real eTwinning projects, thereby directly involving future teachers in the educational process with schools and European peers. Considering the recent reform in Italy's initial training for secondary school teachers, eTwinning ITE offers a framework that aligns well with the new regulations, equipping trainee teachers with essential skills for digital teaching, collaboration, and fostering European and global citizenship. This paper will explore eTwinning's implementation models within ITE for pre-primary and primary teachers in Italy and other countries, aiming to identify improvements and effectiveness enhancements. Moreover, given the recent reform in Italy, it will discuss potential models for integrating eTwinning into secondary teacher education, leveraging eTwinning's recognized effects on teacher training.

Keywords: eTwinning, Initial Teacher Education, Digital Innovation, Inclusive Teaching, Professional Development

Extended abstract

eTwinning[1] is a popular initiative in the field of teacher education that promotes collaboration and exchange between teachers across different countries. Using technology and online platforms, eTwinning allows teachers to connect with their peers in other countries, share resources, collaborate on projects, and engage in professional development opportunities. The impact of eTwinning experiences on in-service teachers has been widely studied in Italy (Fabbro et al, 2021) and it has proven to be effective especially as for the pedagogical competence but also in the professional area especially with regards to digital and collaboration competencies.

eTwinning provides a unique opportunity also for pre-service teachers to develop a global perspective and enhance their intercultural competence (Tosi, 2023). By participating in eTwinning projects, future educators can gain valuable insights into different educational systems, teaching practices, and cultural contexts. This exposure can broaden their understanding of diverse perspectives and help them develop a more inclusive approach to teaching and learning. Moreover, eTwinning fosters the development of digital competencies among pre-service teachers, as they learn to effectively utilize technology for communication, collaboration, and project-based learning. In addition, eTwinning offers a platform for pre-service teachers to explore innovative pedagogical approaches and gain inspiration from the experiences of their international peers. By engaging in collaborative projects and sharing best practices,

future educators can enrich their toolkit of teaching strategies and methodologies.

[1] https://school-education.ec.europa.eu/en/etwinning (european platform); https://etwinning.indire.it/ (italian web site) eTwinning ITE (Initial Teacher Education) started in Europe at experimental level in few countries in 2012 that became an integral part of eTwinning National Support Units work programs across Europe in 2019. eTwinning ITE aims at involving universities in the initial training of future teachers conveying eTwinning's values, experiences, and European dimension to the service of initial teacher education.

The 2023 European monitoring report (Mouratoglou et al, 2023) evaluates the "eTwinning for future teachers" initiative within initial teacher education, based on data from focus groups and interviews with participants from seven institutions recognized for their excellence in integrating eTwinning across Europe. The report highlights how eTwinning has been successfully incorporated into various levels of teacher education across countries, predominantly through collaborative projects that connect student teachers and teacher educators internationally, despite challenges like limited access to schools and time constraints. Consistently with recent research results (Castaño Muñoz, 2023; Kowalczuk-Walędziak, 2023; Eirín Nemiña, 2023) these projects have not only facilitated the development of intercultural, digital, and pedagogical competences among student teachers but have also enhanced their confidence and practical teaching skills, making the teaching profession more attractive. For teacher educators, eTwinning has spurred professional development, international collaboration, and a more practical approach to teaching and research.

The eTwinning for Future Teachers initiative aligns with the broader goal of achieving a European Education Area by 2025, emphasizing resilience and inclusivity in national education and training systems through cross-border collaboration and learning opportunities in Initial Teacher Education. Complementing this, the Erasmus+ Teacher Academies initiative under the European Education Area fosters large-scale networks for teacher training, supporting educators throughout their careers with innovative methods, virtual training, and learning mobility opportunities. Additionally, the European School Education Platform offers online professional development resources, covering topics linked to EU education priorities. These initiatives collectively support the Commission's commitment to enhancing the teaching profession, addressing the critical challenge of attracting and retaining teachers amid widespread shortages.

Italy was among the pioneer countries embracing the ITE experimentation 2012 and has, since then, seen the participation of an increasing number of universities over the years. Currently, 26 Italian universities, spread across nearly all regions of Italy, actively engage in this initiative, impacting thousands of aspiring teachers each year, particularly those from pre-primary and primary school sectors (Tosi, 2023).

In Italian primary and pre-primary ITE universities eTwinning is based on two main activities that can be flexibly applied in future teachers training. Firstly, it involves integrating eTwinning modules into the curriculum of future teachers. To date this happens especially in subjects like educational technology labs, languages, and didactics as well as in indirect internship. Secondly, and perhaps more importantly, it encourages the active participation of students in real eTwinning projects through direct internship. Indeed, the true impact of eTwinning ITE emerges when future teachers directly engage with students and schools within eTwinning projects, whether national or international, during their traineeships, with the guidance of tutors and in collaboration with other European teachers.

The experience made in Italy so far as for eTwinning ITE for pre-primary and primary future teachers can therefore provide important insights on how to introduce it for the training of future secondary teachers according to the Decree of the President of the Council of Ministers 4 August 2023, which reformed the initial training of secondary school teachers.

In this study, we examine the varied implementation frameworks of eTwinning within Initial Teacher Education (ITE) for pre-primary and primary educators, as currently practiced in Italy and internationally. Our aim is to pinpoint areas where improvements and enhancements in effectiveness can be made. Furthermore, in light of the recent reform of initial training for secondary school educators in Italy, and building on the outcomes highlighted previously, we will explore and propose potential models for the incorporation of eTwinning into the training programs for future secondary teachers. This exploration intends to capitalize on the positive impact of eTwinning on developing competencies in teacher education, a benefit well-documented by existing research.

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A New Teacher Portfolio towards Lifelong Learning

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Abstract

The integration of a novel teacher portfolio for newly recruited teachers in Italy epitomizes a new approach to meeting the demands of lifelong learning within the teaching profession. This paper explores the deployment and implications of this innovative model, which has been embraced by over 40,000 teachers during their probationary year starting from the 2023/24 school year. Anchored in a set of minimum professional standards, the teacher portfolio promotes self-evaluation across a broad spectrum of teaching competencies, from didactics and engagement in school life to organizational involvement and professional advancement. It encourages teachers to undertake reflective practice by documenting their professional development experiences, thereby fostering growth and facilitating adaptation to the complex realities of contemporary classrooms. This transformative instrument is pivotal for the systematic documentation of teachers' professional trajectories and serves as an essential mechanism for continuous professional development and self-assessment. Its adaptability, extensive applicability across all educational levels and disciplines and flexibility across professional development phases (from Initial teacher Education, to Induction, to Continuous Professional Development) renders it a valuable tool in sustaining the principles of quality teaching and learning processes. Leveraging empirical data from the 2023/24 school year, based on the widespread adoption of the teacher portfolio by a significant number of teachers in the induction this study articulates the teacher portfolio's potential to markedly influence teachers' professional growth from a lifelong learning standpoint.

Keywords: Teacher portfolio, Teacher Development, Professional Standards, Reflective Practice, Lifelong Learning

Introduction

The introduction of a new portfolio for teachers newly hired in Italy in the 23/24 school year marks a step toward addressing lifelong learning needs in the teaching profession.

The theoretical construct of the lifelong teacher portfolio was developed in 2021 through research work conducted by Indire, the University of Macerata and the Catholic University of the Sacred Heart (Di Stasio et al., 2021). Based on previous teacher portfolio models tested over the years and on a large scale, the model developed is centered on the Competency Framework, which enables the function of self-assessment and projection of the competencies that characterize one's professionalism and revolves around the functions of Documentation (motivated collection of useful materials to document one's professionalism), Reflection and Narrative (in which the teacher connects certain materials to enable one to grasp how one moves in a given dimension of professional competence), Projection (in which one positions oneself in relation to a competence profile and more or less deeply takes stock of one's competence), and Publication (in which one selects elements of one's portfolio to show others one's professional journey).

By construction, such a model had as a design requirement that it be flexible and adaptable in order to be used continuously at various stages of growth from initial teacher education to in-service training.

As of school year 23/24, the general portfolio model was reworked and implemented in the new newly hired portfolio for the purpose of supporting the documentation of professional development in the training and probationary year, as articulated according to DM 226/2022 by

which it is regulated. In accordance with the theoretical model, the new portfolio is based on two fundamental constructs: 1) Teacher Standards and 2) Documentation of Experience.

The importance of Teacher Professional Standards emerges as a key issue in global educational systems, essential for defining the skills and knowledge required of teachers. These standards, as emphasized by CEPPE (2013) and Call (2018), and confirmed by Darling-Hammond (2021), are fundamental to the quality of education, emphasizing that countries with better results in international assessments share descriptions of a defined set of competencies that every teacher must acquire and demonstrate.

The Standards in the Competency Framework of the newly hired portfolio have therefore been designed in such a way as to articulate the flexibility due to different moments and different purposes and thus adapt to a use that can be mainly self-assessment ("where am I") and/or preparatory to training choices ("what do I want to improve") and/or useful to place one's role also in extra-classroom profiles ("in what areas can I support my professionalism"). Building on the work done at the ministerial level (MIUR, 2018) and on large-scale experimentation experiences with Competence Framework documented for the initial and entry training phases (Magnoler, 2017, Pettenati, 2022), the competence profile developed in the new portfolio revolves around three main areas: the Teaching area, the Institution and Community area, and the Profession area, and includes five levels of mastery ranging from "the competence has never been tested" (level 0) to "the competence is mature and accredited and can be made available to/for colleagues and the school" (level 4). The Teachers Standards were also designed with the aim of linking to the most recent normative documents defining the "Concluding Profile of the Qualified Teacher, Professional Competencies and Minimum Professional Standards on Initial Teacher Training for Middle School and Second Cycle Teachers, " (DPCM 4/8/2023), but also with Annex A to DM 226/22, which regulates the training and probationary year and provides a tool for reciprocal observation between tutor and newly hired teacher, declining the evidence that can support the explication of professional competencies especially with regard to the area of Didactics.

The section of the new new-hire portfolio called Documentation of Experiences, calibrated in implementation to the formative-professionalizing Experiences of the probationary year but fully generalizable, aims to support reflection in action and after action (Schon, 1993) and to stimulate constant adjustment of one's professional actions (Vinatier & Altet, 2008). It provides for the description of training activities (workshops, visits to innovative schools, teaching activities) on which reflection guided by specific questions-stimulus is required.

This paper analyzes the introduction and implications of the implementation of the new portfolio, used in 2023/24 by more than 40,000 teachers in their probationary year to explore its potential in a lifelong learning use perspective.

Drawing on empirical data from monitoring questionnaires addressed to the entire cohort of newly hired teachers-in-training, the research questions underpinning this paper are:

1. What is the potential for use of the new portfolio from a continuing professional development perspective? That is, what is the perceived value and what uses are possible and desired by teachers?
2. Does the use of the online portfolio contribute to enhancing quality in teachers' training?

The new teacher portfolio is proposed as a tool for strengthening teachers' professional identity, serving as a bridge between theory and practice and between initial training and continuing professional development. Its implementation and adoption by a significant number of teachers in their training and probationary year allows us to explore its potential for broader implications and from a continuing education perspective.

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Digital Credential at the University of Turin

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Extended abstract

Lifelong and lifewide learning are becoming increasingly important in today's job market (Giraudo *et al*., 2019). Consequently, there is a growing need to recognize and value skills, knowledge, and educational experiences, whether acquired within or outside formal pathways. Digital credentials - particularly open badges (hereafter referred to as OB) - represent an innovation in the field of certifications. With OBs, a plethora of information can be consolidated into a single digital document, encompassing acquired competencies, learning outcomes, the issuing authority, the recipient, attainment criteria, validity period, etc. The advantages of digital credentials over traditional paper certificates are manifold; indeed, numerous institutions, including many universities, are increasingly adopting these certification systems. Currently, there are still few case studies that have aimed to explore the phenomena of lifelong and lifewide learning within university institutions (among others Mewburn *et al*., 2014; Grant, 2016; Hamson-Utley and Heyman, 2016; Niehaus *et al*., 2017; Whitehouse *et al*., 2022). Particularly in the Italian context, there are not many studies related to digital credentials issued by universities (Bertazzo and Furlati, 2015; Calò, *et al*. 2018; Cherubini *et al*., 2019; Coggi, 2019; Baratto *et al*., 2024; Presutti and Natale, 2024). This contribution aims to illustrate how the University of Turin is progressively creating an 'ecosystem' for digital credentials that is coherent and complementary to traditional certifications, aiming to enhance the value of skills acquired in the academic field and to align them with the current job market reality and employer needs. The digital credentials creation and assignment service at the University of Turin was introduced experimentally at the end of 2016, within a training project aimed at technical-administrative staff, culminating in the assignment of OBs for the recognition of acquired competencies. Since this experimental phase, the University has relied on the Bestr platform for publishing OBs, the first Italian platform for issuing and managing digital credentials. Initially, the service mainly focused on certifying competencies and knowledge acquired by teaching and technical-administrative staff, with the aim of enhancing internal training paths. In the following years, the use of OBs rapidly expanded to student users, particularly for certifying language skills and short extracurricular learning experiences (micro-credentials). Even within the framework of a significant international project, UNITA - Universitas Montium, led by the University of Turin, students, lecturers, and technical-administrative staff are certified via OBs for participation in certain training initiatives. OBs are also increasingly used to certify participation in lifelong learning training courses, such as University Courses for Professional Updating and Training (CUAP) and some individual courses, also attended by workers for professional upskilling and reskilling. Since 2023, the University has also started issuing OBs linked to the attainment of certain academic qualifications, incorporating specific information about the student's academic career (e.g., grade point average, thesis title, etc.). Concurrently with degree OBs, another type of digital certification has been introduced since 2023: the University now certifies the attainment of certain academic qualifications using blockcerts in conjunction with OBs, thereby providing greater authenticity guarantees for the issued certificate and facilitating its verification. The service is managed by the E-learning, Online Collaboration, Architectures of the Information Systems Directorate, Portal, E-learning (SIPE) Staff according to an organizational model that has been refined over the years and involves a network of actors in the management of various operational phases. In particular, the current organizational model involves those wishing to create an OB (whether a university unit, an external entity, or an individual lecturer) making a request by completing a document containing the necessary informations and materials for subsequent editorial phases. A strength of the OB implementation lies in the ability to network between different university units and external organizations. Over the years, the service has grown both in terms of the number of digital credentials issued and the units involved, as well as in the variety of solutions adopted to meet new needs. Within the University context, the service has seen progressive growth, especially from 2022 onwards, both quantitatively (i.e., OBs published and assigned) and qualitatively in the editorial process. Regarding the latter aspect, the initial contact

phase with the applicant has gained increasing importance over time, as the types of training paths requiring OB creation become more diverse. From this initial phase of detailed listening to the educational experience that will lead to OB issuance, the decision on the type of OB to be created is derived: standard, incremental, or learning path. Modalities have been applied to make the OB assignment process more efficient. Specifically, compatibility has already been tested between Bestr and the student career management system, as well as between Bestr and the Moodle platform used for e-learning activities. The growing importance of the service has also led to a reorganization of request management methods, resulting in the creation of a dedicated channel in the service desk used by the SIPE Division for managing support requests from various stakeholders (lecturers, students, units, etc.). The service has acquired such relevance within the University context that implementing a dedicated page on the University Portal has become appropriate, where users can find useful information, such as what digital credentials are, the advantages of these certifications, what types of digital credentials the University of Turin issues, how to obtain them, etc. The introduction of the service has led the E-learning Staff to engage with a new area rich in potential developments, both technically and theoretically. The topic of digital credentials is currently of particular relevance both nationally and in Europe, and in this sense, methods are being investigated for the integrated management of OBs between the Bestr platform and the Europass platform, which manages digital micro-credentials in the European scenario, for issuing European Digital Credentials for Learning (EDCL) linked to OBs published by the University. As can be inferred from the above, the digital credentials creation and assignment service is currently experiencing strong growth, as are the initiatives that the E-learning Staff intends to implement, including scaling up the creation of degree OBs by promoting process standardization. Another aspect being explored is the impact that OBs issued by the University can have both in job seeking and in the professional growth of its learners, and how digital credentials are evaluated in recruitment processes. In March 2024, a survey was sent to University learners who had obtained an OB, specifically to gather feedback from the service recipients and assess its usage and perceived usefulness. OBs can indeed be shared by learners on their electronic CVs and on social media (e.g., LinkedIn), increasing the visibility of undertaken training paths. Previously, even the Orientation, Tutoring, and Placement Office of the School of Management and Economics had conducted a pilot survey to assess the impact of digital credentials on the careers of its learners and in the personnel selection processes of some partner companies. In conclusion, the case of the University of Turin illustrates how the implementation of an 'ecosystem' for digital credentials, where traditional certifications are seamlessly integrated with digital ones, represents a significant step towards enhancing the value of skills acquired in the academic field and supporting the lifelong and lifewide learning of its learners.

Keywords: Digital credential, Micro-credential, Open Badge, Lifelong Learning, Digital Technologies.

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ID 136

The Impact of Educational Robotics, AI and Virtual Reality on Inclusive Language Teaching: a Pilot Study

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Introduction

In the realm of language education technologies, there exists a wide array of options, which pose a challenge for educators to effectively incorporate them into lessons that cater to the diverse needs of students (Hyun et al., 2008). While conventional multimedia resources such as audio, video, and specialized educational software have long been used to enhance language proficiency, there is a burgeoning interest in exploring more advanced tools for educational purposes.

Current study

This paper presents a preliminary investigation into the integration of virtual reality tools (Cospaces.edu), artificial intelligence and coding (Dancing with AI), and educational robotics (Ozobot) in five sessions of English as a foreign language instruction involving 30 students aged between 8 and 12 (Cersosimo & Pennazio, 2022). The objective of these activities was to foster inclusivity, with eight students with Special Educational Needs (including dyslexia, mild cognitive impairment, and socio-economic challenges) taking part in the project. Learners with such needs often encounter various difficulties and motivational hurdles in foreign language learning environments (Kontra, 2019; Palladino et al., 2017).

The technologies employed exhibit potential for fostering inclusivity by offering students experiential learning opportunities. Drawing from constructivist and social-interactionist viewpoints (Ackermann, 2001), these tools not only boost motivation and social interaction but also stimulate cognitive, visuoperceptive, and motor skills (Alemi et al., 2017; Wang et al., 2013). Prior research has underscored the advantages of such technologies for individuals with Special Educational Needs, including enhancements in abstraction, storytelling, exploration, hypothesis processing, and expression of emotional states (Besio, 2010; Alvarez et al., 2013; Pennazio & Fedeli, 2019; Cersosimo, 2023). Nevertheless, there remains a scarcity of research studies specifically focused on language learning within this domain (Cersosimo & Pennazio, 2022).

The five sessions revolved around the theme of emotions in English, with the dual objectives of cultivating positive attitudes toward language acquisition and harnessing socio-emotional education through technologies (Table 1). We also tried to identify the most promising tools to use for future – more systematic – research. All lessons were based on the principles of the Universal Design for Learning and activities were organized in groups, following the guidelines of cooperative learning.

Contents	Tools
1. Warm-up: emotions in English 2. Activity: flashcards to learn new vocabulary 3. Restitution: mime the emotions	Quizlet (https://quizlet.com)

1. Warm-up: emotions in Inside Out 2. Activity: an emotional rollercoaster for a robot 3. Restitution: presentation to other teams	Ozobot (https://ozobot.com)
1. Warm-up: can a robot detect our emotions? 2. Activity: an AI model for emotion recognition	Dancing with AI (https://dancingwithAI.media.mit.edu)

3. Restitution: presentation of the model to other teams	
1. Warm-up: how to ask friends how they feel 2. Activity: a dialogue in a 3D world 3. Restitution: view and presentation with VR glasses	Cospaces (https://cospaces.io)

Table 1 – Structure of the lessons and technological tools

Data Collection

Following each session, participants were given a brief questionnaire aimed at gauging their emotional experiences throughout the activities. The questionnaire utilized emoticons to represent a spectrum of emotions, including sadness, neutrality, and happiness. This choice was intentional, considering the difficulty children often encounter in verbalizing emotions (Chaplin & Aldao, 2013). Implementing emoticons proved to be an effective method for encouraging easier reflection on emotional states.

Results

For data analysis, the emoticons were assigned numerical values on a scale of 1 to 5, with 1 corresponding to the saddest emoticon and 5 to the happiest. This numerical conversion allowed for the calculation of an average score for each activity. Notably, all activities received consistently high scores, ranging between 4 and 5 points (refer to Figure 1).

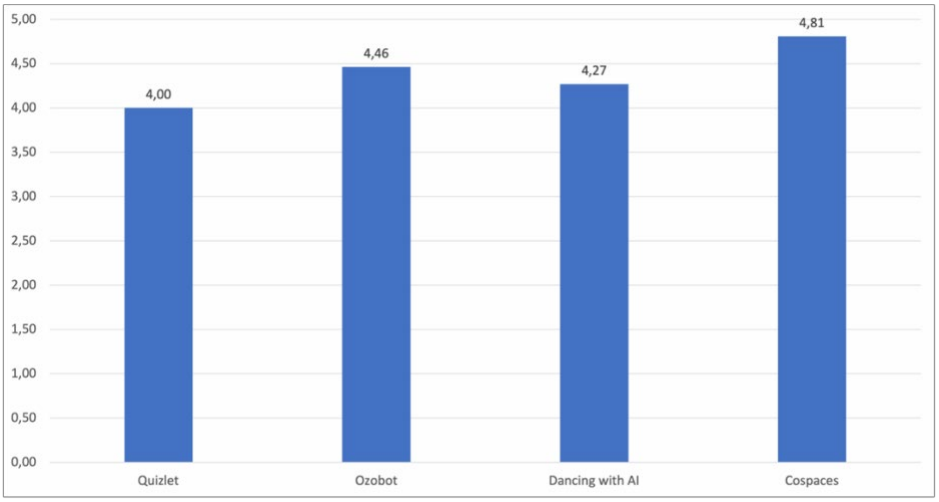

Figure 1 – *Data from the emoji questionnaire*

Conclusions

Insights gleaned from exploratory questionnaires revealed children's favorable perceptions regarding the usefulness and engagement facilitated by these technological tools, and virtual reality and robotic tools were the most appreciated. Informal classroom observations suggested that the Ozobots exhibited particular adaptability for inclusive design, enabling cooperative learning through their physical presence as facilitators in group activities. Although this observation necessitates additional systematic analysis in forthcoming research endeavors, it corroborates the concept proposed by numerous prior studies that educational robotics can amplify positive experiences when employed within a cooperative learning structure (Benitti, 2012).

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ID 137

Is ChatGPT Like Facebook 20 Years Ago? A Diachronic Reflection on its Use in Schools

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Abstract

At the dawn of the new millennium, during the apex of the social networking boom (Alexander, 2008), there was a concerted effort by educational institutions and other stakeholders to forge innovative paths in education by harnessing the capabilities of platforms like Facebook and its counterparts. In Italy, national conferences on applied computing burgeoned with projects, proposals, and methodologies centered around the utilization of online groups, video lectures disseminated through social channels and pages, comprehensive analyses, and interactive feedback structured as live comments, measured by likes and emoticon reactions (Sprugnoli, Gabriella, Federico & Del Gratta, 2019). Now, two decades later, what is the verdict on these once-revolutionary approaches? The situation appears somewhat tangled and contradictory. Especially since the endemic shock of COVID-19, positions of techno-optimism on the one hand and techno-skepticism on the other have emerged, setting us on a dilemmatic path that leads the educational sector to question how to manage its difficult relationship with technologies (Kumar, 2022). The contradictory and doubtful positions regarding the use of educational technology, however, concern not only the teaching component, as a common bias might lead us to think, but also the students themselves (Zaimakis & Papadaki, 2022). After all, the younger generation's relationship with social networks, mostly associated with Generation Z and later, is problematic and complex. In an article published by Meta (Facebook's actual name) three years ago, the vice president of corporate research addressed a survey in The Wall Street Journal (Wells, Horwitz, & Seetharaman, 2021) that highlighted the negative effects social networks can have on teenagers' psychological well-being (Raychoudhury, 2021). Without resorting to extreme views, it is important to recognize that teenagers may have both negative and positive experiences with social networking tools. This, of course, also leads us to question other digital tools that are making a significant impact today, in addition to social media. This paper endeavors to offer a retrospective and critical examination of the use of digital tools in education, while also taking into account the evolving discourse surrounding the topic in recent years. The essay's aim is to provide readers with insightful perspectives and concrete references to comprehensively frame the discourse on Artificial Intelligence (AI) utilization within educational settings, with a particular focus on the ChatGPT tool (Rahman & Watanobe, 2023). Given its prominence in numerous studies investigating its applicability in education, ChatGPT emerges as a potential candidate for integration into educational environments as a functional tool (Opara, Mfon-Ette Theresa & Aduke, 2023). The authors seek to construct a critical and historical perspective in this paper, serving as a mechanism for unraveling the potential challenges, risks, and opportunities associated with the incorporation of ChatGPT into classroom settings.

Keywords: Education; Social Networks; ChatGPT; Artificial Intelligence; Media Education

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ID 138

Digital Literacy for the Inclusion of Adult Citizens of Protected Classes

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The European Union recommends the development of digital skills for all citizens, with the ultimate aim of promoting the development of a digital, capable, aware and responsible society. In defining these skills, we take as a reference the European Framework for Citizens DigComp 2.2 (Vuorikari, 2022) which was developed as a starting point for defining what digital competence is, thus providing a basis for framing the digital competences needed to use digital tools competently and to be able to live in the digital world.
It identifies five areas such as Information and data literacy, Communication and collaboration; Digital content creation; Safety; and Problem solving. As a result, digital skills are a key item on of the European Policy Agenda, which has set ambitious policy targets of reaching a minimum of 80% of the population with basic digital skills (ibid). However, the digitisation process is difficult to implement and contributes to the phenomenon of social exclusion (Chianese & Marescotti, 2022). It affects people on the margins of society, such as those who are not included in the labor circuit, who are either not directly involved in the transformation, or pushed towards it by the need to change and adapt with respect to the new reality that combines the real and the digital. In fact, the digital goal requires a great effort on the part of citizens, since it involves working simultaneously on a wide range of skills, from the practical use of ICT technologies to the development of critical thinking as well as responsible and participatory use for digital citizenship (Navarro-Lalanda & Sforza, 2021).
To support the transition, CEIS Formazione, in collaboration with the Employment Centre, promotes digital literacy projects to work on the development of active citizenship skills, including the digital aspect, and to overcome the distrust of citizens. On the one hand, they have difficulties in familiarising themselves with the new platforms and are discouraged by too many simultaneous demands for change and learning; on the other hand, they lack the technological means to support this literacy.
For the formulation of the objectives, the projects are inspired by the "National Strategy for Digital Competencies" (2020), with particular focus on point E of the action lines on digital inclusion, and they are inspired by the learning outcomes formulated on the basis of the digital competence areas argued in DigComp 2. 2. Starting from a basic level, the training moments are completed after learning the basics of all five areas mentioned above through direct, experiential, participatory and collaborative learning in a step-by-step way with immediate feedback that supports learning. As these are people who are far from the world of education and training, i.e., not used to using digital devices and tools as a means of learning, working or, for example, producing content. Therefore, it was preferred to plan an initial meeting to collect their digital citizenship needs and experiences, to test skills and competences in a playful way, and create a learning climate supported by suspension of judgement and peer-to-peer education. It was decided to use strategies to work empathetically with the participants in order to encourage autonomous learning strategies.
Directive-interactive teaching is proposed (Bonaiuti, Calvani, & Ranieri, 2016), for which it was preferred to form groups with a maximum of 8 components, selected from unemployed adults aged 40-65.
Therefore, during the first hours of the class, therefore, the focus was on welcoming and group building. For example, activities were introduced with games mediated by open source gamification platforms such as Kahoot! and Genially, creating small individual and team tournaments with questions of varying complexity on the very topic of digital citizenship. The use of digital platforms, mediated by both computer and personal devices has made it possible to limit the initial resistance to the use of electronic devices and to introduce more difficult theoretical topics, proposing a reflection based on the answers received in the games, such as knowledge about privacy, data protection and digital identity. It is therefore possible for the students to become aware of the final objectives of the course and to compare them with their personal level, to become aware of their skills, to think individually about the learning steps to achieve each objective, and then to agree together the lesson topics and the scan of the training days.
The repetition of a fixed routine in each lesson agreed and decided together, reassures the participants, who consolidate basic skills in the classroom routine. They always use the equipment, starting from switching on

and using the PC, to creating folders and documents, using the Google account and all the environment associated with it, to managing a video call to give a short presentation of themselves, prepared in advance in previous lessons, sharing the screen and animations. The use of digital platforms, both on the computer and on personal devices, made it possible to limit the initial reluctance to use electronic devices and to introduce more complex theoretical topics, proposing reflection based on the answers obtained in the games, such as awareness of privacy, data protection and digital identity. In this way, it is possible for the trainees to become aware of the final objectives of the course and their personal starting level in relation to them, to know each of their own competences, to think individually about the intermediate learning stages into which each objective can be broken down, in order to reach an agreement on the teaching topics and the scheduling of the training days.

In forty hours of teaching, the classroom is transformed into an active, vibrant workshop, where opinions and skills are shared with mutual help and support. At the end of each day, the assessment of learning is used as a tool for self-evaluation and for planning subsequent lessons, in order to deepen and revisit themes and ideas that may seem far removed from the direct experience of the participants, but are very relevant to everyday life. In designing the course, it was decided to involve teachers who were experienced and competent in designing and facilitating groups and who were able to facilitate the learners' learning process, to the detriment of teachers who were more attached to the notional lecture.

The preference was to promote homogeneous learning in a calm and non-competitive climate, allowing the trainees to face a new and distant environment, transforming initial resistance into enthusiasm for learning, leading to the personal achievement of the objectives proposed in the project.

Talking about lifelong learning in contexts other than school or work requires careful reflection on the objectives and didactic strategies to be adopted in order to support the individual learning of adults. In fact, learning in adulthood is characterised by a strong impulse towards self-determination and the search of validation with regard to one's own idea of oneself and what society can offer (Chianese & Marescotti, 2022). It should not be forgotten that each adult has developed a personal vision of his or her own abilities and the demands that he or she feels able to meet, as well as the characteristics of his or her own learning style. These perceptions can lead to a sense of inadequacy and consequent fragility in the face of the expectations of continuous learning, that result from the changes of continuous becoming towards which they are pushed by the digital society.

In addition, most adults registered with Job Centres have not acquired the appropriate skills for self-directed learning, and remain excluded from the processes of inclusion and participation that training aims to promote. They often need reassurance and help to rebuild confidence in their abilities. It is advisable to allow time to help people to become aware of their real abilities and potential, and to establish a trainer-student contact in order to create a climate of mutual trust and respect.

Time should be set aside to highlight the individual and group characteristics, and learning potential of both, and to make them available to the group in a peer education perspective. Active individual and group experimentation make it possible to work on the role and functions of the individual and the process of digital literacy becomes both a means an end.

In the new society driven by Information and Communication Technologies, digital adaptation concerns, among other things, both citizenship and the ability to develop skills. Citizenship also becomes digital through the exercise of the rights and duties (Navarro-Lalanda & Sforza, 2021), that belong to each citizen, such as participation in collective life, conscious information and the dissemination and exchange of new information. Moreover, the ability to develop skills is necessary for continuous training to counter misinformation and new challenges (Chianese & Marescotti, 2022).

The intention is therefore to take advantage of classroom training in small groups to experiment an initial form of active citizenship mediated by digital tools, through active participation in the life of the class group. In the project, each person feels that he or she is a member in the process of being and a resource for others, the digital transition and transformation becomes an impulse to continue growing and training to become active citizens, who train and inform themselves and mature awareness with regard to the change and digital transformation of society. In the meetings, it was possible to observe this impulse for change and the progressive growth of a collaborative, non-judgmental climate, supported by ICT as a tool for interacting with reality outside and inside the group.

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ID 140

Fostering Global Learning Through Erasmus Blended Intensive Programs

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This extended abstract presents the innovative approach to managing Erasmus Blended Intensive Programs (BIPs) to enhance global learning experiences. The integration of physical and virtual mobility, as part of the Erasmus+ program, aims to democratize access to international education, foster inclusive learning environments, and promote the development of digital and green skills. Through practical examples and reflections on the implementation of BIPs at the University of Pavia, we explore their potential to revolutionize international cooperation and educational methodologies.

In the evolving landscape of higher education, the Erasmus+ program has introduced Blended Intensive Programs (BIPs) as a novel approach to enhance learning mobility. BIPs combine physical mobility with online cooperation, offering flexible, inclusive, and innovative ways to engage students from diverse backgrounds in transnational education. This paper examines the impact of BIPs on fostering global learning, with a focus on the integration of digital and physical educational components.

The primary objectives of BIPs are to:

- Promote Learning Mobility: Enable students from various academic fields and backgrounds to engage in international learning experiences.
- Enhance Digital and Green Skills: Incorporate digital tools and sustainable practices into the learning process.
- Foster Cooperation: Encourage collaborative efforts among higher education institutions (HEIs) across different regions.
- Encourage Social Inclusion: Make international learning accessible to all students, including those who face barriers to traditional mobility programs.

Erasmus BIPs are intended to experiment new curricula format and didactic methodologies, such as:

- Innovative Learning Approaches: BIPs utilize challenge-based learning, where international teams work together to address real-world challenges aligned with the UN's sustainable development goals. These programs leverage a combination of online and physical activities to create a rich, interactive learning experience.
- Integration of Virtual and Physical Mobility: The BIPs structure includes online preparatory courses followed by a short-term physical mobility phase. This approach supports flexible learning formats, allowing students to engage in international education regardless of their physical presence.
- Interdisciplinary and Transnational Collaboration: By involving instructors and students from multiple countries, BIPs promote interdisciplinary learning and cross-cultural collaboration. The virtual component often includes Collaborative Online International Learning (COIL) projects, laying the foundation for deeper interactions during the physical phase.
- The integration of virtual components not only enhances accessibility but also facilitates collaboration across borders, support transversal and innovative teaching, achieving educational objectives and promoting intercultural dialogue on a global scale, with reference to the European University Initiative (EUI).

Case Studies regarding BIPs organized and coordinated by the University of Pavia are then presented:

- Clinical Skills Training for Pharmacists: A BIP at the University of Pavia involved students from Paris and Dublin in an experiential learning process in Pavia. Using flipped classroom methods and the OSCE (Objective Structured Clinical Examination) format, this program provided hands-on training in clinical skills, enhancing practical competencies and intercultural understanding. Enhancing Inclusivity through RobotCam: Engineering students participated in a BIP focused on programming and competing with robotic soccer players. This project not only provided technical skills but also encouraged hesitant students to participate in international exchanges by integrating such experiences into their final thesis projects.
- Entrepreneurship Goes International: A BIP in collaboration with the Department of Economics and Management at UniPavia enabled students to develop and pitch brand strategies to real Companies. This experiential learning approach aligned with the objectives of forming students capable of managing internationalization processes and fostering an entrepreneurial mindset.

BIPs serve as catalysts for inclusive mobility by breaking down traditional barriers to participation. Through innovative pedagogical approaches, including online modules, virtual collaborations, and immersive face-to- face encounters, BIPs accommodate diverse learning styles and needs, thus widening access to international experiences for a broader spectrum of students. By fostering a more inclusive environment, BIPs contribute to the democratization of international mobility, ensuring that students from fewer opportunities can engage meaningfully in global learning experiences, such as:

- Impact on Internationalization: BIPs have significantly contributed to the internationalization strategies of participating institutions. They facilitate the creation of multilateral partnerships and enhance the global competencies of students.
- Inclusivity and Flexibility: BIPs offer a more inclusive approach to international education by providing opportunities for students who may not engage in traditional Erasmus exchanges. The flexibility in combining online and physical learning components makes these programs accessible to a wider audience.
- Recognition and Credentials: Participants in BIPs can earn microcredentials for specific competencies gained during the program, such as digital collaboration and project management skills. This provides tangible recognition of their achievements and enhances their professional profiles.

Blended Intensive Programs represent a transformative innovation in the realm of international education. By integrating digital and physical learning components, BIPs offer flexible, inclusive, and impactful educational experiences that prepare students for the challenges of a globalized world. The University of Pavia's experience with BIPs underscores their potential to foster global learning, enhance cooperation among HEIs, and promote inclusivity in international education.

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ID 142

Academic Integrity and E-Dishonesty in Online Assessment: a Student Perspective

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Online assessment has become increasingly popular, leading to debates and the adoption of alternative assessment methods and digital resources in both traditional and distance university courses (Sannicandro, 2023). This contributes to a greater awareness of assessment processes, which can have a significant impact when integrated into the organizational culture (House, 1993).

As a result, the growing prevalence of online assessment experimentation and research in universities has led to the development of a valuable and widely applicable framework for mapping assessment processes (Poth et al., 2014). These processes involve *reflexive, technical, and situational* approaches (Canadian Evaluation Society, 2015; Patton, 2014). *Reflexive* approaches focus on knowledge of theories and evaluation practices, as well as the application of standards and levels. *Technical* approaches deal with the strategic, methodological, and interpretative decisions required to conduct an evaluation. *Situational* approaches focus on understanding and analyzing the unique circumstances of each assessment.

Indeed when assessment needs to respond to different, often opposing interests, it is necessary to use heterogeneous approaches, methods and criteria. This requires the involvement of all stakeholders, including instructors, students, and instructional designers, who should share their views on the means and ends of assessment.

Against this complex background, several studies have explored policies and practices surrounding the management of online exams, as well as the viewpoints of instructor and learners. Pedagogical approaches and the teaching choices that promote academic honesty, however, have received less attention despite their importance. It is crucial to focus on these aspects in digital learning settings to ensure academic integrity and not only on the critical issues related to academic misconduct.

Academic integrity is based on six core values: honesty, trust, fairness, respect, responsibility, and courage, according to the International Center for Academic Integrity (ICAI). Upholding these values is crucial, even in challenging circumstances. Consequently, academic misconduct may include using resources and other materials not authorised by the lecturer, assisting others to cheat, falsifying one's identity, and plagiarism by using the work of others, even in part (Hill et al., 2021; Holden et al., 2021). Therefore, we are dealing with complex phenomena that not only involve plagiarism or cheating during assessment tests (Surahman et al., 2022; Tatum et al., 2022), but can also include contract cheating and ghost-writers, not forgetting the use of recent artificial intelligence (AI) tools.

What constitutes academic integrity or dishonesty in students' experiences? What types of behavior do students consider to be risky or academic misconduct? What resources and activities can be developed in online and blended university courses to promote a culture of academic integrity? To answer these questions, it is essential to investigate students' awareness of integrity and misconduct issues and develop skills (*academic literacy*) to promote a culture of academic integrity (Festas et al., 2022). Students should be viewed as active participants in the learning processes that occur in online environments, rather than mere consumers (Lowyck et al., 2004).

The study described is part of a broader research that aims to investigate the impact of online assessment in the context of university distance courses. Starting therefore from the analysis of the main research

trajectories developed in recent years (Sannicandro, 2023), the objective has been set to carry out an exploratory investigate to map guidelines and best practices developed in the university context to encourage academic integrity (Sannicandro et al., 2023).

This paper presents the analysis of a semi-structured questionnaire aimed at students enrolled in blended or distance learning degree programs to investigate their perceptions and awareness of academic integrity, e-dishonesty and evaluate the extent of cheating. The study employs a mixed methods research design and will integrate quantitative data collected with qualitative data obtained through focus groups with students and faculty involved in research. The data collected will also be used to develop guidelines, recommendations and digital resources on academic integrity that can be shared between teachers and students in blended or distance degree programs.

Keywords: Online Assessment, Academic Integrity, E-Dishonesty, Cheating, Academic Literacy

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ID 143

"Social Media Puppeteers", "Social Media Fake News" and "Data Defenders": games and Video Games to Promote Youngsters' Information and Media Literacy

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Extended Abstract

The contemporary youth cohort is confronted with many transformative dynamics and adversities, which have garnered significant attention in the media landscape. Cultivating dynamic literacies (Potter & McDougall, 2017) emerges as imperative for navigating through the deluge of information and discerning falsehoods, particularly when news is accessed through unfiltered social media channels (Herdzina & Lauricella, 2020, Krumsvik, 2023, Santos et al., 2023). Against this backdrop, the *YO-MEDIA project - Youngsters' Media Literacy in Times of Crisis* - has been funded by the European Media and Information Fund established by the European University Institute and the Calouste Gulbenkian Foundation. The primary objective of this endeavor was to address these concerns through the conceptualization and implementation of a hybrid game focusing on misinformation/disinformation, and information literacy in times of crisis.

Video games have acquired a fresh perspective following the experiences endured during the pandemic, notably concerning personal well-being and social connection (Cauberghe et alii, 2021, Kriz, 2020, Ohannes et alii, 2021). This pivotal shift prompted *YO-MEDIA* to advocate for enhancing young people's media literacy through ludic tools and languages. Games and video games foster a more critical and participatory engagement among youth, facilitated by narrative immersion, identification mechanisms with characters or stories, interactive elements coupled with the allowance for failure, and the necessity to formulate strategies applicable beyond the gaming realm (Moro et al., 2022).

The contribution presents the tangible outcomes of *YO-MEDIA* (Carenzio, Ferrari, Pasta, 2024), specifically the video game, and the board games, which are the result of the writing and production efforts of the project team, in particular, the mechanics, graphic choices, characters, and atmospheres of the hybrid game.

"Social Media Puppeteers" is a micro TTRPG adapted and customized to create an educational experience focused on media literacy, critical thinking, and social media dynamics developed by the Spanish unit of the project (the target audience is 11-17 years old). Incorporating elements of character creation and dice rolling found in traditional RPGs, it has been specifically designed to address the game's objectives and learning outcomes. Players assume the roles of politicians, journalists, scientists, or influencers, competing on a fictional social media platform to gain influence

and promote media literacy. During the game, players earn points when they achieve certain objectives or goals related to their character's role and special abilities.
“Social Media Fake News” is a card game designed to help players understand the features that can make a news story vulnerable and false. The goal is to be the first to run out of cards by constructing a fake news story. It is divided into news construction cards with elements such as striking headlines, emotional language, references for your story, polarizing phrases, and action cards that allow for strategic counterattacks on the news, causing opponents to eat their words.
“Data Defenders” centers on a tower defense experience intertwined with a rich narrative and engaging mechanics, strategically designed to highlight media literacy during times of crisis. During the simultaneous threats of an alien invasion and a devastating pandemic, players assume the role of defenders tasked with safeguarding global data servers. The gameplay unfolds across diverse islands, each containing a key character in disseminating information in today's society and the game's universe. Players must deploy strategic defenses to contain the alien robots and stop the servers from being hacked. Featuring innovative elements such as the Data Analyzer mechanic, players can dissect and assess various media content for credibility and biases. Moreover, the Crisis Impact mechanic dynamically reflects the prevalence of misinformation, challenging players to manage the crisis effectively while developing their media literacy skills. The game is crafted with players aged 13 and above in mind, appealing to teenagers and young adults who enjoy mobile gaming experiences.

Additionally, we will focus on the study protocol accompanying the experimentation, and the in-depth analysis of the games and the video game during the test sessions designed with various research stakeholders, including adolescents, educators, and teachers, part of the latter group having already been involved as informed and knowledgeable subjects during the interviews administered in the initial phase of the project.
Games and video games, then, are designed to foster critical thinking, ethical decision-making, and discussions about the impact of social media in a fun and engaging way, offering significant educational potential in promoting critical thinking skills and media literacy.

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ID 144

Technology and Museum Sustainability: a Digital Heritage Education Solution

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Abstract

The issue of overtourism poses significant challenges to environmental sustainability and necessitates proactive measures from local authorities. In cities like Rome, there is a concentration of visitors in the city center, placing strain on heritage infrastructure and resources while neglecting suburban areas and museums. Redirecting tourist flows towards cultural routes, as demonstrated in cities like Dallas and Pittsburgh, could foster economic and social benefits for the entire community and can promote museums sustainability and inclusive education experiences.

In response to this, the WAT(H)ER project aims to redefine the economic and social value of cultural and museum heritage. As part of this initiative, an innovative digital approach is being implemented to divert tourist traffic from heavily visited heritage sites to lesser-explored areas. Through a digital platform, the WAT(H)ER WebApp, museums can define sustainable heritage experiences and tourists can be engaged in an alternative and immersive cultural and educational activity. The WebApp offers several features, including an interactive map of Rione Testaccio (a suburb area of Rome) tour with multilingual support and accessibility features, detailed information on cultural points of interest, virtual museum exploration though AR, a treasure hunt activity with rewards and digital learning experiences that elicit Critical thinking and Creativity within users. Functionality such as geolocation, user profiling, quizzes and an AR virtual assistant is integrated to enhance user engagement. This approach was piloted between June and July 2023: during the presentation, the WebApp's capabilities and the educational outcomes of the pilot phase will be discussed.

Keywords: Heritage Education, Innovative solutions, Webapp, Sustainability, Tourist flows

Introduction

Overtourism causes huge problems at the level of environmental sustainability, as well as requires strong supporting actions by local administrative bodies, which need to deal more carefully with issues of administration, public order, cleanliness, transportation and security of some areas at the expense of others. The case of the city of Rome is particularly revealing: every day in Rome there are 1 mln more people than its inhabitants visiting and crowding the city's most important heritage sites and museums, all located in the city-center. Of this revenue, little or nothing reaches the suburbs.

According to some studies, if tourist flows are relocated and oriented toward cultural routes, the economic and social enhancement of the entire community of the city could improve (see Dallas or Pittsburgh examples). In this direction, digital instrumentation would be able to provide innovative solutions of economic and cultural valorization.

In particular, research in the field underlines the strong impact that the critical and conscious valorisation of artistic and cultural heritage can have in social, cultural and economic terms (British Council, 2018). Art and educational experiences of tangible and intangible cultural heritage can improve the mental and physical health levels of individuals and communities (Fancourt & Finn, 2019). Heritage education experiences together with the use of innovative learning methodologies can be effective in terms of promoting transversal skills and lifelong learning, fostering social inclusion and fighting marginalization (Dodd & Sandell, 2001; Poce, 2018; Poce, 2020; Re, 2020).

Starting from this premises, within the WAT(H)ER project (Defining a neW model for the economic and social vAlorisaTion of artistic and cultural HERitage), the research team realize an itinerary to dislocate the huge flow of tourists who visit the Rome city- centre, by proposing an alternative and digital tourist experience, available through a WebApp, of Rione Testaccio, a characteristic district of Rome, but not much visited by tourists.

Materials and Methods

The WAT(H)ER WebApp was realised in order to support an itinerary of Rione Testaccio through an interactive, multilingual map capable of guiding tourists throughout the entire route. In particular, the WebApp allows tourists to: 1. use an interactive map of a designed Testaccio tour with multilingual captions and support for the visually impaired; 2: acquire specific contents on the selected cultural point of the tour (museums, heritage sites, archaeological areas); 3. explore the cultural points of the tour through a virtual assistant; 3. participate in a treasure hunt to win a special Roman street food prize; 4: promote critical thinking and creativity skills through specific digital learning activities related to the Teastaccio tour. To achieve the goals mentioned above, the app is equipped with the following functions: geolocalization; user characteristics questionnaire; learning quizzes; virtual assistant in Augmented Reality mode.

Results and discussion

The pilot phase of the WAT(H)ER WebApp was conducted in October and November 2023 and was attended by 42 participants, all of whom were tourists in Rome who became acquainted with the WebApp and decided to use it during their stay.

The average age of the participants is 25 years old. 85% of the users spent more than 1 week in Rome and only the 2,67% spent less than 3 days.

The level of well-being assessed by participants while using the WebApp is very satisfactory. More than half of the users (63%) said they felt happy during the tour and very engaged (58%) by the heritage education experiences. In addition, the use of digital instrumentation was found to be comfortable by 45% of users. For many of them, the experience gained additional value because it was done with other people (60%).

The analysis of learning outcomes, especially in terms of promoting soft skills, could be deepened in order to verify the impact of the digital tool in cognitive terms. In addition, an in-depth study of the social impact of the WebApp would be necessary in order to define the elements necessarily to be implemented. Future pilots of the tool could be useful in order to verify the user experience in more detail.

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Evaluating Inclusion through Educational Robotics and Animated Reading: a Research-Action

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Anthropomorphic robots are becoming an increasingly prevalent technology within educational environments, such as classrooms. These robots have transformed into an effective instrument that significantly enhances the learning experience, owing to their capability to engage children and stimulate their curiosity (Goh et al., 2007). Robots with human-like features have been employed to explore social interactions (Tanaka et al., 2007), advance language proficiency, foster learning and the achievement of objectives, alleviate anxiety (Alemi et al., 2015), augment pedagogical frameworks (Park et al., 2016), enhance problem-solving skills during instructional periods (Brown et al., 2013), and seize the attention of children (Ioannou et al., 2015). Nevertheless, given the rapid pace of technological advancements in the educational sector, scholarly comprehension and insights into how young learners interact with and derive knowledge from these robots remain profoundly limited. Despite the growing importance of this subject, research investigating the impacts of such educational engagements on children is still relatively scarce.

In this regard, the National Association for the Education of Young Children (NAEYC) has acknowledged the potential of technology and has advocated for enhanced research to deepen the understanding of technology's application in educational settings (NAEYC, 2012).

In response to this requirement, numerous researchers have delved into the functionalities offered by social and humanoid robots within the educational sphere. These robots are often selected for their distinctive features, such as advanced multimedia systems equipped with microphones, speakers, and cameras, making them exceedingly engaging for young learners. These technologies enable the robots to perform a wide array of tasks, including voice and facial recognition. Furthermore, despite the sophisticated technology embedded, the deployment of these devices does not necessitate extensive programming expertise from end-users, thereby offering a significant advantage for application in educational settings where they can be operated even by individuals without specialized programming skills. Previous studies have also highlighted how children interact with these robots in a natural manner, perceiving them more as learning companions rather than mere playthings. (Ioannou et al., 2015).

Other research points out that children show a greater inclination towards robots over traditional learning materials like books or CDs, consequently leading to enhanced educational results (Woods et al., 2004), especially noticeable in language acquisition contexts (e.g., Georgieva-Tsaneva et al., 2023). The latest advancements in the design of social robots have significantly influenced the educational potential, facilitating the development of a close and personalized engagement with users (Feil-Seifer & Mataric, 2005). For example, contemporary robots are capable of incorporating teaching strategies and forming distinct bonds with each learner (Ramachandran et al., 2017). Moreover, students are able to independently adjust their learning level and articulate their educational requirements to the robot (Chen et al., 2020).

Nevertheless, the cognitive dimension of learning represents just one facet. Research focusing on motivational strategies emphasizes the significance of learning's affective component; in this context, Riggs et al. (2016) argue that emotional development is foundational to cognitive growth. Hence, in programming social robots, particularly those engaging with young learners, it is

essential to integrate emotional recognition capabilities alongside the age-specific linguistic and cognitive skills. Indeed, social robots possess the potential to develop enhanced interactive functionalities, such as discerning emotional reactions, thereby facilitating the creation of tailored motivational approaches that accommodate the individual preferences, needs, and requirements of each child (Obaid et al., 2018).

It is within this latest trajectory that our study is situated, focusing on a new equilibrium between cognitive and affective aspects in the relationship with digital and robotic technologies.

Originating from the thematic-conceptual framework of inclusion and welcoming, our research group has structured a project that unfolds in three phases: (1) the design of the intervention targeted at primary school classes and the collective learning of specific research skills by high school students; (2) action: the narration of an illustrated book to children in primary school and the implementation of activities aimed at the playful reinforcement of content; (3) qualitative assessment of engagement and playful reinforcement among the children, depending on the tool used in the activity: in one class, the Interactive Whiteboard (IWB) will be employed, while in another, the use of educational robotics (M bot 2) is anticipated. The focus, therefore, lies on the potential difference between a two-dimensional technological device (IWB) and a three-dimensional robotic tool. The project entails a dual experience for both primary and secondary school students: a collaborative learning experience – as opposed to a traditional, depositary, and unidirectional teaching process – and the exploration of the connection between learning and technological tools that our current onlife reality encourages us to use.

The focus of the research is inherently interdisciplinary and, as such, multifaceted; the principal themes at play, long under the scrutiny of the humanities, include: a) collaborative learning towards an education that is not merely "depository" but deeply lifelong (Vygotskij, 1934/2023; Freire, 1996/2014; Suchodolski, 2003); narrative as a style of knowledge and educational testimony (Bruner, 1992; 2002); the value of the group in providing experiences of identification and conflict management, in the search for common horizons of meaning, fusions of horizons (Gadamer, 1960/2000; Tajfel, 1974); and finally, the capabilities of digital and robotic technologies to enable diverse knowledge experiences on the same theme, to mediate educational content according to degrees of intuitiveness, mastery, engagement (Damiano, 2013; Dumouchel & Damiano, 2019; Rivoltella & Rossi, 2019).

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Educational Robotics: a Promising Alliance for Inclusive Computational Thinking and CS Education

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Abstract

Keywords: Computational Thinking, CS Education, Special Needs education, Inclusion, Educational robotics

The increasing pervasiveness of technology in everyday life calls for change in education, introducing Computational Thinking (CT) and Computer Science (CS) education into current curricula (Angeli, 2019). These competencies are becoming necessary for both school practices and future careers. However, despite the proliferating research and development of content and tools for average students, the necessities of those with special needs appear to be overlooked, resulting in a significant inclusivity gap. The urgency of this purpose is further heightened by the fact that CT and CS for special needs are not only an aid but the actual learning goal.

Within this scope, we drafted a systematic review analyzing interventional studies published from 2015 to 2024 to address this niche of CT and CS educational interventions, targeted on special needs.
The studies were selected according to the criteria of topic and keywords for CS/CT education targeted at students with special needs in compulsory education.

Firstly, the findings highlight a varied definition of "special needs" that includes sensory impairments, learning disabilities (e.g., dyslexia), and behavioral disabilities (e.g., ADHD, Autism Spectrum Disorder). In this context, extensive research has focused on the effectiveness of interventions for CT and CS in general, while the literature on this specific demographic seems fragmented, prompting further study.
Thus, the challenges addressed range from the initial definition of special needs to the absence of a consistent approach in validating various proposed interventions. The fragmentation of this area of literature introduces further limitations, primarily due to a shortage of studies, and secondarily because the studies that do exist often use very small samples or are merely case studies, limiting generalizability.

At the heart of this review, Educational Robotics emerges as a common denominator in promoting inclusion and engagement of diverse learners. As demonstrated by the selected studies, educational robotics provides a hands-on, engaging approach that, aligning with constructivist principles, catalyzes diverse learning styles and fosters the development of positive attitudes and affective engagement across various disciplines. Additionally, the tangible nature of educational robotics helps students to visualize even abstract concepts while manipulating physical objects.
When contextualized in game-based learning environments and combined with storytelling, educational robotics becomes a valuable tool for introducing complex concepts in a more accessible manner. Moreover, when integrated with unplugged activities, it promotes embodied cognition by encouraging students to translate physical interactions into computational processes.

Therefore, the implementation of these approaches has been shown to enhance key skills such as problem solving and executive functions (Pei et al, 2022). Robotics activities, which involve tasks such as decomposition, planning and troubleshooting, help develop problem-solving sub-processes. The selected studies further emphasize the value of educational robotics in improving executive functions such as planning, self-regulation, and attention, specifically through activities such as design, programming, and debugging (Di Lieto, 2020).
In terms of scalability and effective integration, these tools and approaches must carefully consider accessibility features and differentiated instruction. From this perspective, as suggested by Di Lieto

(2020), the aforementioned interventions can be carried out in classroom settings, fostering an inclusive group experience that allows for a fulfilling exploration where no participant feels excluded..

Beyond enhancing key cognitive processes and skills, CS/CT education involving robotics has demonstrated a positive impact on the social-emotional skills and communication of students with Autism Spectrum Disorder and ADHD by offering a structured environment for practicing these skills (Knight, 2019).

The review identifies both gaps that need to be filled and limitations that must be acknowledged in CS/CT special needs education. While several key areas require further exploration, prioritizing accessibility and conducting comprehensive impact analyses is essential. As mentioned earlier, adopting a holistic approach to investigate the effectiveness of these interventions could potentially address methodological limitations and enhance the generalizability of the findings.

Overall, the selected literature underscores the potential of educational robotics as a powerful tool for promoting inclusive CT/CS education for students with special needs supporting the development of key skills of problem-solving skills, executive functions and ultimately also metacognition.
Envisioning a future with an increasing demand for technology-related jobs, emphasizing CS/CT education for students with special needs through effective and appropriate interventions could positively bolster their future opportunities and support them in fulfilling their potential.

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ID 147

Teaching Approaches for Blended Learning: Results of the Experimental Phase at University Of Florence

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Extended Abstract

Keywords: blended learning, innovative teaching, flipped approach, active learning, group work

The B-LeAF project (Blended Learning at University of Florence) is part of the process of educational and organizational innovation undertaken after the experience of Emergency Remote Education due to the covid-19 emergency, in order to combine the benefits of in-person teaching with those of distance learning. The project aims to foster the application of the blended approach in different disciplines and courses, to evaluate its learning effectiveness and to provide support and training to the teaching staff. After a pilot phase, the educational experimentation was extensively conducted in the academic year 2022/2023: overall, 45 courses were involved, distributed across 15 master's degree and 3 bachelor courses.

In the literature, the formula 'blended learning' refers to "the combination of instructional formats that date back to two historically separate models of teaching and learning: traditional face-to-face learning systems and distributed learning" (Graham, 2006, p. 5). The idea of integrating face-to-face teaching with distance learning is based on the assumption of obtaining benefits from both teaching methods, i.e. flexibility, customization, greater teaching support and adoption of flipped teaching solutions (Ranieri, 2005).

In the Higher Education context, the pandemic has contributed to strengthening a process of rethinking teaching that was already underway, with a focus on possible hybrid scenarios of integration between real and virtual. As highlighted by some researchers (Gaebel et al., 2021), blended solutions were already quite widespread: 75% of European universities provided programs in mixed mode. At the Italian level (Ligorio et al., 2022; Panciroli, 2020), blended teaching can represent an innovation strategy for conventional university courses, capable of responding to the needs of a new and broader typology of students.

Until the pandemic, the University of Florence had always used elearning to support in-person teaching: the didactic experimentation of the blended modality therefore required a substantial redesign of teaching methods. To support teachers in this task, the Guidelines for the application of blended learning have been developed and 3 possible teaching solutions were proposed:

1) flipped approach, in which the delivery part is anticipated remotely and then interactive activities are carried out in the classroom.
2) active individual approach, with asynchronous activities directly involving

students, such as production of papers, exercises, case studies, etc.

3) active group approach, with activities to be carried out in groups throughout the duration of the course.

A monitoring and data collection action was conducted along the whole experimentation in order to evaluate the teaching effectiveness and the organizational impact of blended teaching, both from the point of view of teachers and students. The three teaching approaches were also investigated to understand their effects on the learning process. An ad hoc questionnaire was administered for each target: the responses collected were 40 for teachers and 1584 for students.

As for the effectiveness of the blended modality, responses are positive for all the actors involved (Fig. 1): the teachers believe in particular that this approach was effective in stimulating student participation, but in general also in improving the teaching process, giving greater flexibility to the workload.

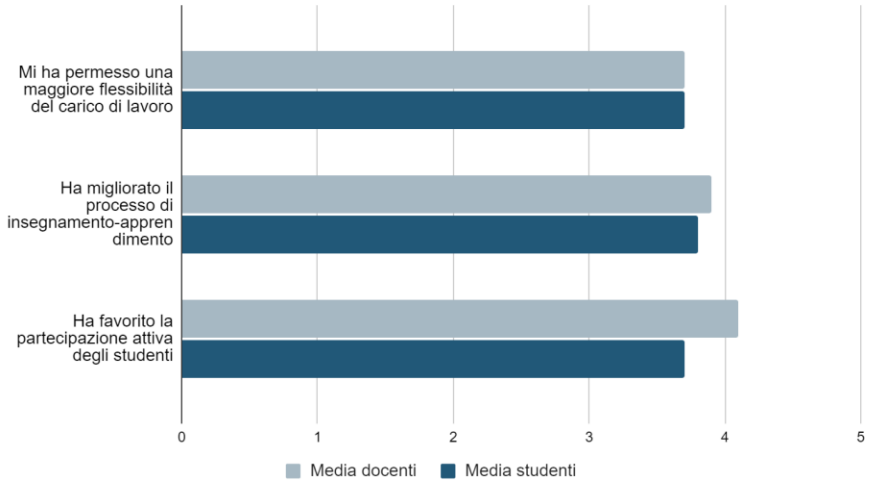

Figure 1 - Opinions on the teaching effectiveness of the blended modality (teachers N=40, students N=1584)

Regarding teaching approaches, all received good feedback. The flipped approach is the one that has been most used: teachers' responses highlight its effectiveness in relation to the possibility of carrying out activities in the classroom that are functional to learning. For the individual active approach, both teachers and students recognize the teaching effectiveness of asynchronous activities. Furthermore, the teachers underline that the distance mode has made possible activities that would not otherwise be possible due to organizational problems. For the active group approach (Image 4), the responses of teachers and students show that the impacts on the organizational factor were captured to a lesser extent compared to the individual approach. However, students' appreciation for group activities is higher than individual ones, as are the effects on learning.

In summary, the three teaching approaches were found to be valid, albeit with some differences between teachers and students. Among teachers, the active individual approach turned out to be the best one because the added value of the technologies emerged more. On the other hand, students preferred flipped and group approaches, i.e. smaller and simpler activities to do individually, or more interesting and engaging work to be carried out with their classmates.

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ID 149

Communicating Science: the Impact of the Social Web on the Interaction Between Science, Communicators, and STEM Teachers

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Keywords: Social web, STEM Teaching, Popular science, Educational research, Science dissemination.

The contribution examines the impact of the social web on the interaction between science communicators and STEM teachers. It specifically investigates the dual role of mediators - recognized both as technical systems of mediation and as social entities - within the realms of exchange, generation, and dissemination of scientific knowledge and citizenship (Carenzio, Ferrari, Pasta, 2024); these mediation processes are situated in the scenario of "digital plenitude" (Bolter, 2019) marked by the stratification of a more complex and articulated "media patchwork".

Thus, it fits into the reflection on social web both as an opportunity for teaching and as a new informational ecosystem, whose logics impact the way scientific topics are treated (Annacontini, 2023). During the health crisis caused by COVID-19, these communicative dynamics are partly related to the phenomenon defined by recent literature as “science-related populism” (Mede & Schäfer, 2020), which emerged in forms of contestation of the official science called to direct and legitimize government action for managing the pandemic, eventually merging with organized hate groups (Pasta, 2021).

In the first stage, online profiles (individual or collective) followed by teachers to find information and educational materials on scientific issues have been explored. A survey facilitated the delineation of these profiles, which were subsequently scrutinized concerning individuals' biographical details, educational backgrounds, conversational tactics, and modes of communication. The data collected in the survey allowed for the identification of 10 profiles of disseminators on which a desk analysis was conducted to answer the second research question: from who they are, we moved on to how they communicate. This analysis was conducted employing a framework grounded in the semio-pragmatic examination of their enunciative selections, as outlined by Rivoltella (2010). It is based on four dimensions: narrative, textual, communicative, didactic.

These are therefore very different references, but we can identify three ideal types, applicable to both individual and collective profiles.

- Disseminators who, after scientific studies, have established themselves through the production of materials aimed at dissemination on the social web. This activity becomes their main professional activity or significantly complements their primary one. They are almost always present on multiple social media platforms and sometimes also in traditional media (radio and

television). They have a pop communication style and produce materials designed from the outset for the social web, which can be used by both teachers and students.
- Professionals (journalists, university professors, scientists) who, after establishing themselves in their field of research, engage in scientific dissemination for different reasons (personal choice, academic assignment, professional commitment). The social channel and the products they disseminate are almost never the main vehicle of their social affirmation.
- Teachers of various school levels who, alongside their teaching activities, share resources experimented with in the classroom on the social web (worksheets, videos, teaching plans). In this case, the static web is also relevant as it serves as an archive with a repository function for teaching materials.

In the second stage, the concerns elucidated through analysis have guided qualitative interviews with science communicators engaged in social media platforms, while concurrently facilitating focus group discussions involving STEM educators. This comparative approach seeks to discern shared challenges about the interface between Science Education and Media Education, particularly within the frameworks of facilitating scientific knowledge dissemination.

In conclusion, it is worth recalling an issue historically connected to dissemination (Grandi, 2022): pedagogical intentionality, which is often not devoid of elements of spectacle and entertainment when scientific paradigms are presented (Faeti, 2018). From the examples analyzed, it is evident that simplifying the language does not mean trivializing the content or sacrificing scientific rigor (Gouthier, 2019). Disseminators know that the social media user does not have a lot of attention to invest, and what little they have must be directed toward the content; thus, the simplicity of the language gives greater importance to the content and removes linguistic barriers to comprehension (Lacriola, 2020). The cross-platform success of some disseminators- from social media to traditional media, to places of knowledge and classical education - debunks the idea that knowledge alone is sufficient for communication and that the public must strive to "elevate" themselves. Also connecting to the debate on teacher training, we believe it could be interesting to continue mapping the relationship between teaching and scientific dissemination, highlighting how the social web brings about changes.

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ID 150

Augmented Reality Active Learning (Anreal) Activities: Teaching and Learning Physics with AR Headsets

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Abstract

Virtual reality setups are high-precision, 6 degrees-of-freedom, high-speed, multiple-objects tracking devices, meaning they can register the motion of these objects with high precision. These devices prove to be very high-quality sensors in the physics laboratory. Stereo cameras may also be attached to the headset to achieve Augmented Reality (AR) and are now often found in newer headsets such as the Meta Quest 3, Pico 4 or Vive XR elite, which can be a winning addition to effectively use these devices in the physics laboratory. The setup proves to be very flexible and while the headsets are not cheap enough to be classified as low-cost (order of magnitude of several hundred euros/dollars), they are not more expensive than other common hardware for the physics education laboratory. A series of Augmented Reality Active Learning (AnReAL) activities are presented: these activities are based on an ad-hoc software we developed for Augmented Reality headsets. We will present these activities and compare this setup to more traditional ones, i.e. ultrasonic motion sensors and video tracking analysis software. The activities were tested with students involved in a pre-service physics teacher education course during several years. Being able to see in AR the physical quantities that are measured by the setup in real-time proves to be a very useful tool for physics education by different metrics, from the quality of the measured data to the active engagement of the students.

Keywords: Augmented Reality, Augmented Reality Headsets, Physics Laboratory, Motion Tracking, Physics Education

Over the past two decades, the increasing availability and ease of use of Virtual and Augmented Reality technologies has placed them at the forefront of Science and Physics Education research (Thees, 2020, Mustafa, 2019, Ibáñez, 2018, p. 109-123, Tosti, 2014, p. 97-1086, Akçayır, 2017, p. 1-11). Various augmented reality setups, based on smartphones, tablets, 3D cameras, projectors, and headsets, have seen a lowering of their costs and the introduction of new user-friendly software. Our research group has been actively engaged in several projects in this direction, exploiting AR in laboratory environments and communication events.

In this work we present and discuss AnReAL, a software we have developed for augmented reality headsets that use controllers which can be tracked in space (Rosi, 2021).

We developed our software using the Unity game engine and we have been testing it with master's degree students following a course for pre-service physics teachers at the University of Trento during several years. Because of this experience we could see how the software behaves in the hands of future teachers in the laboratory and modify it according to the needs that emerged. We have been collecting feedback from the students through group discussions and interviews.

The idea behind the software is to be able to obtain quantitative measurements about the motion of one or multiple objects and visualize the results of these measurements directly in the physical world (i.e., tracking the controllers and visualizing their 3D movement in real time using the headsets, see Figure 1).

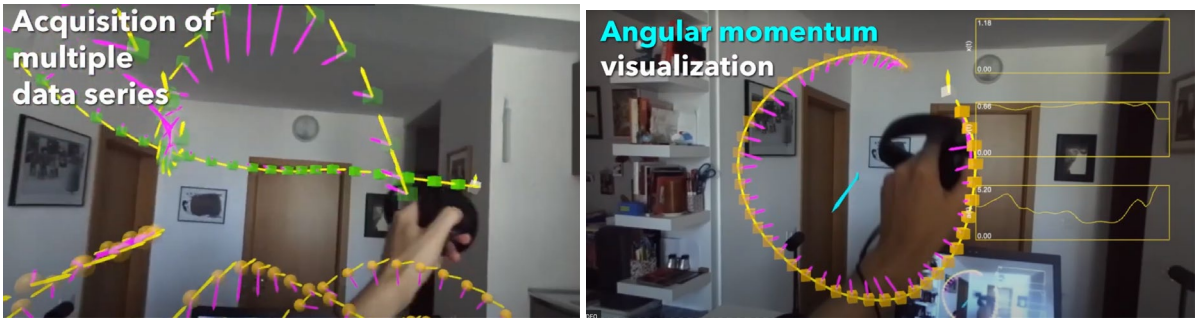

Figure 1. Real-time 6-degree-of-freedom tracking of a controller, viewed through an AR viewer and simultaneously on the computer monitor. At the top you can see the acquisition of multiple data sets (represented by different colors) and at the bottom the display of graphs and vectors such as the angular momentum (in cyan).

The VR controllers can also be attached to some objects to track their motion: for example, they can be put onto carts, they can be attached to pendulums or rotating platforms. Last but not least is the capability of the AnReAL setup to perform the simultaneous tracking of multiple objects. For example, two controllers can be attached to a rotating platform, with different distances from its center of rotation, and the result of their tracking can be displayed in realtime. As a second example, we used two hovercraft toys (low-cost objects that can move with low friction in 2D) to study a 2D collision.

The setup has been tested during a course for master students of physics and mathematics regarding the teaching of physics at high school level. In the same course, they previously tried and commented a modified version of the motion curriculum based on the traditional motion sensors as described in (Thornton, 1980), and they have also been used the Tracker video tracking software (Beichner, 1996) in many experiments. The focus of this test was to gather their feedback about the comparison between the traditional activities based on the motion sensors or Tracker and of the AnReAL activities, and about the VR potentialities in general in a motion curriculum. During the presentation we will present the results of our inquiries.

In conclusion, VR setups are low-cost, high-precision, 6 degrees-of-freedom, high speed, multiple-objects tracking devices. These devices prove to be very high-quality sensors that are well suited to be used in the physics laboratory for tracking in motion experiments. Augmented reality can be often obtained in newer devices that have stereo-cameras in front of them. A series of Augmented Reality Active Learning possible activities have been mentioned, which can constitute the backbone of a motion curriculum to be thoroughly tested in the classroom. As commented by some students, the AnReAL setup features many of the positive key-points of traditional motion tracking tools, such as ultrasonic motion sensors and video tracking analysis software, while overcoming most of their limitations.

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ID 151

Distance Learning in Time of Crisis: the University of Foggia Experience and Expertise in Rethinking Distance Education in the Local and European Dimension

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Abstract

In recent years, online training surged due to Covid-19. University of Foggia adapted with synchronous/asynchronous teaching. Amid pandemic, they launched dual teaching mode for 2020/2021, blending in-person and online classes for 400 courses, becoming top in Italy for e-learning usage. Also, thanks to this significant achievement is actively committed in the planning and learning design of distance teaching, both on the general pedagogical reflections as well as on international partnership. Although, the unplanned digital educational response to the Covid-19 pandemic has been called Emergency Remote Teaching (ERT): it ensured educational continuity, according to UNESCO, for 1.5 billion students in 191 countries; today it is used in war-torn countries such as Ukraine, where 5 million students suffer from depression and anxiety (OECD 2023,). Universities have responded with the technological implementation of online platforms such as Zoom and Google Classroom, but the ERT also highlighted disparities in access and concerns over effectiveness.

This contribution will present, as good practices in the field, the results of two Erasmus+ project in which University of Foggia is involved, both as partner as well as leader, which deal with the transition from ERT to digital pedagogy (CLOSER) and with the support for students' digital and psychological resilience in dealing with distance learning and online social activities in time of crisis (DigiPsyRes).

Keywords: distance education, distance learning, emergency remote teaching, digital pedagogy.

Emergency distance teaching, also known as 'Emergency Remote Teaching' (ERT), is a previously unplanned educational response to crisis situations that prevent normal face-to-face teaching at universities. This teaching modality was adopted on a large scale worldwide in response to the COVID-19 pandemic that hit the world in 2020 (De Martino, 2022, p.79). During the first months of the pandemic, more than 1.5 billion students in 191 countries were affected by the closure of schools and universities, according to UNESCO data. This unprecedented scenario prompted educational institutions of all degrees, including universities, to quickly seek alternative emergency distance learning solutions. This led to a significant increase in the use of online platforms, videoconferencing softwares and learning management tools.

Many students and teachers found themselves navigating a new educational paradigm without adequate training or preparation. Issues related to access to technology, Internet connectivity and digital competence have become evident, highlighting inequalities in access to education. According to the Educause 2020 study, many students expressed concerns about the quality of teaching, interaction with teachers and peers, and the effectiveness of online versus face-to-face learning (Brown et al. 2020). Today, ERT is still being used in war-torn countries such as Ukraine (OECD 2023).

Despite these difficulties, ERT has also accelerated the integration of technology in higher education, prompting universities to rethink and innovate their teaching methods.

Generation Z students also seem able to adapt better to the new learning environment: 19% of the students surveyed consider distance learning to be of high quality, while 75% are currently neutral to this mode of learning and only 6% of the respondents consider these necessary innovations to be ineffective (Dushkevych, Barabashchuk, Hutsuliak, 2020).

ERT experience has provided valuable lessons on how higher education can evolve to address future crises and how it can be rethought to improve accessibility and quality of learning for all. There is the need of a transition from an emergency response to more established approaches of digital pedagogy.

During the ERT period, the Puglia region experienced significant growth in distance learning and the University of Foggia (Unifg) stood out: it is ranked eighth among Italian universities, scoring 93 out of 120 points (CENSIS, 2023). This result is the outcome of precise technological and educational innovation strategies, evolving chronologically from an initial e-learning model to Massive Open Online Courses (MOOC) (De Martino, 2022, p.121).

The Unifg's journey also involves increasing openness towards external societies and partnerships with other training centers. It is among the founder of EduOpen, which represents a unique case in the Italian university landscape: it is the first consortium-based platform offering completely free high- level MOOCs, embodying the absolute values of distance learning: the universality of education. The platform was presented 10 years ago in 2014 at the Ministry of Education. Today, EduOpen counts 417 free MOOCs and +150.000 students.

Through the implementation of innovative solutions like EduOpen, the university not only improves its educational offerings, but also collaborates internationally, highlighting the importance of universal and accessible education. The path paved by the University of Foggia serves as a reference model for the future of FAD in Italy, showing how the integration of digital technologies can open new frontiers and opportunities in higher education.

Moreover, after the pandemic, Unifg and the Learning Science institute (LSi) participated in several European Commission's Erasmus+ call for projects, in order to enhance its online teaching offer.

Two of these are particularly important in going beyond the conception of ERT, involving the students' wellbeing and mental health while learning online: (i) "Enhancing digital and psychological resilience through peer networking in the online environment in times of crises" (DigiPsyRes), which is student-centred and focused on understanding and identifying "which personal resources can contribute to minimizing the mental health costs in students incurred due to the restrictions that disrupted safety and predictability in their academic lives" (Litwic-Kaminska et al., 2023). The project collected data about higher education students' psychological and digital wellbeing and resilience through a questionnaire, in order to understand how to strengthen students' awareness of personal resources and their protective role in maintaining mental health. The main goal of the DigiPsyRes project is to build an international online network, in which students can help themselves in a peer-to- peer basis, after an online training in which students work the concept of resilience and mutual support in digital resilience; and (ii) "Closing the Gap between Smart Learning and Emergency Remote Teaching" (CLOSER) which is teacher-centred. Transitioning to online learning, especially when university curricula are planned for face-to-face (F2F) teaching and learning, requires careful planning and design processes: CLOSER address and provide this support to the transition from ERT to Digital Education through creating evidence-based, open and innovative practices of teaching and learning.

Approaches inspired by the neurosciences and cognitive sciences bring a much-needed evidence base to educational practice, but there is growing evidence that educators do not have sufficient knowledge of cognitive processes to apply this knowledge to learning designs: the project will achieve these objectives through the research and development of a Framework for teachers' professional development. The Framework will be implemented through a MOOC and specific tools that will be available online for free and in different European languages, under CC license.

The digital resources and the MOOC are currently being produces, and will be released during the project final event on July 2024.

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ID 152

What Can Virtual Exchange Offer University Staff and Why We Need to Do More?

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The benefits of Virtual Exchange (VE) as an innovative pedagogy have been explored and documented in depth in the literature in both the Higher Education (HE) and Youth fields, yet the focus has predominantly – if not exclusively – dwelled on the students/learners conceived as the target of the Virtual Exchange projects. As a pedagogical practice, VE is often invoked as supporting youth. However, in different contexts we see that university graduate programmes and professional programmes may host older students returning to complete their degrees after a time away or changing careers. This type of student embodies one of the hallmarks of UN SDG 4 which references education for all and learning across the lifespan.

Yet, in a lifelong learning perspective, little research has so far been carried out that explores the impact of VE on older learners such as non-traditional university students and those in graduate level programmes, while so much of the literature on VE focuses on the younger undergraduate student. Large scale studies of VEs do not typically focus on graduate students or disaggregate them from the undergraduate population. The EVOLVE and VALIANT projects are examples of this as graduate classes took part in both projects.

Nor has the impact of VE on university staff, be it teacher or administrative as well as technical staff, been deeply investigated, and only few real cases of VE projects addressed to university staff have been documented. This is another group worth studying: for university staff, participating in a VE is key to develop essential intercultural skills in the framework of an overall internationalisation of staff at HEI level.

Usually, much more emphasis is put on physical mobility as a measure of staff internationalisation, while international experiences such as VEs tend not to be taken into account as precious ways to contribute to internationalisation at home strategies addressed to university staff. Setting up a VE project or offering dedicated training on VE is a great opportunity for the continuous professional development of university staff in the light of institutional policies on Internationalisation at Home, offering them the opportunity to develop crucial competences for their everyday work.

This contribution endeavours to specifically focus on the potential impact which VE could have on university staff when it is offered as an opportunity for continuous professional development.

Serious intercultural challenges may arise within higher education institutions (HEIs) when teaching, collaborating, and living in different culturally diverse contexts. Specific skills, knowledge, attitudes, and behaviours making up Intercultural Competences (ICCs) are required from them to deal with increasing diversity, as the TICKET project has evidenced.

To this end, VE can be the ideal place for HEI staff to experiment with and enhance their intercultural competences, in the light of the increasing heterogeneity of the student population they are confronted with daily. That is why attending a VE project and placing themselves in the role of the student may offer valuable benefits for HE staff. This can either take place by attending specific training on VE, but also by participating in VE projects organised specifically for staff.

If it is true that a wealth of examples have been provided in the field of teacher professional development on teacher training (see VALIANT project), the reason why little research has instead been carried out on VE for continuous professional development of staff is also due to the scarse evidence of VE projects implemented for staff.

This contribution will therefore aim, by also making references to some of the few real cases available, to highlight the major benefits of VE addressed to university staff, including the opportunity to be trained and develop their skills while not leaving their home institution. This can be a major advantage, especially considering the practical constraints HEI staff often face due to the fact that they have multiple work, family and other social responsibilities, which can restrict opportunities for them to participate in in-person international learning experiences. Furthermore, the value of deep experiential learning behind VE for HEI staff is linked to its ability to disrupt one's understanding through new insights, by engaging with peers from other parts of the world. They can also gain insights about individuals they might interact with in their professional roles through a VE with peers from a similar culture or country.

To conclude, VEs can help create sustained global peer networks extending beyond the life of the exchanges themselves and thus help to establish longer lasting cooperation, share work perspectives and prepare for physical mobility. For European Universities Alliances, for example, it is important to increase the cooperation and mobility between staff and students at her university, and their partners. VE plays a key role in this and is a way of enhancing the quality of teaching and improving collaborations between staff, also in the light of joint degree programmes.

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Teachers' Perceptions on AI Integration in Teaching: an Exploratory Study in Veneto Schools

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Abstract

This exploratory study, in collaboration with the Veneto regional school authority, attempted to investigate the perceptions of over 1000 teachers from all school grades in the area about the subject of a possible integration of Artificial Intelligence (AI) into teaching and learning. Teachers from primary, lower and upper secondary schools, as well as VET (Vocational Education and Training) institutes, responding to a specific questionnaire on the topic, showed a rich variety of nuanced opinions, where optimistic views on AI potential to adapt and improve teaching and learning experiences coexist with several concerns about its possible negative effects and with a strong need for being trained on the topic. Indeed, the results underline a broad consensus on the importance of artificial intelligence literacy for both teachers and students, highlighting the need to acquire specific skills that can effectively address this constantly evolving educational challenge. Above all, important concerns arise regarding ethical implications, data privacy and the potential 'dehumanisation' of educational processes, highlighting a cautious attitude towards this technology. Finally, there is an interesting and strong desire among teachers to be able to collaborate with artificial intelligence developers and policy makers to ensure a responsible and participatory integration of AI in education

Keywords: AI in teaching, AI teachers' perceptions, AI teachers training.

Introduction

The prospect of integrating generative Artificial Intelligence in education has recently provoked different reactions among teachers, reflecting a mixture of optimism and concern about the implications on teaching and learning processes and on all the actors involved. This exploratory research in collaboration with the Veneto Regional School Authority (the General Directorate of the Italian Ministry of Education in Venice) sought to elicit the opinions of N. 1,063 teachers from schools of all levels on this issue.

The survey confirmed what has already been reported in the most recent literature (fig. 1): teachers recognise the potential of AI in revolutionising teaching practices, e.g. in its ability to create personalised learning paths (53.4%), improve motivation (53.2%), automate routine tasks such as the creation of tests and assessment papers (55.8%) and support inclusivity and accessibility (53.9%). (Nikolopoulou et al., 2024).

The declared competence in the use of AI tools turns out to be surprisingly high with 30% of teachers responding 'average' (3 on a 5-Likert scale) to the question "How do you rate your current knowledge of AI and its application in education?" and 10.2% responding 'high' (4) or 'very high' (5). At the same time, though, the need for training on these issues is also recognised, with 60% teachers responding 'low' (2) or 'very low' (1) to the same question (Mingyeong & Lee, 2023; Galindo-Domínguez, et al., 2024). In fact, 66% of respondents do not feel prepared to integrate AI into their subject curricula (33,9% selected '1' on the 5-Likert scale, while 32.1% selected '2').

However, while 62% of respondents declared that providing AI literacy courses for

teachers is very important (18% selecting 4. and 44% choosing 5. on a 5-Likert scale to answer the question “How important it is to include AI literacy for teachers?), only 11% of teachers were able to attend a course on AI at their own school, while 13% attended AI courses that were provided by external organizations and 23% trained on the topic autonomously through resources they found on the Internet. The strong need for training seems to be reinforced by the respondents’ answers to the question “To what extent have you already used AI in your teaching?”, with 67% declaring they have never used it and 20% stating little recourse to AI in their practice.

On the critical side, concerns emerge in the area of data privacy, the potential increase in inequalities in education and the de-personalisation of learning due to a potential lack of empathy. Teachers are also cautious about an excessive use of AI that could undermine important educational dimensions such as critical thinking, student-teacher relationship (Mishra & Heath, 2024), and above all assessment: 68.8% say they are against entrusting it entirely to AI, considering it a wholly human task. The concern that AI could potentially replace part or all of the teacher's role is perceived as critical by only 12.1%, of respondents emphasising the importance of using AI as a support tool rather than a substitute, calling for a balanced approach that integrates innovative and traditional teaching methods (Klemke & Jarodzka, 2024).

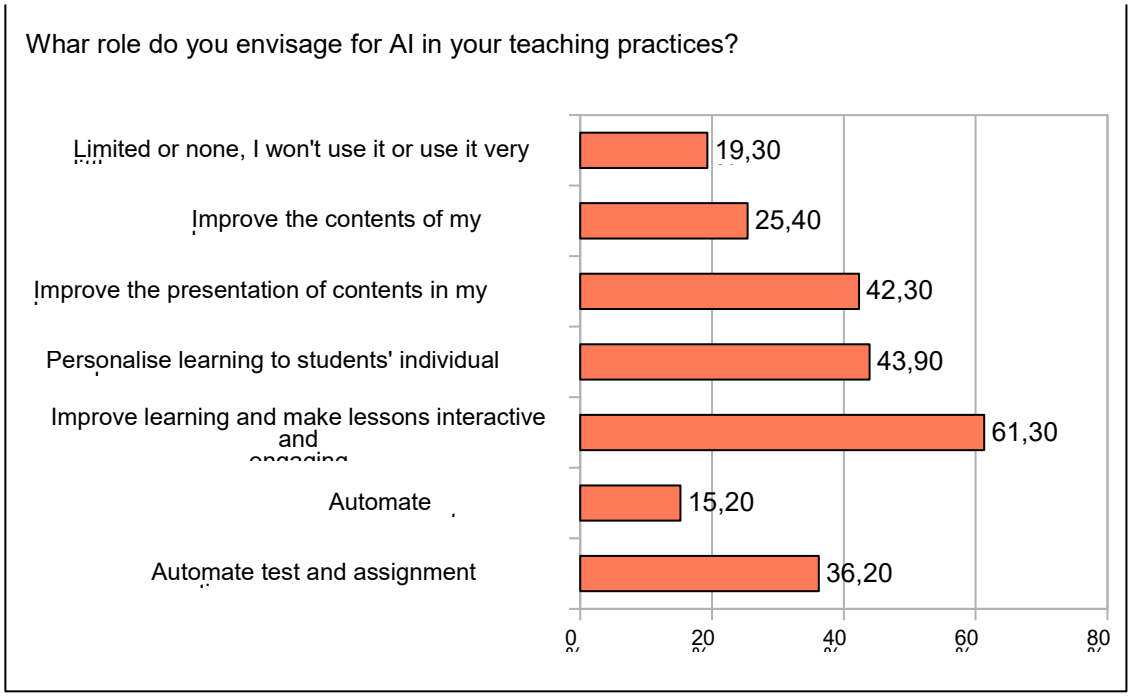

Figure 1: Teachers’ answers to the question concerning potential uses of AI in teaching & learning.

Regarding future perspectives, there is a clear call for the development of policies that activate participatory development processes involving educators in the creation and implementation of AI technologies, especially to ensure that these tools are aligned with educational goals and ethics (Holmes, & Miao, UNESCO Guide, 2023) (Radwan & McGinty, 2024). In conclusion, for teachers AI seems to present significant opportunities to improve educational practices, though it also raises substantial challenges that need to be addressed through appropriate training, and the development of ethical and policy guidelines.

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ID 154

How Technologies Can Support Learning in Higher Education: an Exploratory Study at University of Genoa

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Extend Abstract

The Italian university context has a very heterogeneous range of users (study background, age, language and culture) and for this reason faculties should adapt their educational offerings to meet students' needs (Coggi, 2019; Calvani, 2003), integrating active and student-centred learning experiences with traditional teaching methods. European indications require university teaching to be able to activate meaningful learning in students in order to promote the acquisition of lifelong learning skills (European Commission, 2019) necessary for professional life. Italian universities, in fact, with the aim of improving student learning, are moving, through Faculty Development, to make learning more effective and meaningful, investing in the professional development of teachers (Lotti, 2020; Beach, 2016; Silver, 2014).

As can be read in Lotti (2020), Lotti (2021), Lotti (2023) to promote and support university students' learning, various methods have been experimented, researched and shared. In particular, projects, laboratories, interdisciplinary activities, active teaching strategies, such as Flipped Classroom, Service Learning, case studies, Team Based Learning, Debate, Collaborative Learning, peer-to-peer experiences, such as peer observation, peer-to-peer, peer review and innovation paths with the use of new technologies, such as Augmented Reality, podcasting and collaborative platforms. Experimentation in the field of innovation in university didactics is mainly aimed at the design of meaningful activities, the choice of the most effective teaching methodologies, the development of collaborative practices and the introduction of evaluation practices capable of supporting the students‘ training process and the teachers’ teaching practices. In fact, assessment is of decisive importance, since it plays a central role in learning processes at every level: assessment methods can significantly influence students' learning experience, not only in school but also in university paths (Grion et al., 2017), and increasing importance is being given by universities to formative assessment and its benefits for learning (Baldissera et. al. 2007). Assessment methodologies significantly influence students' university experience (Grion et. al. 2017) and the quality of their learning (Coggi, 2019), since they aim to promote cognitive processes that lead them to bring out their own resources, bringing them into play, strengthening them and possibly modifying them (Trinchero, 2018).

Technologies can be a particularly significant tool for supporting active student learning, especially regarding the possibility of creating collaborative learning contexts. (Abdulrahman et al., 2020; Boud & Molloy, 2013; Limone, 2012). In particular, technological devices can be useful in supporting active and student-participated assessment practices. Digital is a space to manipulate, structure and organize artifacts, and through it the student can be at the centre of his learning process (Bandini et al., 2019).

The study moved in this direction, the aim was to investigate whether and how technologies can support undergraduate students' learning.
The research questions were: How do professors at the University of Genoa use technology in their teaching activities? Which tools are most commonly used? Can technological tools also support assessment practices?
The research group identified 97 teachers who carried out innovative teaching activities between the academic year 2020/2021 and the academic year 2023/2024 with the support of the Teaching and Learning Centre of the University of Genoa. Of the teachers, 57 were female and 40 male; 42 were associate professors, 24 full professors, 24 researchers and 7 contract professor.
The lecturers came from the five different schools of the University of Genoa: 18 from the School of Mathematical, Physical and Natural Sciences (SMPNS), 26 from the School of Social Sciences (SSS), 29 from the Polytechnic School (PS), 13 from the School of Medical and Pharmaceutical Sciences (SMPS) and 11 from the School of Humanities (SH). The sample cannot be said to be representative of the reference population, however the origin in the different subject areas provides an opportunity to reflect on the use of educational technologies in different contexts.
An analysis of the documentation provided by the teachers to the Teaching and Learning Centre revealed the following.
The types of technologies used by the teachers are: interactive platforms (73), survey tools (18), specific software (6), video (3), podcast (3), Artificial Intelligence tools (2) and repository (1).
The types of strategies used by teachers are as follows: Project Work (5), Collaborative Learning (12), Team Based Learning (12), Problem Based Learning (10), flipped classroom (9), feedback (7), Case Study (6), Discussion (5), debate (5), Think, Pair, Shaire (4), Role Playing (3), Storytelling (1), Inquiry based learning (1), debate (1).
The types of assessments used with these technologies are: Peer Assessment (28), Formative Assessment (15) and Self-Assessment (12).
The variety of methodologies, tools, strategies and activities used is very rich and diversified. This suggests the need to investigate the phenomenon in more detail in order to understand its implications as well. This preliminary study will continue through exploratory research that will aim to understand in more detail how teachers at the University of Genoa use technologies in their teaching activities. Professors will be interviewed to listen in depth to their ideas and experiences on the topic.

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ID 155

Promoting Accessibility and Inclusion in E-Learning: the University of Turin's Experience

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Extended Abstract

The Strategic Plan of the University of Turin (Objective 1.2) aims to promote inclusion and accessibility for all students, with particular attention to those with disabilities or specific learning disorders (SLD). Based on these directives, the E-learning Staff of the University of Turin has implemented over the years a series of initiatives to realize the ideal of an accessible web (Mangiatordi, 2019; Repetto *et al*. 2022). Since 2007, all educational structures of the University have been equipped with the open-source Moodle e-learning platform to provide online access to materials and activities for all students, thereby facilitating their academic journey. To encourage more conscious and effective use of the tool, training sessions were organized for faculty members. Once the faculty had become accustomed to using Moodle for course management, the E-learning Staff deemed it appropriate to expand their approach from a primarily technical one to a more pedagogical-theoretical one. In this perspective, training courses have been launched to provide teachers with methodological guidance as well: Moodle, in fact, allows them to rethink their teaching materials, overcoming the idea of the platform as a mere repository and making the most of the potential offered by e-learning. For instance, the use of collaborative activities, customizable learning paths, self-assessment systems, and interaction spaces between faculty and students and among students themselves can enhance inclusivity by catering to different learning styles. In the ensuing years, additional services were introduced, including the capability to record lectures - both live and on-demand - and the use of plugins for creating interactive and accessible multimedia content. During the pandemic, there was a substantial, if not exclusive, reliance on Moodle e-learning platforms for managing educational activities, which confirmed the utility of this technological solution. Currently, every course instructor at the University has their own Moodle course for each in-person class they teach, and faculty members have become adept at using the platform autonomously. Therefore, the time appears opportune for a further qualitative leap towards maximum inclusion in educational design. Today, each teacher at the University has their own Moodle course for each in-person class, and the use of the platform by professors and teachers is now stable. They use its functionalities with a certain degree of autonomy. The time therefore seems ripe for a further leap in terms of quality in the direction of maximum inclusion in educational design. With the ideal of an accessible web in mind, the E-learning Staff has undertaken various initiatives. Guidelines for creating accessible educational materials have been drafted for faculty and made available on the University's Intranet. A feature has been implemented in the Moodle theme that allows users to customize the platform's font; the available choices include fonts specifically designed for accessibility, such as Easy Reading or Open Dyslexic. Text-to-speech software has been introduced, which is also available for the University portal and departmental websites. Applications for subtitling video content, both live and on-demand, have been made available to make this type of material accessible. To facilitate the production of accessible content, the H5P framework has been adopted, allowing for the creation of educational objects that activate learning using multimedia, multichannel and multimodal communication strategies, and targeted interactivity.

A particularly noteworthy initiative by the Staff was participating in the design of an online course for tutors of disabled students in 2020 (see Vindigni *et al*. 2023). In this context, accessible resources and activities were created from the ground up, using the tools available at the University. This activity laid the groundwork for a further initiative presented in November 2023 as part of the call "Embrace the Future: Unleash Innovation in the Classroom" proposed by the University's Teaching and Learning Center to encourage the entire University Community to promote educational innovation at various levels. The project presented involved the creation of an e-learning course for University faculty, aiming to raise awareness of inclusion and foster a shared culture of producing accessible educational materials. The Staff, in collaboration with faculty experts in accessibility, has thus worked on designing a Moodle course addressing various aspects of making educational content accessible. Lastly, in 2024, the Staff launched a pilot project to use an integrated application that allows for the assessment of a Moodle course's accessibility and provides guidelines for resolving any issues.

In recent years, the University has observed a considerable increase in students with SLD and disabilities. There has also been a growing demand from students for accessible educational materials and a desire to study in a University that is generally attentive to inclusion. The emerging need is thus to consolidate a culture of equality and inclusion. In line with this trend, the Staff aims to continue focusing on technological tools that can effectively ensure access to the resources and materials necessary for acquiring knowledge and skills; these tools must be easy for faculty to use and widely applicable in educational activities.

Keywords: Universal Design for Learning, E-learning, Accessibility, Diversity and inclusion, Digital resources

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ID 158

Playing in the Classroom? Italian Teachers' Attitudes on the Introduction of Games at School

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Abstract
The increased awareness that gaming is a very valuable educational support has not been accompanied by an effective diffusion of games in Italian educational agencies, where an ambivalent behavior is manifested: a strong widespread interest is contrasted with a limited application of games or online resources that are often behaviorist in nature.
However, the analysis of research on the use and diffusion of games in Italian schools highlights the lack of recent studies investigating teachers' fundamental didactic-pedagogical knowledge, their level of acceptance and confidence regarding the introduction of games in the classroom. Building on the Technological Pedagogical Content Knowledge-Games (TPACK-G) and the Acceptance of Digital Game-Based Learning (ADGBL), which investigates learning opportunities, preference for games, experience with games, and attitudes toward game-based learning, a quantitative analysis tool was created that, integrating the two frameworks TPACK-G and ADGBL, adapts the areas and items to the Italian context, extends the survey to include non-digital games, and accommodates and integrates the sections to aspects related to game-integrated instructional design, game scenarios, and the role of teachers in teaching activities.
The aim of the research is not only to investigate how the prevalence of play in the classroom is changing, going beyond mere expressions of interest and fads, but has the purpose to study how the approach of play is changing in the design of educational activity and what is the degree of awareness of the ludo-pedagogical-didactical skills necessary for the introduction of play in education.

Keywords:
Game-Based Learning (GBL), Italian School, Teachers' Perceptions of Classroom Game, Teachers' Attitudes toward Classroom Games, Quantitative Research Tool

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Interest

The preparation of a tool for the analysis of teachers' perceptions and attitudes toward the use of games in Italian schools is functional for a better calibration of training courses dedicated to teachers and to the identification of more appropriate solutions in the Game Design phase by developers of games for learning.

ID 159

Inclusive Museum and Digital Teaching: Enhancing Learning in Students with Special Educational Needs

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Abstract

The contribution aims to explore the importance of museum education in the context of the education and training of boys and girls with Special Educational Needs (BES). Through an in-depth analysis, it will investigate how museum experiences can be optimal in order to promote meaningful learning and the development of all those life skills that are necessary today in every life context. Particular attention will be paid to the integration of digital education within such contexts, exploring how technologies can be used to personalise learning and make information accessible in an inclusive way.

In addition, the importance of promoting flexibility and critical thinking through museum activities will be examined. The ability to adapt educational programmes to the specific needs of students with BES will be the focus of the discussion, highlighting how a flexible approach can foster engagement and success in learning.

Through case studies, empirical research and recommended practices, this research aims to provide a comprehensive overview of the crucial role of museum education in the education of children with BES. The practical implications of this study could inform both museum educators and specialist teachers in implementing effective pedagogical strategies to enhance the educational experience of all students.

Keywords: Special educational needs, meaningful learning, museums, soft skills, digital

Museums can facilitate the learning of children with Special Educational Needs through multisensory and interactive stimuli, which connect theoretical and practical knowledge and allow everyone to learn according to their own learning style (Bertolini et al., 2023). This experiential approach stimulates curiosity, imagination and interest, encouraging independent learning. Museum education, which is complementary to museum services, has transformed the museum from a static place to an interactive and playful space, increasing the involvement of visitors.

In recent years, the collaboration between school and museum has grown thanks to digital technologies and online museums, strengthening the educational partnership (Perrella, 2023). Museum visits develop cultural awareness and cognitive skills, preparing students to become future adult visitors. New teaching methodologies, including immersive technologies, respond to emerging educational needs, promoting active participation of students and connecting them to cultural traditions of the past (Coppola et al., 2020).

Visiting museums, exhibitions, theatres and concerts stimulates neuronal circuits, reduces stress and contributes to brain health, suggesting a holistic approach to public health. The ONU Convention on the Rights of Persons with Disabilities, adopted by MiBACT, has led to the implementation of inclusive projects such as itineraries in Italian Sign Language, tactile routes and the use of technology to enhance the cultural experience of blind people.

Museum education also develops social and cognitive skills, as demonstrated by numerous programmes to promote inclusion and accessibility (Capasso et al., 2019). The integration of digital technologies, such as audio guides and interactive apps, personalises learning and enhances the educational experience, especially for students with Special Educational Needs (Rossi et al., 2024).

Starting from these premises, through an exploratory investigation aimed at understanding the importance of museum education in the context of the education and training of boys and girls

with Special Educational Needs (BES), research and projects will be analysed in order to find answers to two main research questions:

1. Can museum experiences be optimal for promoting meaningful learning and the development of life skills?
2. Can insights be gained from these technologies that can be used in the preparation of future intervention protocols?

Museum education represents an extraordinary opportunity for the education and training of children with Special Educational Needs. Museum experiences, with their interactive and multisensory approach, promote meaningful learning and the development of skills essential for everyday life (Finestrone et al, 2024).

Museum education plays a key role in shaping political awareness, especially about the European Union. Museums, as custodians of cultural and historical heritage, have a duty to promote understanding of common European roots and contemporary challenges. Through museum education, visitors can be guided on a path of learning, growth and transformation, thus contributing to the formation of informed and participative citizens (Luigini et al., 2018).

However, it is crucial to rethink this concept, recognising museum education as a central and indispensable element of museum cultural policies and beyond.

The integration of digital technologies makes possible a more personalised and inclusive education that takes into account the learning styles of each learner by ensuring that all students can access information and actively participate in learning (Di Paolo, 2023).

Investing in museum didactics and educational technology is key to creating inclusive and stimulating learning environments that meet the needs of all learners, particularly those with BES.

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ID 160

A Digital Community of Practice Model for Mathematics Teachers

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1. Identity and practices in mathematics

All people can appropriate something more visible, such as an object, a material, a property, or something less directly visible, such as a quality, a gift, knowledge, etc. Getting to "act in a transformative way" is something more, it requires commitment and effort (Rosa H., 2020).

For the mathematics teacher it is not enough to "appropriate" the profession: it is necessary to know how to act in a transformative way on one's practices. The challenge is therefore to relate to one's mathematical practices in a meaningful way.

By practice we mean habitually acting in a certain way, that is a specific action that the mathematics teacher implements in the context of mathematics teaching, in a specific historical and social context. Practice is also understood as constant exercise with the aim of learning, becoming expert in that specific practice, in teaching mathematics (Lampert, 2010).

Practices are the result of "experiences, knowledge, objectives, context" (Zhang Q., Morselli F., 2016, pp. 12), all factors that have to do with the construction of a person's identity, and in specific in this research in the identity of the mathematics teacher.

What really tells the identity of a mathematics teacher is not his communicative activity, his talking about himself, but his specific practices. For this reason, the focus of this research is the creation of a specific space in which the teacher can reflect on their own mathematical practices, discussing them with other professionals in the same subject.

This space is a “community of practice”, and specifically a “digital community of practice” as a place where the professional identity of participants is renegotiated.

2. Digital community of practices

Covid19 has forced many mathematics teachers to think about a new approach in their teaching through the use of digital tools, even those that allow interaction and communication between peers (Jessup, Wolfe & Kalinec-Craig C., 2021) for professional development. Research has highlighted, in fact, how online professional development, adapted to the different needs of teachers, can lead to changes in their educational practices (Arzarello, Robutti & Taranto, 2021), and in their personal identity.

The digital community of practice focuses on actions and routines relevant to the teaching and learning of mathematics, around which members coexist, share information, help each other, interact, build relationships, collaborate and discuss ideas; how engagement occurs is influenced by the structure of the platform (Radakovic & Jao, 2020).

3. Study of the identity of the mathematics teacher

A better understanding of the mathematics teacher's own specific practices and an exchange of these through the interaction of similar or different practices in the same field and subject would lead to a development of professional competences in mathematics and a change in the teacher's identity of maths.
The designed community of practice model seeks to foster the conditions to explain the beliefs and experiences that led participants to develop certain practices. At the same time, sharing and working on materials, protocols and documentation aim to create the ground in which professional development is anchored to a transformation of professional identity.

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Keywords: mathematics teacher, digital community of practice, beliefs, identity.

ID 162

Space as the Sustainability Heather

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Abstract

The (just) twin transition is recognized by the community as key element for the development of our society for the first time during the last decade of the XXth century (Verdonini, Belpietro, 2022) and in recent years has attracted the attention of the scientific community and large international organizations. The European Union report "Towards a green and digital future" deepens the distinctive elements of the twin transition, investigating how this process could be effectively accomplished. The document involves the concept of sustainability - environmental, social and economic - aimed at achieving the green transition. Besides it links the sustainability theme to the profound social and economic transformation due to the pervasiveness of technologies.

This representation aims to put digital system and technologies on one side and sustainability on the other. The twin transition is recognised in the report as a cornerstone for a fair future, which is why it must be achieved as much as possible through an integrated and proactive approach (EU, 2022).

The two leading components of this process represent two elements of which today's society is deeply connected to. On the one hand, technologies, whose presence has contributed to the transformations of the world, often accelerating processes and providing increasingly complex and performing tools. These imply the need to acquire new skills and ways of acting to support such fast changes.

Digitalization affects each single part of our society: services for citizens, farms and industries, as well as the whole cultural and educational world. Such pervasiveness requires the development of digital skills especially in the younger generations, who will be called to manage and deal with processes in which technology will be increasingly integrated. Digital competence can be defined, according to the DigComp 2.2, as the proper use of technologies in learning and working environments as well as in society. Specifical reference is made to issues such as safety and security, data and media literacy, content creation, problem solving and critical thinking (DigComp, 2022).

The urgency and topicality of this issue is further confirmed by the recent development of technologies related to artificial intelligence, as described by Taddeo made up by "large set of technologies that rely on large amounts of data to make predictions or make decisions" (Taddeo, 2023).

In parallel the environmental theme. The Global Footprint Network reveals that lifestyle of the overall population would require 1.75 Earths in terms of ecological resources. A change of perspective is therefore urgent, as also underlined by the 2030 Agenda, from which emerges too how the environmental issue is intimately linked to the theme of sustainability, which finds full completion in the social and economic dimensions.

The environmental change in its ecological dimension is so profound that it has generated the birth of the term Antropocene, named by Paul J. Crutzen that recalled himself the work of Antonio Stoppani that "in 1873 had defined the human species a «new telluric force», a factor of transformation of the terrestrial ecosystems capable of producing a new era geological called «anthropozoic era»" (Crutzen, 2002, in Lai, 2020). The awareness that arises this term concern the skill of understanding the impact that human activities have on the planet, thus education is an essentialally in increasing such evidence.

The development of appropriate skills to understand one's own impact on the environment cannot be separated from the exploration of the awareness of the world in which students live. In this regard it is a priority to understand how citizens experience and live their specific environment, to develop a systemic thinking and an educated gaze at the complexity of the landscape. Systemic thinking is meant as the ability to recognize and understand relationships; to analyze complex systems (Unesco 2017). While the reference to the complexity of the landscape should be intended as "the concept of synthesis, which is based on the close relationships between the different components, in particular between the natural and the anthropic" (Castiglioni, Cisani & Piccolo, 2020).

Landscape and environment are the result of a complex whole, in which soil represent one of the basics. Indeed, it is intended both in its look as upper layer of the earth crust, and as a non-renewable resource,

as a resource for human activities, for biodiversity and a balanced biosphere (Ispra, 2006).
The complexity and stratification of elements that are enclosed within soil, therefore, deserves to be adequately explored to identify the different systems and the consequences of their management at different scales. This process can be effectively supported by an active and conscious use of technologies in two main ways: technology in an educational media key aims to provide the tools for an informed search of knowledge sources as well as for documentation and sharing activities (Rivoltella, 2019).
It can thus be said that the need to relate research to the spatial and territorial dimension stems from "a pedagogical interpretation of the cognitive experiences, resulting from the contact with the land where the subject lives and the active methodologies that make an effective located learning" (Zanelli, 2011).
The path illustrated below in its only fundamental features fits into a dual framework, the first one represented by the national doctoral path "Learning Sciences and Digital Technologies" and second one consist of Project “Regione 4.7”, coordinated by the Piedmont Region and funded by the Italian Agency for Development Cooperation on the AICS 2021 Call for Contributions to Awareness Raising and Education for Global Citizenship and of which the University of Turin is a partner (WorkTeam: Prof. Ricchiardi, Prof. Torre, Prof. Perazzone, Prof. Tonon, Prof. Emanuel). The Project aims to promote the dissemination and integration of education to global citizenship in local planning and strategies, on the territory of the Piedmont Region by 2025, to help strengthen and broaden the concept of citizenship intended as belonging to the global community and expression of international solidarity.
The experimental activity that represents the core of the research project is part of the process described above and involved around 110 students aged between 17 and 20 years old, belonging to seven different classes (five experimental classes and two control group classes) of two different secondary school. These institutes are extremely different, both in relation to the environmental context in which they are inserted, both in terms of type of students. The first one is a scientific high school in the city of Turin and the second one a state higher education institution of Oulx, a small mountain town of the Susa valley.
The developed educational path has been conducted between January and March 2024, six two-hour meetings were held in every experimental class. Each module has been structured following the same scheme: a brief introduction to the main topic and a more consistent part of active work for students. The covered topics concern the Ecological Footprint as starting point, that led the path to the different kind of use of soil, and thus the recognition of possible improvement that were displaced on the crowdmap created by students on FirstLife (a civic social network developed by the Informatic Department of the University of Turin - https://edu.firstlife.org/wall). Then students had the chance to face the theme of big data and of online resources reliability, that flowed into the Rockstrom theory of Planet Boundaries, to get to the creation of specific manifesto on how to contribute and commit to these topics.
In particular, even though the full analysis of the data is still ongoing, an initial glimpse of the manifestos shows how students approached sustainability in a different way. The first reference is owed to what emerges from the developed themes: in fact, a few manifestos concern topics afforded during the learning path (i.e. ecological footprint, soil), others present themes to which students are evidently more connected and more interested in (i.e. concerts, clothes). In other cases it can be read the influence of the school context, as in manifestos that propose themes related to waste recycling, central topic in everyday practice in one of the two involved schools. The influence of the context is also found in the approach to the manifesto, as in the case of the multimedia course class in which the graphic design and the communicative elements have greater weight than other elements.
The variety in dealing with the issue of sustainability is also confirmed in relation to the approach and the proposal itself of the manifestos. In some cases, these propose recreational and engaging activities in which a positive spirit and proposal emerges (i.e. mountain walks, workshops). In other cases, on the other hand, a more negative atmosphere prevails, where it is rather underlined the evidence of unsustainable behaviours and their effects on the environment (i.e. water consumption).
To answer the research question “Does an educational path focused on the theme of land consumption achieved through direct observation and support of technologies affect the development of systemic thinking of secondary school students?” both qualitative and quantitative data were collected through pre-post questionnaire and in-depth questions and assignments to acquire information both about the lifestyle, the sustainability of students, and the reasons for their choices.
For this transition and transformation to take place, it is necessary to acquire a posture that allows to grasp the interrelation between the different elements for the creation of a new coherent system supported by solid foundations. The creation of such bases cannot but pass from the education, that must supply the tools to the new generations to realise the necessary change.
School and education in general can help to find a new balance between the parties characterized by "persistence [...]. An ecosystem, in fact, can persist over time while undergoing certain changes and perturbations" (Casetta, 2023).

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ID 163

The Impact of Experience in Immersive Education: a Longitudinal Study on Students' Interactions within Virtual Reality Social Platforms

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Background

Universities worldwide, including those in Italy, are progressively integrating immersive virtual reality (VR) applications into their curricula. Among these, **VR social platforms** are becoming increasingly prevalent (see h ttps://sh o rtu rl.at/kMQV5). These platforms, representing early prototypes of the Metaverse (Cheng et al., 2022), merge social interactive components with VR's immersive capabilities, paving the way for integrating rich immersive, experiential, and collaborative learning activities into traditional classroom settings. Specifically, VR social platforms offer shared virtual spaces where users, represented by avatars, can communicate real-time with each other and interact with the digital world around them. This provides the opportunity to design learning experiences where students can firsthand explore course contents and concepts. For example, students can be virtually transported to various locations, they can participate into simulations, or be exposed to scenarios that deepen their understanding of the subject matter. Within this immersive virtual environments, collaborative activities such as role-playing and hands-on experiential tasks are profoundly enriched, providing dynamic and interactive ways of learning.

In this educational landscape, where immersive, experiential, and collaborative elements are merging into novel educational practices, new social, cognitive, and emotional aspects of students' learning experience become central, supported and enhanced in novel ways. Firstly, the sense of **social presence** (Short et al., 1976), that is the sense of being close and interconnected with others. In immersive VR learning environments, social presence is amplified (Oh et al., 2018), fostering genuine connections among learners and instructors, enhancing engagement, encouraging collaboration, and supporting emotional connections, creating a dynamic and interactive educational experience. Secondly, **activity emotions** (Pekrun, 2006), which refers to the set of emotions related to an ongoing learning activity. The immersive qualities of immersive VR has the potential to enhance positive emotions like enjoyment (Makransky, & Lilleholt, 2018), making educational experiences more engaging and emotionally enriching. Thirdly, the **state of flow** (Csikszentmihalyi, 1990), which refers to a state of optimal engagement and immersion in an activity, leading to heightened focus, intrinsic motivation, and a deep sense of satisfaction. The immersive nature of VR is uniquely suited to facilitating this state of flow, thereby maximizing the learning experience by keeping students deeply engaged and motivated (Huang, et al., 2019). Finally, **extraneous cognitive load** (Mayer & Moreno, 2003) which refers to the extra cognitive effort needed to process information that isn't directly related to the learning objectives. In immersive VR, extraneous cognitive load can be exacerbated by irrelevant details, hindering focus and motivation, potentially causing frustration and negatively impacting the learning experience (van Merriënboer & Sweller, 2005).

When assessing these aspects of student learning experience in the context of VR social platforms, it's crucial to acknowledge that the adoption of these technologies is still in its early stages. Therefore, their successful incorporation into mainstream education encounters a substantial challenge: students' **familiarity** with the technology (Miguel-Alonso et al., 2023). On one side, the novelty of using VR tools can increase engagement and foster positive emotions. On the other side it can also present challenges for new users, who might not benefit from the immersive education during first experiences. Difficulties in using immersive technology, like navigating a virtual environment or interacting through avatars, can indeed cause frustration or confusion in users. These obstacles can lead to increased cognitive load and a less positive learning experience. This contrast underlines the importance of examining how repeated use of such technologies impacts the social, emotional, and cognitive aspects underpinning this new learning experiences. Understanding this evolution is crucial for optimizing VR social platforms educational potential and ensuring that learners can overcome initial challenges to fully benefit from immersive learning environments.

Objective

This study aims to longitudinally investigate the changes in students' learning experiences, specifically, their social, emotional, and cognitive aspects, before and after participating in a university course that integrates VR technologies and uses VR social platforms as core learning tools.

Given the emerging nature of this field and the limited availability of VR devices in higher education, this research is a pioneering work, similar to studies conducted at Stanford University (Han et al., 2023), and represent a first case in the Italian context. This study aims to build upon and extend the current understanding of students' attitudes towards VR in education (Di Natale et al., 2024), by exploring the critical factors that shape learning experiences provided by these technologies. The ultimate goal is to provide institutions and educators with insights for the effective incorporation of VR social platforms into educational practices.

Methods

Participants were selected from the "VR and Metaverse Techniques for Well-being" course, currently offered by the Department of Psychology at the Università Cattolica del Sacro Cuore. This course provides immersive experiences tailored to explore VR's psychological applications, such as immersive relaxation, body-swapping techniques, and the utilization of VR social platforms to improve health and well-being. The present study specifically focuses on the first and last lesson of the course, both structured in a similar way and using Engage, a VR social platform, to explore the course's key concepts. The format of these lessons consists of a lecture-based theoretical overview delivered traditionally with slide presentations and an immersive experiential session, where students access the VR social platform for hands-on learning. These sessions are divided into three parts: individual, pair-based, and group-based activities.

The first lesson, completed in February 2024, focused on using embodiment techniques in VR to foster a positive body image. To facilitate students' understanding of the concept of embodiment, the immersive experiential session comprised three tasks. An individual *embodiment task* where students replicated movements demonstrated by the instructor, thus promoting a closer identification with their virtual avatars. A *theatre mirror play*, a paired exercise designed to have participants mimic each other's actions, in an effort to explore the possibility of embodying another body. A *proxemics exploration task*, a group activity aimed at navigating and understanding the spatial dynamics and boundaries associated with one's virtual body.

The final lesson will take place on May 2024 and will focus on creativity and its application for wellbeing. The practical session will encourage students into a dynamic exploration of creativity. The first activity is an individual *3D pen task*, where students, following the instructor's demonstration, use a 3D pen to explore personal experimentation and artistic expression with this innovative three-dimensional creative tool. Next, students will engage in a pair-based creative activity, using a 3D pen and other tools to collaboratively *craft an artifact* symbolizing their journey through the course. This exercise facilitates meaningful dialogue and shared reflections, culminating in a shared artistic expression of their experiences. Finally, a collective *gallery walk*, wherein students will explore and discuss their creations, promoting a shared reflective dialogue.

This consistent structure between the first and the last lesson facilitates a comparative analysis of students' learning experiences dimensions under similar conditions, before and after prolonged exposure to VR applications offered in the course. Students who agreed to take part in the study completed a Qualtrics questionnaire after the course's first lesson. This initial survey collected data on their prior VR experiences and sociodemographic information. Additionally, it assessed various aspects of their learning experience during the immersive experiential session through the VR social platform, such as their sense of social presence (Makransky et al., 2017), affective state (Pekrun et al., 2017), state of flow (Diana et al., 2012), and extraneous cognitive load (Parong & Mayer, 2021). Following the last lesson of the course, which is planned for May 2024, participants will be invited to fill out the same survey focusing on their learning experience.

Expected results

This longitudinal study on the use of VR social platforms in higher education aims to illuminate how students' experiences evolve over time. Specifically, we seek to identify changes in students' sense of social presence, emotional responses to immersive learning, the occurrence of flow states and the degree of extraneous cognitive load encountered during the first and last lesson of a VR-integrated university course. Our hypothesis posits that as students become more familiar with VR technology, we will observe an increase in social presence, an improvement in emotional experiences during learning, a greater likelihood of achieving flow states, and a reduction in extraneous cognitive load. These changes are anticipated to collectively enhance the learning experience's overall quality.

The results of this study aim to contribute significantly to the ongoing discourse on the integration of immersive technologies in education. By providing empirical evidence on the effects of repeated VR exposure on students' learning experience, the study will provide institutions and educators with crucial insights for incorporating VR social platforms into educational practices effectively.

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ID 164

Higher Education and International Cooperation. A collaborative project of Master Design in Advanced Digital Literacy

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The European Commission is steadfast in its mission to develop a high-performance digital education ecosystem and enhance digital skills for digital transformation (European Commission, 2021; 2023). By equipping students to be active participants and contributors in a digitally driven world, the Commission is not only fostering a more inclusive and progressive society (Dallmann, 2021), but also laying the foundation for a future where digital literacy is a societal norm, benefiting all (Van Laar, Van Deursen, Van Dijk, De Haan, 2017).
The European University Association's (EUA, 2021) goal of creating sustainable, inclusive, and engaged educational environments (Claeys-Kulik & Jørgensen, 2018) focuses on interdisciplinary learning, enhancing education delivery and access through digital advancements. This approach equips students with essential digital skills relevant to contemporary and future job markets, supporting lifelong learning and adaptability (Panciroli & Rivoltella, 2023).

This paper reports on the case study of the Digital4Business (D4B) project, which is part of the Digital Europe Programme 2021-2022. This Programme aims to provide funding for projects to ensure the widespread use of digital technologies in the economy and society. The focus will be on four key aspects of developing barrier-free, responsive, and future-oriented higher education (Schwittay, 2021). The D4B project exemplifies a transformative approach to higher education by aligning academic programs with the dynamic demands of the digital job market. Initiated in 2022, D4B incorporates real-world challenges into the learning process focused on key areas such as Digital Transformation, Artificial Intelligence, Cybersecurity, and Blockchain, ensuring that students gain competencies crucial for the digital economy.

The consortium behind the D4B project comprises 15 stakeholders from universities, research organizations, and industries. This collaborative effort facilitates the exchange of expertise and resources, promoting a knowledge-driven society. Online collaborative platforms play a crucial role in this process, enabling seamless communication and joint problem-solving (Zheng et al., 2023). The collaborative processes among these stakeholders are crucial in designing postgraduate training that integrates academic knowledge with industry practices, addressing the needs of the European labor market.

The primary objective of this paper is to present the D4B project as a model of integration and collaboration between universities and industries, where the Department of Education Sciences at the University of Bologna has significantly contributed by managing all pedagogical aspects related to the LMS platform. This ensures a pedagogical imprint on the teaching methods through the Trainer of Trainers Programme (TOT), aligning all who will subsequently create materials for their modules. Built upon the methodological framework of the BLEC model (Modenini & Rivoltella, 2012), the primary objective of the proposed teaching approach is to facilitate the swift adoption and efficient use of the project's digital learning platform from a pedagogical perspective using the following aspects:

- Blended Learning: the curriculum is delivered through in-person and online sessions, utilizing diverse teaching methodologies based on the Moodle platform (Panciroli, 2022);
- E-tivities: small, structured learning activities that guide and pace the learning process, ensuring continuous engagement and progress (Salmon, 2013);
- Coaching: a unique aspect is that coaching involves the presence of an expert who acts both as a tutor and a consultant. This expert provides external perspectives and guidance, helping learners navigate their learning paths and achieve their goals.

Innovating aspects of this didactic approach include:

- Comprehensive Training Materials: detailed guides, instructional videos, and best practice examples designed to be easily adaptable to various European institutions.
- Online Workshops and Webinars: these sessions provide hands-on experience with digital tools and cover topics from primary platform navigation to advanced teaching techniques.
- Interactive Learning Modules: these modules cover essential aspects of digital teaching, including course design, student engagement strategies, and assessment methods (Episode of Situated Learning – ELS, Rivoltella, 2013; 2023).

By means of the above-mentioned analysis and methods, this contribution focuses on the analysis of the cooperation processes between the 15 partners in the first year of activity, in particular in the design of postgraduate training based on the interdisciplinary approach that integrates the teaching and research competences of academic institutions with the practices and needs of industrial stakeholders within the transformations of the European labour market.

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ID 165

The Changing Perception of Artificial Intelligence in Future Teachers. A Two-Year Survey in Prospective Teachers' Students at University

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Abstract

Born in 1956, artificial intelligence (henceforth AI) reached the attention of the general public with the dissemination of large language models: the production of texts (e.g., Chat GPT) and images (e.g., Midjourney), to name a few. The widespread availability of these tools raises questions about the relationship between AI and education. It raises the need to understand how AI can be used to learn and how to train AI, both teachers and students. As the design of any training course requires, there is the need to understand how best to define practices, perceptions, levels of awareness, and teachers' expectations regarding AI training. In an exploratory survey conducted in 2023 on a sample of second-year students at the University of Molise, an unexpectedly marked gap emerged concerning declared AI knowledge on the one hand and actual levels of awareness on the other. In the face of high expectations regarding AI, even as a teaching tool, significant uncertainties emerged regarding its use in the everyday context, even before the professional context. Even though this outcome may be due to how AI works, this discrepancy deserves attention. The design of targeted training pathways, primarily linked to teaching and educational technology workshops, requires an adequate assessment of pre-knowledge and usage practices. Referring to a sample of second-year primary education students, we ran a second survey to verify the data that emerged last year, thus updating the design of specific workshop activities in the university curriculum to become teachers.

Keywords: AIEd, teachers' perception, teachers' training, university's curriculum

Artificial intelligence now has a long history: the term, first used in 1955 (McCarthy et al., 2006), was linked to reducing the world's complexity to symbolic, computable models. The element that has recently marked a disruptive change compared to the past is the availability of Large Language Models for the general public: the possibility of using - partly free of charge and without having any specific knowledge - generative artificial AIs capable of producing texts (Chat GPT, Gemini) and images (Midjourney, Dall E) has created great attention going far beyond the sphere of individual and specific scientific communities. The development of institutional interventions of a legal nature, as in the case of the European Commission (2021), is further proof of this. Turning to the relationship between AI and teaching/learning processes - a topic that, under the acronym AIED (Artificial intelligence in education), both in the Italian context (Panciroli & Rivoltella, 2023, Ranieri, Cuomo & Biagini 2023) and internationally, as recognised by bodies such as UNESCO (Pedro et al., 2019), is receiving increasing attention - a central issue is the promotion of forms of critical awareness in the belief that the development of AI should be human-controlled and centred on people. The first approach is to investigate how much and how AI is known and perceived by both teachers and those preparing to be teachers. Teachers' perceptions of technology have long been the subject of research (Cope & Ward, 2002). In the wake of this approach, several studies have examined the perceptions of AI by preservice teachers (Attwood et al., 2020) and teachers (Cong-Lem et al., 2024; Diliberti et al., 2024; Sanusi et al., 2024). Transversal to all the research is the conviction that if training courses on AI are to be proposed, as is appropriate, for future teachers, an effective connection must be found between what is known and practised on the one hand and what is proposed in terms of instructional design on the other.

In this context, initial research was carried out in 2023 with a sample of second-year primary education students at the University of Molise about their perception of AI (Bruni & Murgia, 2023)

and GPT chat (Murgia & Bruni, 2023). As a key finding, this research revealed a gap between stated knowledge about AI and awareness related to usage practices. Hence, the research must be repeated in the following academic year, again targeting second-year students. A self-directed structured questionnaire was administered using CAWI (Computer Assisted Web Interviewing) methodology, and 133 students responded. The first element to point out is the substantial reduction in the gap between knowledge and awareness of use: 96% of the participants declare they are familiar with AI, and 81.2% say they use some AI application. The special meeting with practical exercises in the educational technology laboratory was partially effective. The second element to be pointed out concerns the relationship between AI and its teaching potential. The emerging picture is articulated: the sample often seems divided between interest and fear, positivity and negativity. For example, regarding using a tool such as GPT chat at school, 42% consider it fundamentally helpful, and 57.6% consider it harmful overall. Regarding inclusion, the situation is also the same: 50% say it can be pretty valuable for inclusion as opposed to 46.2% who lean towards "I do not think so" and 3.8% who lean towards "no, absolutely not". From this perspective, a recursive approach to grasping evolutionary trends and an in-depth examination of the underlying perceptions are appropriate for designing appropriate training activities.

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Social Robotics in Hospitals and the Training Needs of Professionals. An Empirical Research Design

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The complexity of today's *onlife* reality, pervasively platformed and marked by the uncertainty of rapid and unprecedented global changes (Poli, 2019), requires not only performance-based skills (Kerr, 2020) but, more crucially, a renewed agentive mindset to address it responsibly, consciously, and ethically. Considering this, the current research project aims to explore the emerging and expanding social robotics technology within the delicate context of hospital care, primarily from an ethical, educational, and formative viewpoint. Specifically, the teleological focus is rooted in the exploration of the professions involved in these sensitive techno-relational interventions, capturing the training needs (in terms of professional learning) related to the ethics of *good care* (Mortari, 2015; Coeckelbergh, 2022) and a professional agency (Bandura, 2006; Biesta & Tedder, 2007; Kerr et al., 2020; Raffaghelli, 2022) capable of responding ethically, fairly, and consciously to the relational challenges introduced by human-technology interaction (Raffaghelli, 2022; Khun, Raffaghelli, 2023).

The narrative review and systematic literature review products developed by the authors have indeed highlighted a growing focus on the uses/abuses of social robotics. Yet, a unified research gap regarding the professionals handling such interventions and, most importantly, the existence of specific professional learning paths is found. Although the interdisciplinary nature inherently characterizing social robotics is emphasized (Rossi, 2019; Becchimanzi, 2022), the contribution of predominantly educational professionals is nearly absent from the literature, even within the hospital context where the concept of care transcends therapeutic boundaries to reach a space of good care, in which the educational relationship plays a central role.

In line with the ethical principle that technology is not inherently neutral but fundamentally depends on the quality of the socio-cultural context in which it is embedded (Cingolani, 2018-2019; Coeckelbergh, 2022), there is a recognized need to build environments of trust, clear agentive responsibility aligned with reliable human values (Floridi et al., 2018; Dumouchel & Damiano, 2019; Rossi, 2019). A fundamental step in this direction is to emphasize attention and care towards the dimension of professionalism, which plays a primary role in operationalizing social robotics interventions and, consequently, has an undeniable impact on their outcomes.

From this horizon of meaning, four main investigative macro-areas of the project are identified, establishing the framework for the empirical phase: (a) identifying the professionals involved in social robotics interventions; (b) the ethical potentials and concerns these professionals hold towards the use of social robotics in hospitals; (c) the existence of specific training paths and the professional learning needs of the professionals; (d) the significance of the educational figure as a professional involved in social robotics interventions in hospitals.

The general goal of the research project is to promote a formative and reflective culture in the use of social robotics within the hospital context, with particular attention to the ethical implications of *good care* and the challenges of educational agency for the involved professionals. From here, the specific objectives unfold as follows: identify existing professional learning lines and the configuration of professional teams involved in social robotics interventions in hospitals; intercept the professional learning needs, highlighting the critical-reflective and practical implications for professionals in using social robotics in hospitals; understand the relevance of educational professionalism in the hospital context that uses social robotics; sensitize the scientific community about the importance of ethical care and professional agency about technology, contributing to the construction of innovative training tools.
In coherence with the qualitative exploration and comprehensive deepening approach guiding the research project, the multiple-case study method was chosen (Trinchero, Yin, 2017; Creswell & Poth, 2017; Günes & Bahçivan, 2016). This approach allows for a deep understanding of a complex phenomenon through the analysis of multiple cases that may present significant variations and/or convergences: "a multiple-case study includes two or more cases or replications across the cases to investigate the same phenomena" (Lewis-Beck, Bryman & Liao, 2003; Yin, 2017).
The cases involved in the study are:

- University of Padova (Department of Women's and Children's Health), which foresees the use of social robotics in pediatric hospice care (UOC Pediatric Hospice)
- University of Modena and Reggio Emilia. At the University Hospital of Modena (PASCIA Center), the team coordinated by Prof. Maria Grazia Modena uses social robotics (NAO robot) with pediatric patients within the autism spectrum
- University of Genoa, which plans a trial of social robotics (Pepper robot) at the San Martino University Hospital in Genoa with patients admitted to the Departments of Acute Geriatrics and Orthogeriatrics.

The research phases involve four key moments, to be pursued in each of the hospital services involved: non-participant observation of a social robotics intervention; semi-structured interview with the reference figure of the service coordinating the social robot-patient interventions; focus group with the professional figures involved in the interactions of social robotics; final member-checking in terms of public engagement and transparency of the research. Each of these phases implies specific objectives, timings, and tools. In particular, a methodological note regarding the focus group phase: the guided discussion will be stimulated by a speculative scenario, establishing a continuity anchor with methodological reflexivity lines that have characterized the research project from the start: referring to the speculative method of Jen Ross (2016) and to Futures Studies, we recognize that "working with the future" (Poli, 2019) can unlock an innovative theoretical-operative educational approach to creatively address complex themes, in a collaborative and shared manner. The careful and rigorously future-oriented attention indeed aims to restore the present to an authentic value of educational action (Poli, 2019) aimed at "making a difference" (Ross, 2016), actively pursuing the underlying ethical purpose of *good care*.
Proposing the futuristic approach as a formative practice means creating a path of educational agency that diverges from a merely reactive modus operandi, recognizing the importance of stitching the continuity of educational practice according to an anticipatory and projective "what if" logic. The data collected during the four research phases will be subjected to thematic analysis. The open expectations of the research group regarding the results are aimed at an understanding of the professional dimension that, for each hospital case involved, is implicated in the delivery of social robotics interventions. This expected understanding specifically aims to: highlight existing training lines, intercept the training needs of professionals, emphasize the critical-reflective implications that the use of social robotics entails for professionals in a perspective of *good care*; highlight the practical implications that the use of social robotics entails for professionals in a perspective of good care; bring out convergences and divergences among the cases involved; understand the relevance of educational professionalism in the hospital context that uses social robotics; contribute to documenting the use of social robotics in hospitals from the perspective of professional dynamics; contribute to sensitizing the scientific community on the importance of

“caring for those who care” to promote authentically ethical and educational contexts in relation to technology; generate novel reflexivity and new perspectives of formative action (for example, the construction of innovative professional learning tools).

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School Curriculum and Artificial Intelligence: Analysis of Teachers' Uses and Representations through ESL (Episodes of Situated Learning) as a Projective Device

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The rapid integration of Artificial Intelligence (AI) into various sectors emphasises the collective responsibility of equipping future generations with the knowledge and skills to navigate an AI-driven world. In recognition of this shared duty, the University of Bologna, in close collaboration with the association Dirigenti Scuole Autonome e Libere (DiSAL), launched the pilot project "AI4S - Artificial Intelligence for School" during the 2023-2024 academic year. This project, according to a research-intervention methodology, aims to empower teachers to experiment with the ESLAI (Episodes of Situated Learning in AI) framework, a tool designed to facilitate the adoption of AI within school curricula (Panciroli et al., 2023). The ESLAI framework organises AI work in the classroom into three stages: (I) anticipation with AI; (II) production with AI; (III) reflection with AI. Anticipation involves using AI-based applications to explore topics in advance, generating summaries, and producing visual representations. The production focuses on using AI applications to support the creation of artefacts, such as texts, images, videos, and audio. Reflection involves critical analysis of the results produced with the support of AI and developing critical awareness of AI's use.

The project is structured into two distinct steps. The first one involves designing educational activities focused on Artificial Intelligence, conceived as Episodes of Situated Learning (ESL), following the theoretical model proposed by Pier Cesare Rivoltella in 2013 and further developed in 2023 (Rivoltella, 2013; Rivoltella, 2023). This part of the project aims to create and experiment with innovative teaching methodologies integrating AI to promote immersive and contextualised learning. The second step seeks to build an AI school curriculum across primary and secondary education levels.

The whole project has been monitored using research framework. In this paper, we aim to focus on the following research's core hypothesis: (I) explore the representations of the teachers involved in the experimentation about the innovation of teaching with AI and its impact on learning; (II) present the outcomes of the first step of the research.

Methodologically, we have codified the teachers' ESL projects and worked on them as projective devices (Panciroli & Rivoltella, 2023; Elliott, 2019). The intention was to assess which of the four dimensions of the ESLAI Framework they were focused on: literacy dimension (knowledge of language); critical dimension (conscious use); ethical dimension (reflection with responsibility); and expressive dimension (creation).

The design and/or implementation of 105 ESL using AI involved teachers from 25

schools throughout Italy, including primary, lower secondary and upper secondary schools.

An initial analysis of the data shows that 82 teachers (78.1%) designed ESL but had not yet experimented with them in the classroom, while 23 teachers (21.9%) put the designed ESL into practice.

To explore ESL as projective devices (meaning projects analysed to identify the representations that teachers have in using AI in education), the 105 ESL were analysed as follows: (I) the ESL were divided into their three main stages (anticipation, production and reflection); (II) for each stage, the use of AI applications, type and function was analysed; (III) for each activity in which AI was involved, the corresponding dimension of the ESLAI framework (literacy, critical, ethical, creative) was identified.

The relationship between the four ESLAI dimensions and the three ESL stages showed that in the anticipation stage, AI apps were most used by teachers to develop critical thinking (81.8%) and to create content (44.8%); of the few ESL that contemplated the adoption — at this stage — of AI by students (10.5%), most focused primarily on developing literacy skills (60%).

The production phase is the preferred moment to use AI (81%). 74.3% of these ESL envisage using AI by students, mainly to create artefacts (70.5%) and to support the development of literacy skills (23.1%). The restructuring stage saw many teachers not using AI (86.7%), noting that the few teachers who envisage AI (6.7%) made personal use of it. Of these, 85.7% adopted AI to create assessment and/or transposition tools. Students' use of AI in the restructuring phase is low (2.9%). Moreover, the restructuring phase presents a low level of activities aimed to reflect on the use of AI in the production phase, negating the development of critical thinking in the use of AI.

This data summary shows that, as highlighted by the ESLAI framework, the preparatory phase involves the use of AI-based applications to explore the field, lay the groundwork for subsequent activities, build a foundational literacy, and, from the teaching perspective, produce presentation materials for the activities. Similarly, the operational phase entails using AI to support the creation of artefacts, especially from the student's perspective. However, the restructuring phase does not directly involve AI, except as support in producing materials useful for evaluation. There is only a minimal presence of post-production reflection on the artefacts created with AI and the development of critical thinking using this technology. In this sense, the analysis of the 105 EAS represents teachers' projections regarding the use of AI in educational and/or school contexts.

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ID 168

Enhancing Design Pedagogy through Generative AI: a Theoretical and Practical Perspective

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Generative Artificial Intelligence (AI) emerges as a transformative catalyst in university education, promising to revolutionize teaching methods and personalized learning. This presentation explores innovative AI applications, from the creation of generative educational content to predictive analysis of student success, highlighting how these technologies can not only enrich the educational experience but also challenge existing pedagogical conventions. Through concrete examples and recent research findings, it will demonstrate AI's potential to facilitate a more engaging inclusive, and personalized learning environment in universities.

This presentation focuses on the application of AI generative tools as collaborative design partners for Master's students specializing in communication design. It builds upon the preceding research undertaken at the Department of Design at the Polytechnic of Milan and subsequently presented at ISYDE 2023. This exploration seeks to evaluate the efficacy and pedagogical implications of incorporating artificial intelligence in the creative process, positioning it as an integral component in the educational journey of communication design students. The study aims to bridge the gap between advanced technological tools and creative academic endeavours, emphasizing the transformative potential of AI in enhancing design education and practice.

The first part of the paper goes deeper in the genealogical history of Artificial Intelligence in Education (AIeD), presented last year. This exploration aims to delineate the ways in which AI can augment both the learning and research paradigms. The initial segment elucidates the capability of AI to sift through, organize vast datasets, predict and model future occurrences, streamline research methodologies, and tailor the educational journey to individual needs, as supported by the findings of Jordan & Mitchell (2015), Agrawal, Gans, & Goldfarb (2018), Chui, Manyika, & Miremadi (2016), and Baker & Siemens (2014). These functionalities underscore the potency of AI as an invaluable resource in optimizing the research and learning experience (Di Rosario, Ferri, 2023).

The second part describes and analyses two case-studies. Last year, an initial experiment was carried out with a class from the Faculty of Design at Polytechnic of Milan, which uncovered various methods and activities designed for assignment objectives within the Digital Culture course. In this context, students were tasked with creating ten digital culture products, utilizing Generative AI as co-designers. This experiment aimed to integrate advanced AI technology into the educational framework, providing insights into the collaborative dynamics between students and AI in the design process.

The ongoing research has been enhanced with the integration of another case study. In this case, particular emphasis was placed on the use of generative techniques in the development of programs and concepts that could be integrated into various types of monographic courses, from those dealing with media aesthetics to those concerning privacy and security. Students were asked to develop 17

monographic courses that encompassed theoretical and laboratory-based learning. The integration of artificial intelligence within these courses has been pivotal. It has facilitated the construction of course content and enhanced the verification of practices and scenarios wherein dynamics of experimental pedagogy involving AI in education are already in play.

Furthermore, artificial intelligence has been consistently employed to generate materials which were then scrutinized by student groups. This process has been instrumental in delineating the role of the designer and educator in relation to the role of the machine. It underscores a nuanced understanding of the interplay between human and artificial intelligence in the educational context, highlighting the evolving nature of pedagogical design in the age of digital technology.

In conclusion, this presentation traces the genealogical history of Artificial Intelligence in Education, and illustrates and analyses the expanding role of Generative AI in reshaping the landscape of higher education, particularly within the realm of design. Our exploration, grounded in empirical research and practical applications, focusing on the transformative impact of generative AI on pedagogical strategies and educational paradigms. The case studies presented serve not only as an example to the practical usability of AI in enhancing creative educational processes but also as an example for future pedagogical exploration and experimentation.

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Enhancing the CME-Continuing Medical Education: an Engaging and Effective MOOC Experience at the University of Turin

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Abstract

Online Continuing Medical Education (CME) offers an appealing and effective learning avenue, thanks to its accessibility and flexibility, allowing learners to engage from anywhere, at any time. Massive Open Online Courses (MOOCs), with their diverse content offerings including video lectures, interactive modules, assignments, and online discussions, have garnered significant interest in the health and medicine domain. As a result, reputable institutions increasingly offer MOOCs through various online platforms, both commercial and non-commercial. The University of Turin has been providing CME since 2013, offering a wide range of training programs hosted on the Moodle platform. In 2021, the University launched a MOOC "The Six Pillars of the UN Decade Against Malnutrition", developed by the e-learning team. This course, conducted in Italian, comprised eight modules with progressive access. Learners were required to complete a self-assessment test at the end of each module to advance to the next stage. To enhance course engagement, video animations and interactive activities were integrated as learning props. The MOOC commenced in November 2021 and concluded in November 2022, attracting 54,462 learners with a retention rate of approximately 77%. A Likert survey was used to gauge learner satisfaction, revealing overwhelmingly positive responses regarding the relevance of the topics, the quality of course instruction, and the value for lifelong learning.

Keywords: Continuing Medical Education, MOOCs, Lifelong Learning

Medical education is an arduous process with widespread study of very complex information across diverse subjects. In this regard CME- Continuing Medical Education bridges the gap between academic research and clinical practice, providing physicians with a well-balanced education consistent with the patient's needs and evidenced-based medicine [Setia et al. 2019] Two of the main issues of CME arise from the teaching methods used and from the access to training. In his review Bloom [Bloom, 2005] examined the effective teaching approach, from most to least, used to conduct CME. He reported that interactive techniques show the most effective results on improving medical education, while passive ones, such as didactic presentation, printed education materials, conference or other in-person meeting, demonstrated less beneficial effects. As for the access to training, fee, traveling cost and time consuming can exert a negative impact on course attendance. Online Continuing Medical Education (CME) offers an appealing and effective learning avenue, thanks to its accessibility and flexibility, allowing learners to engage from anywhere, at any time. Moreover, in the last years, technology improvement has allowed teachers and formers to create engaging and effective learning experiences.

Massive Open Online Courses (MOOCs) are a form of online learning where courses are accessible at little or no cost, without limits on participant numbers or prerequisites. Thanks to their peculiarities, such as the easy accessibility and capability, the availability of different contents (i.e. video lectures, interactive e-learning modules, assignments, online discussion, etc.), MOOCs have attracted interest both from universities and from businesses, particularly for adult lifelong

learning. As a result, reputable institutions increasingly offer, in the area of health and medicine, MOOCs through various online platforms, both commercial and non-commercial. The University of Turin has been a CME provider since 2013, offering a wide range of training programs hosted on the Moodle platform.

In 2021, the University launched a MOOC titled 'The Six Pillars of the UN Decade Against Malnutrition', developed by the e-learning team.

This course, conducted in Italian, comprised eight modules with progressive access. Learners were required to complete a self-assessment test at the end of each module to advance to the next stage. For the purpose of self-assessment, the multiple-choice Moodle quiz was selected. The eighth modules are: 1. The UN decade on nutrition: what is it and why?; 2. Sustainable and resilient food systems for healthy and environmentally friendly diets; 3. Aligned health systems ensuring universal coverage of essential nutrition actions; 4. Social Protection and Nutrition Education; 5. Trade and investment to improve nutrition; 6. Creating enabling environments for local food systems, including fostering breastfeeding; 7. Review, strengthen and promote "Governance" in nutrition; 8.The Mediterranean diet: an age-old example of healthy and sustainable nutrition.

Each module starts with a video introduction. In order to make the course more appealing and incentivize attendance, the animation format was chosen: two avatars, a doctor and a dietist accompany the learners along the learning path. Other learning props were produced by using H5P, an external plug-in integrated in Moodle. Among the resources available inside H5P, the ‘Course Presentation’ and ‘Interactive Video' were chosen because it enables users to create interactive props. The former was created integrating slides with audio and multiple-choice quizzes, the latter was used to introduce the case study of three patients.

The MOOC commenced in November 2021 and concluded in November 2022, attracting 54,462 learners with a retention rate of approximately 77%. A survey based on Likert-scale questions [Likert, 1932] each including a 5-point range – was devised with the aim of measuring the learners’ satisfaction. The survey was completed by the 71,52% of the learners revealing overwhelmingly positive responses regarding the relevance of the topics, the quality of course instruction, and the value for lifelong learning. Concerning the relevance of the topics the 98,72% of learners answered that it was from relevant to very relevant, on the educational quality the 90,36% of participants thought that it was from good to excellent and regarding the usefulness the 99,20% of learners found that it was from useful to very useful.

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ID 170

Teachers' Perspectives and Challenges in Inclusive Education: Insights from IA-ME Project Focus Groups

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Extended Abstract

The European Project IA-ME (Innovative methods and Artificial Intelligence in MOOC for special needs teacher Education) aims to support teachers in inclusive education by introducing a technological tool guiding them from evaluation to the implementation and monitoring of individualized educational plans for Special Educational Needs (SEN) students. The project encompasses 5 work packages with initial findings stemming from focus groups conducted across all IA-ME partner countries (Italy, Hungary, Spain, Greece, Turkey). Focus groups are a well-established method in educational research, offering realistic settings where participants can interact, influencing and being influenced by each other (Casey & Crueger, 2000). Our focus groups were designed to collect teachers' views and practices on using technology to enhance inclusive education. Each partner country led two focus groups in various schools including public, charter and private institutions. A total of fifty-two teachers (Female: 43; age range: 24-62 years), belonging to primary and middle schools, actively participated in all sections. The sample included 16 general and 16 SEN teachers, while 20 teachers fell into both categories, with professional experience ranging from 2 to 37 years. Before the FG, participants were asked to complete the MyDigiSkills questionnaire (https://mydigiskills.eu/it/), to evaluate their digital competencies.

Teachers from each partner country answered 14 questions, led by a moderator with two observers. For each focus group, a thematic analysis was carried out by each partner research team and results were summarized into a unified report. Here, we focused on 7 questions out of the initial 14 questions, selecting those that aroused the most interest and garnered significant responses across all partner countries. In particular, we explored: the concept of inclusive teaching by teachers, their experience in using inclusive practices supported by technology, expectations about the potential of technology, the degree of flexibility in the integration of technology, and the obstacles and facilitators encountered in their daily practice, and the type of Educational Technology (ED-Tech) frequently used. Finally, we addressed the possible use of technological tools for the drafting of Individualized Educational Plans (IEP).

A common vision emerged for the concept of inclusive teaching, stressing the importance of adapting and personalizing teaching catering to students' needs. The findings suggest that technology integration not only boosts student's motivation and enhances educational

pathways, but also provides critical support for teachers in lesson preparation. Indeed, teachers believe that technology could represent a useful resource for personalizing educational paths and preparing interactive and engaging teaching materials. Moreover, the discussions underscored the need for extremely flexible teaching practices to incorporate new technologies, although time constraints pose a significant barrier to acquiring the necessary technological skills. However, participants highlighted several obstacles in their daily work, including insufficient technological training and inadequate infrastructure to integrate.

The Ed-Techs frequently used by teachers relied on: evaluation and feedback systems (e.g., Kahoot, Quizziz, Mentimeter), learning platforms (e.g., Wordwall, Youtube), and software creation of educational content (e.g., Canva, Mindomo).

Notably, all partner countries, except Italy, reported to use technological tools to create Individualized Education Plans. Despite this, there was a strong interest among all focus group participants in employing technology to develop these plans, albeit with concerns about maintaining empathy and direct contact with students and their families.

To conclude, results highlight a keen interest by teachers in the use of technologies within their daily work. Teachers view technology as a supplementary tool that enhances personalization and inclusivity within the educational environment, rather than as a replacement for traditional teaching methods. To fully leverage technology in creating a cutting-edge, equitable and inclusive school environment across Europe, further efforts are needed to assess and address the obstacles and resistances encountered.

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ICF and Artificial Intelligence: Personalisation Techniques from an Inclusive Perspective in the Asklea Chatbot

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Abstract

In recent years, the topic of artificial intelligence (AI) has gained increasing importance in research and applications, also in the educational and didactic sphere. One of the aspects investigated in this field is the evaluation of the impact of devices incorporating AI components on learning processes and inclusion, within innovative educational contexts. Analysing the case of conversational chatbots, the report will highlight how such devices are still not designed for interaction with pupils with special educational needs, and even more so with disabilities, excluding them from use and in fact constituting a barrier from an inclusive perspective. In order to intervene on this aspect, IRCIT(International Research Center for Inclusion and Teacher Training) and the company Talent (a training organisation accredited by MIUR and active for years in the field of technological research) have undertaken a collaboration aimed at creating a conversational chatbot capable of interacting with students with all types of functioning: through specific prompt engineering techniques applied to the system message and based on the ICF coding found in school documentation, IRCIT and Talent are working on the development of AskLea, a chatbot capable of adapting communicated imagery, ways of expressing oneself, types of concepts, vocabulary, syntax and emotional tone to the functioning characteristics of different disabilities. In this way, this tool can be used within inclusive and special education, to allow pupils with disabilities to use it directly - and not through the support teacher - in the teaching-learning processes addressed to them.

Keywords: Artificial intelligence, chatbots, personalization, inclusive education, ICF.

Artificial intelligence is becoming increasingly pervasive in our society, significantly influencing the way we inform ourselves and make decisions. It is therefore natural that its presence and use is also extending to the educational context. Students and teachers are making increasing use of such systems, sometimes without being aware of it; search engines, machine interpretation and translation, navigation apps, image analysis and facial recognition systems, intelligent assistants and many other various applications used in everyday life rely on the use of AI. As Rosemary Luckin of University College London (2017) writes, there are two main dimensions that need to be explored, regarding AI and education:

1) how can AI improve education and help us address some of the big challenges we face?
2) how can we educate people about artificial intelligence so that they can benefit from it?

It seems relevant, therefore, to understand how artificial intelligence can help improve teaching and learning processes by intervening to support the process itself. The various themes mentioned lead towards an important reflection on «how necessary it is to educate for a conscious use of AI, so as to know its potential and not remain at the mercy of a consumer technology, dictated by market laws and not by pedagogical choices» (Fiorucci, 2023, p.12). There are many ways in which artificial intelligence can intervene in the learning process of human beings; among the many functions that AI can perform in education is personalised tutoring through conversational chatbots, software that simulates and processes human conversations (written or spoken) allowing users to interact with digital devices as if they were communicating with a real person. The advancement of these new social agents in human interactions and educational contexts appears to be one of the fields in which AI is advancing

considerably, posing quite a few ethical questions to the scientific community about their use. The advent of conversational chatbots in educational contexts offers important opportunities in the world of education, favouring feedback and individualised support to students, adapting the contents and pace of learning according to their needs and level of comprehension (Di Tore, 2023). Despite the high potential of such systems, the figure of the teacher must maintain its fundamental centrality in teaching-learning processes, both in traditional practice and as a key intermediary in the design of artificial intelligence systems, generative and not substitutive, effectively useful in the educational sphere. Through generative AI tools, including those aimed at text generation, conversational chatbots represent a new educational challenge, capable of guiding the learner in his or her learning experience within a learning- by-teaching setup. However, most AI-based systems do not guarantee a high degree of accessibility, as they are not conceived and designed to interact with all different types of human functioning. In today's educational landscape, inclusion is a central theme and technology, and more specifically new AI systems, play a key role in making it a reality. The development of the conversational chatbot AskLea, born out of the collaboration between the IRCIT research centre and the Talent company, opens up new frontiers in this field, proposing an innovative approach that gives accessibility and active participation to teaching-learning processes in a truly inclusive perspective.

AskLea is based on precise educational and pedagogical principles: through the deployment of personalised tutoring, it does not solve exercises or generate solutions for the student, but stimulates him/her in the development of his/her own thinking, proposing questions and providing support in his/her personal learning process; this not only enables the acquisition of new content, but also allows the student to actively rework it, deepening his/her understanding. But how to make the AskLea chatbot a highly personalised tool to ensure that all students, including those with Special Educational Needs or disabilities, can use it in a fully accessible manner? In structuring a conversational chatbot from an inclusive perspective, it is necessary to adapt the physical characteristics, communicated imagery, communicative styles, types of concepts, vocabulary, syntax and emotional tone to the functioning characteristics of the person using it. The use of such customisations can only be based, necessarily, on accurate and centred descriptions of the actual functional characteristics of that particular student with disabilities or other BES; descriptions that must, moreover, be both reliable, i.e. from competent people, and readily available. Since ICF profiles use a standardised and unified language with codes and descriptors centred on detailed elements of functioning, the research centre (IRCIT) has identified a potential synergy between the conceptual universe of the ICF and the interactivity of AI-based systems. By acting on the system engineering prompts, i.e. the hidden instructions that are provided to the AI model in a special (system) interface, it is possible to set the mode of interaction between the chatbot and the user. Within AskLea, these specific ICF-based prompts will be implemented by the teacher himself through a rigidly defined and structured graphical interface, where the student's specific functioning data can be easily entered; these will complete the system's prompt, which in turn will set up the interaction between the virtual assistant and the student with disabilities in a personalised manner. Importantly, a correct and detailed description of functioning through the ICF allows for a more appropriate response of the artificial intelligence model. The chatbot based on an AI system, personalised in this way, is a valuable support for both the student with a disability, in his or her learning process, and for teachers by allowing them to programme learning experiences that enable students to be creative, develop critical and conscious thinking, solve real-world problems and collaborate effectively, as well as provide learning experiences that AI systems alone would not be able to produce.

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ID 172

A Mixed Quanti-Qualitative Study in Anti-Doping Digital Intervention: the Animate Project

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The use of Performance Enhancing Drugs (PEDs) or methods to improve sport performance is a pervasive phenomenon, involving also young athletes. Anti-Doping Rule Violations (ADRVs) Report shows that out of a total of 149.758 samples collected by ADOs in 2020 and subsequently analyzed by WADA-accredited laboratories, 1.007 samples (0.67%) were reported as Adverse Analytical Findings (AAF). Of these, 672 samples (66%) resulted in ADRV (with consequent sanctions; WADA, 2023). The doping phenomenon is a problem concerning not only sporting ethics, but also public health (Lucidi et al., 2017).
A pioneering scientific meta-analysis revealed that the strongest psychological predictors of doping are social-cognitive constructs, such as motivation and self-efficacy (Ntoumanis et al., 2014). For this reason, to increase the effectiveness of educational interventions, it has been noted that it is not enough to rely only on methods that provide information on the risks and consequences of using PEDs to reduce cases (Ntoumanis et al., 2014), but it is important to understand the psychological factors associated with doping (Lucidi et al., 2008; Mallia et al., 2013; Barkoukis et al., 2011).
Furthermore, a new paradigm has been structured, showing the importance of values in terms of "clean identity of the athlete" (Petroczi et al., 2021).
This recent anti-doping literature has focused on prevention approaches as promoting clean sporting behaviour, considering how values are indirectly linked to behavioral intention and behavior exerting an influence on the individual's reasons for acting (Westaby, 2005).
The increase in the use of new technologies in the educational field represents an important challenge to make the user more active during the learning process and for greater effectiveness of interventions (Vlachopoulos et al., 2017). In this regard, the World Anti-Doping Agency (WADA) has implemented an Anti-Doping e-Learning (ADEL) digital information platform in order to promote clean behaviors. Our study aims to develop, implement, and evaluate a digital anti-doping intervention targeting psychological mechanisms (e.g., motivational, and social-cognitive variables), through a dedicated web platform and specific learning digital objects (i.e., synchronous lessons, video clips, serious games, and interactive forums of discussion).
The present contribution shows the preliminary results of the “Animate” project funded by WADA, focusing on qualitative-quantitative data to develop a digital anti-doping intervention.

The project is a longitudinal controlled study, based on the Self-Determination Theory (Deci, & Ryan, 2012), for the analysis of motivational processes; the theory of Planned Behavior (Ajzen, 1991), and the Social-Cognitive Theory (Bandura, 2001). The project’s aim is to test the efficacy of a serious game in influencing clean sports behavior, comparing it with the standard face to face interventions. In this phase of the project, a qualitative analysis was conducted through three focus groups with 21 young athletes in total. The content analysis served to structure the main themes of the serious game. Furthermore, a quantitative analysis (i.e. screening survey on athletes) was implemented to investigate the socio-cognitive variables (e.g. motivation, self-efficacy, moral disengagement) related to the clean athlete behaviors. Both investigations were aimed to inform the developing of the digital serious game.

Participants of the focus groups reported that young athletes strongly promote clean behaviors, recognizing the use of doping substances as a risk to their health. The recurring values identified were discipline, respect, socialization, honesty, sacrifice, tenacity, consistency, and respect toward teammates, opponents, and coaches. Athletes thought that these values can be applied equally to both sports and personal life. They reflected on the fact that these values are also shared by elite athletes. In particular, young people believe that sports values are a trait of the athlete very difficult to change. Subsequently, some reflections related to doping also emerged, which concern more how the environment surrounding elite athletes and the system in which they are inserted, linked to their fragility (e.g., low self-esteem), can make them "collapse."

From the screening survey data, we tested a mediation path analysis model, the results showed that among all the predictors of doping intention (moral identity, moral disengagement, attitudes toward doping and self regulatory efficacy), attitudes and self regulatory efficacy showest the strongest effects ($\beta = .47$ $p = < .001$; $\beta = -.01$ $p = .335$ respectively), furthermore moral identity showed an significant indirect effect on intentions trough the mediation of attitudes toward doping ($\beta = -.09$ $p = .47$).

The results, from both investigations, allowed the development of a serious game on a moodle platform. Specifically, the serious game simulates real-life situations, educating users on recognizing psychological mechanisms underpinning clean sports behaviors. The story takes place in five environments; some contain clickable objects that present information useful for the story's plot (training tables, newspapers, and more). The variables analyzed (self-efficacy, attitudes, behavioral intentions, moral disengagement) are "masked" within the serious game through multiple questions (at least 3) and each choice is associated with certain scores.

The effectiveness of the intervention will be evaluated through a comparison between pre-intervention data and post-intervention data, also considering the scores expressed within the game.

Overall, the study's results could highlight the psychological mechanisms and processes associated with the decision-making process regarding doping and how education can promote clean behavior. The development of a serious game or digital learning objects is in this direction. These approaches can be considered a different and innovative new approach in anti-doping education by engaging, educating, and inspiring young athletes to embrace clean and ethical behavior in the world of sport.

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Digital Technologies, Resources and Strategies at the University of Milano - Bicocca: an Overview from the Backstage to the Exam

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Abstract

Digital education should take into account the heterogeneity of teachers, students and subjects. In order to include all of these aspects, a proper didactic design should begin from the lecture room, through the supporting technologies, resources and strategies. Herein we will present the background inspiring the design of the lecture rooms at the University of Milano - Bicocca with technologies able to support the teaching/learning process whatever the mode of delivery (classroom-based, distance learning, e-learning), suitable for different subjects, teachers and students. The classroom is a responsive environment where the teachers may display on the widescreen among others slides, audio/video contributions and through the connection to the document camera paper materials, models, geological/archeological specimen or a combination of materials, even extending the audience beyond the physical limits of the classroom. The technology is strictly interconnected with the moodle platform, making it possible for the teacher/student to continue the teaching/learning process through distance e-learning. The classroom-based activity can be recorded and uploaded (and edited) on the e-learning platforms, supporting the individual study. The moodle platform can be further enriched with slides, documents, quizzes, engagement activities, video-pills of selected topics, web resources, exam simulations and forum for a continuous teacher/student interaction. If the assessment method includes tests and project/work writing the moodle platform is exploited also for exam conduction. Applications of all the above mentioned technologies, resources and strategies will be exemplified for chemistry courses in B.Sc (200 students) and M.Sc. Degrees (100 students).

Keywords: e-Content Management and Development, e-learning, DEI (Diversity/Equity/Inclusion) in Digital Education, digital technology, university

Education can be thought as a multifaceted polyhedron including (but not limited to) several aspects such as environments, resources and tools, strategies and methodologies; all of the "polyhedron faces" comes into play in a strict interconnected way and they should be carefully considered while designing the teaching activities towards an effective learning process. One face of the polyhedron which is emerging with more defined edges than in the past is emotional fragility and special educational needs and disability (SEND); emotional immaturity and fragility, anxiety, depression, and stress, minor resilience are featuring today's students more than their predecessors. The debate if these issues reflect an increasing trend or are "simply" the result of a growing awareness and a shift in attitudes toward psychological problems and their public disclosure is still ongoing (Dweck, 2017).

In this framework, the student-centered learning paradigm is not sufficient any more to support the instruction process. A strict interconnection, mutuality and reciprocity among teacher and students, collective involvement, and bi-lateral learning are a frequent unmet need (hook, 1994).

In the last decades we're experiencing an unprecedented development of digital technologies that can be exploited both by the teachers and by the students, being a key support. We may assume that nowadays digital technologies and tools are one of the several faces of the

educational polyhedron: they definitely encompass the heterogeneity of students (and teachers), enlarging the boundaries of inclusive teaching and learning.

In order to take plenty advantage of the digital technologies in the teaching/learning process, the design should start from the "backstage", that is the identification of the technological and staff infrastructure able to afford a ready-to-use didactic environment suitable for teaching/learning whatever the mode of delivery (classroom-based, distance learning, e-learning), and fitting different subjects, teachers and students.

The staff at University of Milano–Bicocca identified the lecture room as the central node for the didactic support, design and implementation: a "plug-in" lecture room for every teacher, student, subject, teaching methodology (blackboard, slide and video projections, document camera display on the widescreen of paper materials, models, geological/archeological specimen or a combination of materials, even extending the audience beyond the physical limits of the classroom), mode of delivery, facilities (microphones, audio systems, camera, wi-fi projections, combination of different projection sources, i.e. slides and document camera material or video from a different location, touch digital ink whiteboard, recording of the lecture and projected materials, room combining). The node is not only supporting the teaching process in the lecture room, but it is the starting point from which the teaching process can be redirected to individual learning. The Kaltura platform guarantees the interconnection between the "lecture room consolle" and the e-learning system (LMS – Moodle), with the complete automation of the processes the teacher finds the recording in his/her personal profile and has just to make it visible to students (if desirable). All of the classroom-based activity can be recorded and uploaded (and edited) on the e-learning platforms. The "analytics" functionalities allow the teacher to analyze visualization and interactions by the students. The same can also be done with autonomous video recordings made on personal devices.

The Moodle platform can be further enriched with slides, documents, quizzes, engagement activities, video-pills of selected topics, web resources, exam simulations and forum for a continuous teacher/student interaction. If the assessment method includes tests and project/work writing the Moodle platform is exploited also for exam conduction.

The use and the added value of lecture recording, interactive quizzes (Wooclap) will be presented as tools for the chemistry course for M.Sc. students (100 students), including non native italian speakers, and visually impaired students. The use of combined sources in the classroom, quizzes and forum for individual study support will be exemplified for chemistry courses in B.Sc (200 students).

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ID 174

Balancing Innovation and Integrity: the Dual Role of Generative AI in Transforming Journalism, a Systematic Literature Review

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Artificial intelligence (AI) has been utilized in journalism for about a decade. The Associated Press, one of the world's leading news agencies, introduced it in 2014 for economic data collection. Subsequently, other media, both digital and traditional, began automating news in various areas beyond the stock market and financial data, such as sports results and weather conditions (Broussard et al., 2019). Over the years, there has been a gradual and continuous increase in the adoption of AI-based systems in various journalistic processes: from information analysis to data processing and content searching. The spread of generative AI based on NLP models, which began with OpenAI's ChatGPT in November 2022, has led to an acceleration promising to transform journalism, the role of journalists, and the production of news, images, and videos. It is also likely to affect the organization of editorial work. Global editorial groups like BBC, Reuters, NYT, and Financial Times have transparently announced the formation of task forces within their organizations to integrate this technology into journalistic information production processes. The integration of Generative AI into journalism represents a pivotal innovation that promises to transform news production, the role of journalists, and the overall information ecosystem. This systematic literature review (SLR) seeks to address two main research questions: RQ1: How can the adoption of Generative AI balance innovation and integrity in journalistic practices? RQ2: What is the current state of AI literacy among journalists, and how can it be improved to ensure the responsible use of AI technologies in journalism? The primary objective of this study is to investigate whether journalists' digital and AI-related competencies can keep pace with the rapid development of new technologies, which are often perceived as irrelevant to their work, especially by older generations, or viewed solely as work tools. This research aims to provide a comprehensive, multidisciplinary, and cross-cultural overview of the rapidly changing global landscape, identify the critical issues related to the use of AI in journalism, focus on the most controversial and significant topics in news production, outline future challenges, and suggest further areas for research. Using the digital academic database Scopus, scientific articles from 2014 to April 2024 were collected and cataloged, containing terms such as "GenAI and Journalism," "artificial intelligence and journalism," "automating news," and "robot-journalism." The final search was set up with the following Boolean logic: (journalism AND artificial AND intelligence OR chatgpt OR disinformation OR ai OR generativeai). Out of 448 articles, those related to a specific historical period (Covid-19), specific case studies in medical, legal, or other specialized fields, and those not representing general themes were excluded. Thus, 286 articles were analyzed and divided into eight categories: Automating (42%): Transformations in the process and product of news creation. Sentiment (15%): Perception and attitudes of journalists and readers towards AI and Generative AI Disinformation and Fact-Checking (15%): Production of fake news, photos, and videos, as well as the potential for verifying news accuracy. Ethics and Regulation (9%): Topics like transparency, accountability, guidelines, and the need for regulations. Data and Digital Journalism (7%): Datafication and AI in news production. Training (4%): The need for AI literacy among current and future journalists in the face of rapid changes exceeding learning times. Strategy and Tools (4%): Development of Generative AI and AI tools in case studies deemed interesting. Systematic Review (4%): Previous research. Additionally, a database with over 300 articles published in international media, from late 2022 to April 2024, was analyzed. This database is available on the Slack platform of "Journalist AI Connect," a community of over 1400 journalists encouraged by the London School of Economics and Political Science, where professionals exchange ideas and practices on AI and the development of Generative AI in journalism. The automatic generation of news occurs in various directions and heterogeneously. Algorithms can be used for personalizing and optimizing news distribution (Shin, 2024), collecting news, rewriting, or summarizing texts (Gutiérrez-Caneda et al., 2023), writing brief reports on football matches, or employing virtual assistants for content search (Rojas Torrijos et al., 2019). Automating routine content, as per Associated Press practices, frees up 20% of the workforce for more exclusive and rewarding activities, such as finding unique stories or in-depth reporting (Diakopoulos, 2019). Although mainstream media are deepening their use, Generative AI is still infrequently used to write longer, complex texts for direct publication. Where it is used (especially local media), the limitations of the technology, prone to frequent hallucinations, have been highlighted (Pavlik, 2023). AI and Generative AI tools available to journalists are useful for summarizing texts, retrieving information, understanding data, and creating structures. Spanish television RTVE even carried out a pilot project for the 2023 municipal elections with automated writing,

transforming election results into news without human intervention (Aramburù Moncada, 2023). Journalists' attitudes and perceptions of Generative AI technologies are controversial. On one hand, the benefits are recognized when the tool is harmonized with traditional journalistic practices. On the other hand, skepticism persists about the future impact of automation on job security: many professionals fear increased unemployment and reduced opportunities for creative and investigative journalism, worrying about losing the profession's identity (Lewis et al., 2019). The main issues emerging from this research concern ethical and legal questions and the risk of weakening democratic processes due to lack of transparency and potential bias. The discussions emphasize the need for regulation to prevent the misuse of AI and Generative AI. While there is concern that the ability to generate images and videos may increase fake news and disinformation, paradoxically, the same AI can become the best antidote against false news or propaganda. An example is the New York Times analysis of Gaza bomb craters, guided by AI and coordinated by expert journalists, which contradicted the official version of the Israeli army. AI and Generative AI can be a valuable support for journalists, contributing to a more robust information ecosystem. However, this requires a critical application of technology, adherence to specific ethical guidelines, and, above all, adequate AI literacy and training for journalists to increase their digital competencies. Ensuring the responsible integration of AI in journalism is a more important challenge than merely using various tools. Additionally, there is a need for continuous monitoring of AI's impact on journalistic practices and democratic processes and exploring new AI applications in news production.

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ID 175

Interacting with AI: Prompt Engineering as a Digital Competency for Teachers

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Abstract

Conversational AI systems based on large language models (LLMs) have been popularized with the emergence of ChatGPT. By leveraging natural language processing, interaction with AI systems is made intuitive, and chatbots and AI assistants can be found anywhere online. Many articles, courses, and tutorials on tailoring the best-performing prompts have been produced for the most diverse kinds of audiences, including teachers and educators. Since LLM-based chatbots seem to be featured in several aspects of postdigital society, including formal, non-formal, and informal education, this paper aims to present the first results of an ongoing narrative review of academic articles on prompt engineering definitions and strategies. Secondly, it discusses prompt engineering from the perspective of teachers in educational contexts characterized by superdiversity, such as teachers of adult students with migratory backgrounds. Prompt engineering can be framed within the European Framework for the Digital Competence of Educators (DigCompEdu) as an emerging digital competency related to AI and Digital Citizenship Education. Teachers' training in this digital competency must deal with the obstacles for non-expert users of prompt engineering and the specificity of communication when interacting with an AI system.

Keywords: prompt engineering, digital competence, superdiversity, teacher training, artificial intelligence

Introduction

LLMs are a type of generative AI that leverages deep learning techniques to process and generate natural human language. They can integrate various data types to perform multimodal tasks, incorporating texts and additional modalities, such as videos and images (Milana *et al.*, 2024, Cain, 2024, Qi *et al.,* 2023). Multimodal LLMs are often used as conversational agents, where interactions are driven by user input and the model generates responses based on patterns in the pre-training and the contextual information from the user's input. These AI tools do not understand language or context in the human sense since LLMs' output is not the result of the cognitive processes typical of the human mind; they are statistically informed predictions and combinations of textual and multimodal data (Cain, 2024, Floridi, 2023). To bridge this gap in the interaction between multimodal LLMs and human users, it is necessary to consider that users are most likely non-AI experts (Zamfirescu-Pereira *et al.,* 2023) or novice users of such technologies. They might need to be made aware of the differences between human and artificial communication (Esposito, 2022). Hence, users' inputs must be carefully crafted to steer LLM outputs, benefit from the models' capabilities, and prevent hallucinations (Wang *et al.*, 2024). The design techniques of natural language for the interaction with LLM AI agents go under "prompting" or "prompt engineering". Acquiring solid competence in prompting AI tools based on LLMs is likely to become an essential requirement for many professionals, including teachers. In the context of teacher training in digital competence and AI literacy (Vuorikari *et al.*, 2022, Long & Magerko, 2020), prompt engineering is emerging as a new digital competence for teachers within the European framework of DigCompEdu (Korzynski *et al.*, 2023, Redecker & Punie, 2017).

Materials and Methods

Academic literature about "prompt engineering" or simply "prompting" has identified many techniques and strategies for helping users prompt multimodal LLMs. Definitions and key features of prompts were identified by selecting and comparing the most relevant articles on prompt engineering as a digital competence for non-AI experts, specifically within the context of education and teacher training in digital competence, as a part of an ongoing research project. The review did not aim to be exhaustive but to gather prominent knowledge about prompting as a teacher's digital competency.Results

A prompt is defined as a set of instructions provided through natural language-based sentences or fragments to an LLM to customize its output and enhance or refine its capabilities. These instructions can be descriptions, commands, or inquiries. They also include users' indications about conversational styles, roles, and expectations about the output the AI agent should generate. (Cain, 2024, White *et al.*, 2023). Prompt engineering is defined both as a technique for strategically designing human-AI agent interaction and an art of skillful prompt construction for LLMs, which often require clear and explicit guidance (Wang *et al.*, 2024). Various strategies can be implemented to achieve better outputs, providing the LMMs with explicit information that might be implicit for the human user. Prompt patterns (White *et al.*, 2023) are suggested as reusable solutions to specific problems, offering a codified approach to customizing or constraining the output and interaction, although they are limited to textual interaction. Guidelines for crafting effective prompts for multimodal LLMs include the definition of some essential elements, such as goal, context, expectation, and the specification of the source of information, the steps required to perform a certain task, or samples related to the output. Other common indications focus on the AI agent's role, capacity, personality, and some important features of the user's input, such as how to provide details about the task to be performed or restrictions and limitations for the output. It emerges that prompting implies a balance between specific and general instructions and a description of the context in which the output will be implemented. Moreover, for the accomplishment of high-quality tasks, it is required that the human user is engaged in a constant critical evaluation of both outputs and inputs, which undergoes planning, design, testing, and subsequent refinement (Cain, 2024).

Conclusion

Contrary to what non-AI expert users might naively suppose, prompting is not a linear process but an iterative design process. The user's knowledge and critical thinking are essential for achieving the desired outcome and fostering a positive use of AI tools. The descriptions of successful prompting strategies offer some guidance to the users, yet artificial communication reveals a strong need for human contextualization. In education, designing teacher training should be based on active collaboration between AI experts in artificial communication and teachers. Teachers are responsible for contextualizing AI tools adequately to the educational needs and the superdiversity of their classrooms (Pasta & Zoletto, 2023, Zoletto 2023). Training in prompting competence can benefit from teachers' previous pedagogical knowledge: task analysis from inclusive pedagogy seems suitable with the deconstruction of human cognitive processes and the description of the task; Hymes' SPEAKING model from second language pedagogy provides a comprehensive reference for analyzing human communication and enhancing its adaptation for the LLMs. Finally, prompting can be considered a transversal competence within several areas of teachers' digital competence, such as professional collaboration, reflective practice, selecting and managing digital resources, guidance and collaborative learning, actively engaging students, and information and media literacy. More broadly, prompting competence contributes to the acquisition of a New Literacy (Rivoltella, 2020), which is fundamental to fostering Digital Citizenship Education in the postdigital society (Pasta & Rivoltella, 2022) and enabling students and teachers to become critical consumers, responsible producers of digital content and active designer of social futures, rather than being just passive consumers whose human experience is datafied for commercial practices.

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In writing this piece, I used Grammarly (1.69.2.0) and ChatGPT 4o to improve the linguistic presentation of my thoughts, yet I took full responsibility for the content.

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ID 176

A Video-Annotation Tool to Enhance the Students to Teacher Response

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Abstract

The popularity of video-based learning (VBL), exemplified by pedagogical strategies such as the flipped classroom, has become increasingly pervasive. However, this surge presents inherent challenges due to the spatial and temporal separation between learners and instructors. The lack of questions and comments, as well as the absence of direct observation of visual cues, such as students' facial expressions and body language, poses a significant obstacle for educators in assessing levels of learner engagement, attention, and comprehension. To address this challenge, we propose Evoli, a video-annotation tool designed to gather diverse types of data to enhance teacher awareness. Evoli enables instructors to share educational video that students can annotate with questions and comments. Furthermore, Evoli prompts students to provide anonymous feedback on various aspects of their learning experience, such as their level of understanding of the video, the perceived difficulty and a self-assessment of their prior knowledge of the subject. Evoli also collects learning analytics on video viewing activities, allowing the platform to reconstruct viewing patterns and identify different learning strategies. This data is used to build a learning engagement profile for the whole cohort as well as for each student, which is presented to instructors through detailed learning dashboards at three levels of granularity: video, learning unit, and course. The objective of Evoli is to address this "teacher awareness deficit" by assisting educators in understanding students' difficulties and consequently optimizing in-person sessions.

Keywords: Teacher Awareness, Video-Annotation Tools, Video-Based Learning, Learning Analytics, Learning Engagement

Extended Abstract

The popularity of video-based learning (VBL), exemplified by pedagogical strategies such as the flipped classroom approach, has become increasingly pervasive (Sablić et al., 2021). However, this surge presents inherent challenges stemming from the spatial and temporal separation between learners and instructors. The lack of questions and comments, as well as the absence of direct observation of visual cues, such as students' facial expressions and body language, poses a significant obstacle for educators in assessing levels of learner engagement, attention, and comprehension. Consequently, these challenges contribute to a phenomenon that we may call "teacher awareness deficit," signifying the difficulty encountered by educators in accurately discerning the extent of student engagement within the context of video-based learning. To mitigate this challenge, we propose the development and utilization of a video-annotation tool (VAT), called Evoli, aimed at gathering diverse data types to facilitate teacher awareness. Therefore, the central question addressed in this paper is: "How can teacher awareness in video-based learning be supported by a VAT?"

A VAT is delineated as an online or offline application that enables users to annotate specific segments of video content and provide reflections by incorporating written, spoken, or visual comments pertaining to those segments (Evi-Colombo et al., 2020). Evoli is a video-annotation tool that allows instructors to share their video content in an organized structure (Cassano & Di Blas, 2024). Instructors can create courses, divide them into learning units, each containing multiple videos. Videos are directly uploaded from YouTube, and instructors can choose to

upload the entire video or only specific segments.
The tool enables students to annotate the video with questions, notifying the instructor that something is unclear at a particular moment in the video. Additionally, at the end of each video, students can mark it as completed and provide anonymous feedback regarding it. The feedback consists of evaluating: (1) prior knowledge, (2) understanding, and (3) perceived difficulty. These three metrics are provided on a 5-item Likert scale, with the option to add a textual comment.
In addition to student feedback, Evoli is designed to collect analytical data regarding video viewing. By logging viewing activities (play, pause, seek backward and forward), the platform can reconstruct which parts of the video were watched and for how long each student engaged with the video. Furthermore, these data can be used to profile students, identifying different learning strategies during video study. For example, a student with high viewing time, low speed, and frequent backward jumps may have had difficulty understanding the content and thus needed to rewatch certain parts of the video. Conversely, a student with regular viewing time, matching the video duration and few jumps, likely did not experience difficulties.
The combination of feedback and analytics data allows Evoli to build a learning engagement profile not only for the whole cohort but also for each student, in order to inform the instructor through learning dashboards. The dashboards are presented at three levels of granularity: video, learning unit, and course. The most detailed are the video dashboards, organized into four screens. The feedback screen (1) shows percentages of initial knowledge, understanding, and difficulty, along with textual feedback; the questions screen (2) lists student questions at specific moments in the video; the visualization screen (3) shows the most viewed parts of the video and the days with the most student access; the students screen (4) displays each student's viewing profile, including viewing time and video completion. Data from video dashboards can be aggregated at the unit and course levels, providing instructors with a broader awareness of the provided video content.
The ultimate goal of the platform is to enable instructors to become aware of students' difficulties during video content study, allowing them to refine future lessons, such as in-class sessions of the flipped classroom, or better assist students in resolving doubts.
Evoli has undergone several rounds of design, implementation, and deployment in real-world contexts involving more than 500 students, at higher education level. This process, following the design-based research approach (McKenney & Reeves, 2013), has allowed for both the enhancement of the tool and the investigation of student profiling based on learning analytics combined with the explicit feedback Evoli asks for using machine learning algorithms. the clustering analysis revealed three distinct engagement strategies among learners: Regular Viewers, Careful Viewers, and Superficial Viewers. Regular Viewers adopt a balanced engagement approach, demonstrating moderate interaction with the content. In particular, the Careful Viewers, starting with a comparatively lower base of prior knowledge, exhibited the most considerable improvement. In contrast, the Superficial Viewers, despite expressing high confidence in their understanding, did not show corresponding improvements in their learning outcomes. The research is ongoing with the collection of additional data.
The next steps in research aim to empower the tool with Artificial Intelligence (AI), both in providing a "summary" to the teacher regarding the cohort's and individual students' situations, and in supporting student study efforts by creating personalized quizzes based on their usage history and feedback. These developments will open up research questions regarding the AI's capability to scaffold teaching and learning processes.

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ID 177

xFORMAL: reinventing Lifelong Learning in Cultural Heritage

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The xFORMAL-Informal and Non-Formal E-Learning for Cultural Heritage project is a beacon in the field of cultural education thanks to its innovative approach that combines the physical exploration of museums and cultural sites with virtual experiences enriched by a mobile application. This initiative, supported by the Marie Skłodowska-Curie Actions (MSCA), embodies a model of integration of digital technology and cultural heritage with the aim of fostering interest and learning among citizens of all ages.

xFORMAL is based on two methodological approaches: Metadisciplinarity, which unites science, technology and the humanities in a constructive dialogue, and pedagogical innovation, enabled by interactive games that transform cultural visits into a dynamic and engaging learning experience. The project also emphasises the valorisation of cultural heritage, especially that which is less known and less studied in formal education, i.e. at school, by promoting its knowledge through modern and accessible tools.

Specifically, xFORMAL is inspired by an innovative form of tourist pilgrimage that allows the (re)discovery of heritage sites that are usually neglected by tourists and citizens. Pilgrimages have been undertaken by mankind in all historical periods (Reader, 2015). Conceptualised by D. Le Bréton (2012) as a form of communication in space and time, they are defined by S. Coleman and J. Eade (2004) as a 'culture on the move'. Most importantly, the place-based approach replaces the person-centred approach typical of private experience. Not surprisingly, some scholars have identified parallels between pilgrimage and tourism (Graburn 1977). The concept of pilgrimage to enhance the cultural heritage of a region or city has been applied in xFORMAL to a historical period that is usually ignored in school curricula, namely pre- Roman cultures. Throughout Europe, the history of this period (8th to 1st century BC) is rarely covered in history lessons, and citizens are unaware of what is collected in their museums about pre-Roman civilisations. Yet the legacy left by these ancient peoples, such as the Etruscans in Italy, the Gauls in France or the Iberians in Spain, is important and relevant to our times: in addition to the alphabet, which arrived in Europe from Greece towards the end of the 8th century BC, mythology, beliefs and techniques have their roots well before the Greco-Roman civilisation and form a large part of our historical and cultural heritage, which is largely ignored.

Bauman's (1996) considerations were also incorporated into the concept of the cultural journey, which was developed as part of the project: He defines the (secular or religious) pilgrim as a 'restless seeker of identity'. If the modern problem of identity was to construct an identity and keep it stable, the postmodern challenge is to avoid fixation.

The xFORMAL project offers a modern solution to this postmodern challenge. By engaging users in interactive narratives and questions about historical and cultural heritage via a mobile app, it encourages a fluid and dynamic exploration of identity. This approach allows individuals to discover and connect with cultural heritage in a personal and collective way. The mobile application is intended not only as a guide, but also as a companion that offers insights, stories and challenges, making the learning process more immersive and participatory. In this way, xFORMAL seeks to democratise access to cultural heritage and make it more attractive and relevant to a wide audience, including those who do not traditionally engage with heritage sites. In this way, the project not only promotes learning and interest in cultural heritage, but also

supports the development of an inclusive and dynamic cultural identity in the digital age.
To continue to guide and inspire developments in cultural heritage outreach, xFORMAL has implemented strategies to increase interaction with the public and expand its network of partnerships with cultural organisations and educational institutions. These initiatives have not only enriched the educational offer by addressing a variety of interests, but have also increased the dissemination of educational content and the integration of the project into the formal education system.
To summarise, xFORMAL is a model of how cultural heritage can be enhanced through the integration of real and virtual experiences, opening up new perspectives on the transmission of cultural heritage throughout life.

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ID 178

Making Learning and Thinking Visible from Preprimary to Lower Secondary Schools in Italy

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Long abstract

This paper explores the methodologies and practices for Making Learning and Thinking Visible across educational stages from preprimary to lower secondary levels. The objective is to elucidate how teachers can implement strategies that reveal students' thought processes, foster deep understanding, and encourage reflective engagement with content.

Visible Thinking (VT) (Ritchhart et al., 2011; Perkins, et al., 2000; Tishman et al., 1995) is an approach to teaching thinking to learners that develops thinking dispositions, such as the inclination to be curious, open-minded, or planful, while also deepening their understanding of the topics they study. Many educators would agree that it is important to teach students (adult or young) to think. Such efforts typically focus on thinking skills like reasoning, problem-solving, and providing evidence to support a claim. However, if learners are to apply these skills with flexibility in a variety of contexts, teaching thinking skills alone is not sufficient. Decades of research at PZ - a research center at the Harvard Graduate School of Education - and elsewhere - show that the dispositional side of thinking (e.g., alertness to opportunities for thinking and the motivation to to do so) is also critical.

One of the main goals of teaching learners to think is to help them develop different kinds of understanding in different subject areas. This means engaging students (both adults and young) in intellectual activity that is authentic to the discipline. Some types of thinking are specific to certain disciplines—e.g., evaluating the reliability of a source in history or developing a proof in mathematics. However, the Visible Thinking research team also identified certain types of high-leverage thinking moves that are likely to support the development of understanding across disciplines. Once teachers have articulated where they and their students are headed, thinking routines provide a way to help make learner thinking visible and to deepen their understanding. Thinking Routines (TRs) are tools that teachers can use to support specific thinking moves such as activating prior knowledge or using metaphors to make connections. They also provide purposeful and easy-to-learn structures and language that can help learners become more metacognitive about their thinking. The Thinking Routines can be used individually or as a group, with any grade level or content area, and with children or adults. Over time, they become patterns of behavior that teachers and learners can adopt and apply flexibly in diverse contexts.

VT, like the Making Learning Visible (MLV) framework, is designed to support transformational as well as technical learning (Mezirow, 1995). Technical learning refers to the application of proven knowledge and skills in practice; i.e., doing something better; transformational learning refers to questioning fundamental assumptions and beliefs and developing new theories; i.e., doing something different).

Furthermore, effective teaching is about modeling efficient, appropriate and flexible skills, so that the objectives become evident to students.

Transitioning to the primary and lower secondary levels, the focus shifts to more structured TRs for making thinking visible, including concept mapping, role-playing protocols, perspective taking and structured reasoning through sequences of TRs. These methods encourage students to articulate their understanding and reasoning, thereby fostering a classroom culture of open intellectual

inquiry, self-assessment and collaborative, constructive peer feedback and group learning.

The research methodology draws on participatory research approaches where research activities are carried out by different stakeholders from different perspectives (school, educational research, etc.) and are aimed at enhancing the process of knowledge co-construction, where theory and practice, research and action, research and experience are interviewed. In particular, the methodology is based on a collaborative research model (Desgagné, 1997; Magnoler, 2012) with particular attention to value the "Teachers' Thinking" (Tochon, 2000) and to enhance the analysis of practices, seen as a tool for professional development. In fact, collaborative research is very much connected to school-driven research as it implies constant interaction and negotiation efforts between researchers and school players (not only teachers but also school leaders, students, families). All are equally involved in research, though with specific roles and tasks. The research model implies an interactive co-construction in all research phases: co-situating the research, co-operating and co-producing the results (Damiano, 2006; Altet, 2009).

Keywords: making learning visible, visible thinking, collaborative research, deep learning, k-12 education

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ID 179

Women and Career Development: the Role of Digital Soft Skills in Training

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Abstract

The digital skills assessment framework presented by the European Commission in 2021 confirms that there is still a significant gender gap in specialized skills. Only 19% of ICT specialists and about one-third of STEM graduates are women. According to the Digital Economy and Society Index, which measures the progress made by member states in building a digital economy and society, Italy ranks 18th out of 27 EU countries in 2021, below the EU average, especially in terms of the Human Capital component. This data is critical when compared to the relevant literature, which emphasizes how digital skills, particularly digital soft skills, play a crucial role in career paths across all productive sectors in today's job market dynamics. Based on these premises, the objective of this research project is to study the relationship between digital skills and career paths in a sample of 427 Italian women, predominantly unemployed, involved in various training programs. For this purpose, a mixed research methodology was used, administering a questionnaire on digital skills and five open-ended questions specifically designed to investigate the participants' perception of the relationship between digital soft skills and career paths. The questionnaire investigated five domains: mastery of digital tools, information management, online communication, digital problem-solving, and netiquette. A preliminary analysis highlights that the candidates' level of digital skills is moderate to low, with greater difficulty in digital problem-solving. Regarding the qualitative analysis, five specific open-ended questions were constructed and sent via email, containing a link to access Google Forms. The aim of these questions is to explore the participants' perception of the role of digital soft skills in the career paths of the study group participants. The responses to the questionnaire were analyzed using content analysis methodology, and from a preliminary analysis, five main recurring themes were identified in the participant group. The digital skills considered fundamental for their career paths were those that enable them to fully utilize the potential of computers, regardless of specific professional profiles. A second thematic area relates to social media, which is indicated as the primary tool through which participants implement and make their professional presence effective on the web. Furthermore, the participants believe that the use of technology has influenced their relationships with colleagues and clients primarily by

facilitating communication and reducing physical distances. Additionally, among the main challenges associated with digital skills, participants highlight the need for self-directed learning to adapt to rapid and constant changes in the digital field. Finally, another emerging theme concerns training. In the participants' experience, formal training opportunities in the workplace are scarce, and when present, they mainly focus on highly technical professional profiles. The expected outcome of the research project is to thoroughly explore and analyze the perception of the role of digital skills, with particular attention to digital soft skills, in the career paths of the participating women. Through this research, the aim is to understand how these skills influence professional opportunities, growth, and personal development of women in the contemporary work context. Additionally, the project aims to identify any barriers and facilitators in acquiring and applying digital skills to propose effective strategies for enhancing digital soft skills among professionals.

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ID 181

Monitoring Innovation Processes in Schools: the Soft Skills Self-Evaluation System

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In this work we present the "Soft Skills Self-evaluation System", a tool devised for students to self-assess their soft skills.

This tool is employed in the second phase of a research project aimed at assessing the impacts of innovation training in schools. The project is developed around three main objectives, each supported by specific data collection and analytical tools. The first objective focuses on (I) the analysis of teachers' perceptions related to educational and digital innovation, and (II) the analysis of the digital skills gained by the students involved in the workshops. To this end, pre- and post-test survey questionnaires were administered from October 2023 to May 2024. The second objective focuses on classroom monitoring of the dynamics of student-teacher-trainer interaction during the activities. In this phase the following evaluation tools were adopted: (I) an observation grid for the detection of soft skills; (II) a logbook for ethnographic observation; (III) the Soft Skills Self-evaluation System. Thirdly, the project included the documentation and analysis of educational activities within the MOdE (Museum Workshop of Education, Bologna), which serves as a platform for sharing and evaluating educational experiences.

The Soft Skills Self-evaluation System was created from an assessment grid used to detect the acquisition of soft skills. This assessment grid originated from the "European Framework of Key Competencies for Lifelong Learning" (2018/C 189/01). The Key Competencies are also the point of reference of the "National Directions for the Curriculum of Preschool and First Cycle of Education" issued by MIUR in 2012 (and updated in 2018), which outline a special profile of competencies to be assessed at the end of the first cycle of education. The achievement of the competencies outlined in the profile constitutes the overall objective of the first cycle of Italian education. Building on the Key Competencies and the three aforementioned objectives, we have selected five areas of competence: (I) competence in functional literacy; (II) competence in mathematics, science, technology, and engineering; (III) digital competence; (IV) personal, social and learning-to-learn competence; (V) entrepreneurial competence. To enhance the observation process, the five competencies were cross-referenced with the three dimensions of Anderson & Krathwohl's (2001) pyramid: comprehend (remember, understand), use (apply, analyze) and produce (evaluate, create). From this intersection of soft skills and learning objectives, we created the Soft Skills Self-evaluation System, identifying six areas of interest: (I) the area of creativity (designing and creating artifacts); (II) the use of new technologies (indicating technologies never experienced in formal or informal settings); (III) the organization of work steps; (IV) the area of conflict and stress management; (V) the area of problem-solving (the ability to solve concrete and non-concrete problems); (VI) the area of collaboration.

Compared with other self-assessment tools such as focus groups, video interviews, questionnaires, and SWOT analysis, the Soft Skills Self-evaluation System allows for visual and performative quantification of skill and knowledge acquisition. The System is organized as a concentric pattern (Fig. 1) divided into six segments that participants color to indicate the perceived level (from 0 to 5) of skills acquired. This acts simultaneously on two levels: the learners' educational experience and the monitoring actions undertaken by researchers.

Regarding the learners' experience, the Soft Skills Self-evaluation System provides: (I) clear and immediate visual feedback on the areas of competence activated by the experience just carried out (indicated next to each section of the system); (II) a performative dimension activated by coloring the segments to indicate the perceived level of skill acquisition; and (III) a comparative self-reflection of the different areas of competence perceived as acquired or in need further development.

The Soft Skills Self-evaluation System is also a versatile tool to implement monitoring activities that adopt a mixed-methods approach (Creswell & Plano Clark, 2017). The tool allows for quantitative data to complement qualitative root surveys, such as participant observation and logbooks.

The monitoring using the Soft Skills Self-evaluation System was conducted on three sample classes: (I) a group of 10 primary school second-grade pupils, (II) a class of 20 middle school second-grade students, and (III) a class of 20 high school second-grade students.

The analysis of the data collected from the Soft Skills Self-evaluation System revealed the students' self-perception of their performance. This self-assessment was compared with the observation of the researchers who monitored the activities.

The primary school group indicated a high level in collaboration, conflict and stress management, and a medium-high level in creativity, organization of work steps, use of new technologies and problem-solving. The middle school class demonstrated a high level in collaboration, conflict and stress management, creativity and use of new technologies, and a medium-high level in work step organization and problem-solving. The high school class showed a high level in collaboration, creativity, organization of work steps, conflict and stress management and problem-solving, but a low level in the use of new technologies.

From this summary of the results, two relevant elements emerged for monitoring the impact of innovative education in formal school settings. Firstly, the activities chosen by teachers or trainers strongly influence the development of certain categories of soft skills. The tools adopted for monitoring (soft skills evaluation rubric, logbook, Soft Skills Self-evaluation System) provided a comprehensive picture of the soft skills that innovative teaching can develop in school contexts. Secondly, students' self-perception is crucial for comprehensively monitoring the impact of innovation in schools. Students' self-perception often coincided with or significantly deviated from the observations of external researchers. The Soft Skills Self-evaluation System was essential for measuring the gap between students' perceptions and researchers' observations, allowing for reflections on elements that might otherwise have been overlooked.

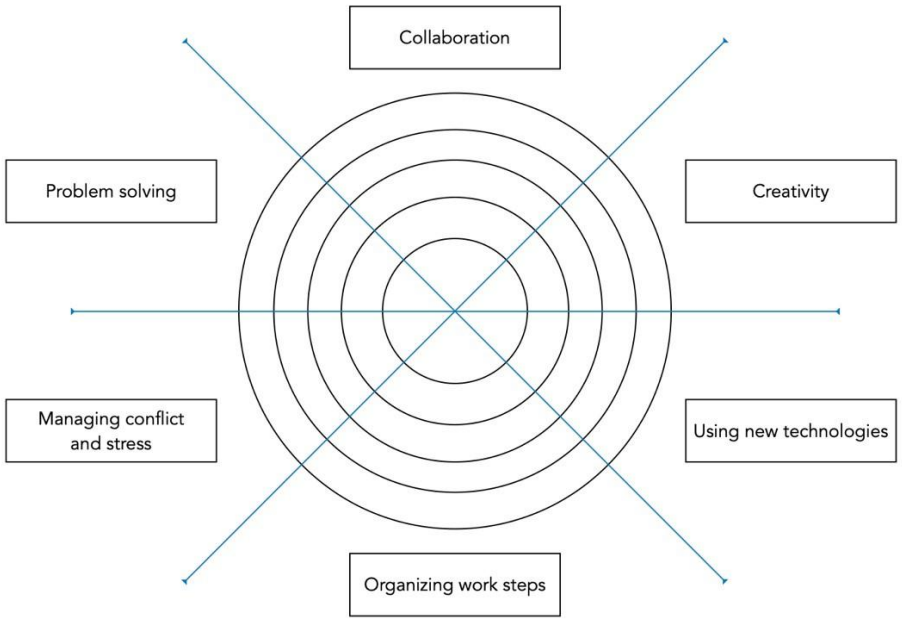

Figure 1 - Soft Skills Self-evaluation System

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ID 182

The Basic Mathematics Moodle Course: an Open and Flexible Teaching-learning Tool for the Transition to University

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Abstract

This study concerns the Mathematics Basic Moodle course, designed to be flexibly used by students, teachers and degree programs as a tool to minimize the students' difficulties in secondary-tertiary transition. The course is organized into thematic sessions including different resources and activities. Different possible uses of the Mathematics Basic Moodle course for Engineering students are presented.

Keywords: university transition, e-learning, blended learning, basic mathematics, moodle

Introduction

The literature in Mathematics Education highlighted the difficulties involving students during the transition between high school and university (Di Martino et al., 2023; Guedet et al., 2016, Hochmuth et al., 2018). In particular, the outcomes of the access test to different degree courses at our university and the first-year university teachers' perception suggested increasing difficulties in Mathematics for freshmen, especially after the pandemic. Students have a distorted perception of their mathematical skills and a mainly procedural approach to Mathematics. Further, according to the students' declarations, the first weeks of lessons at university make them aware of the need to review some contents and modify their study method.

To deal with these criticalities, and in tune with some studies concerning the role of digital environments in the secondary-tertiary transition (Silverman & Hoyos, 2018), we designed the Moodle Basic Mathematics (MBM) course, with the aim of strengthening the mathematical knowledge that students should have already acquired during upper secondary school and of presenting the topics in a form appropriate to the academic context. The MBM course presents the subjects, also covered in the bridging course organized by the university before the start of the first-year lessons, in a synthetic form, using basic but rigorous language. Different semiotic systems and communication channels are exploited to make learning as effective and tailored to individual needs as possible.

The course is organized into thematic sections to provide an organic and self-consistent space containing different resources and activities. Precisely, in each section, there are:

- slides, where the topic is presented in a concise but rigorous way with examples, figures, and diagrams; whenever possible, the topic is faced with different perspectives and presented together with some applications;
- quizzes at different levels of difficulty; they are characterized by carefully designed formative feedback, taking into account the most common difficulties concerning the specific topic. Feedback is automatic, immediate, facilitative. It acts at both the task and the process of the task levels (Hattie and Timperley, 2007) and guides the students step-by-step along the solving process;
- videos, showing the solving processes for some exercises and

explaining little pieces of theoretical notions; GeoGebra applets, providing dynamic examples to be explored, guided exercises and theoretical insights;

- e-books containing the same material provided in the slides, but where videos and Geogebra applets are incorporated.

Moreover, an essential glossary of definitions and properties is available in the course. It is easily accessible directly or by links from words in the e-book. This has been designed to improve the students' understanding, mastery, and coordination of verbal and mathematical languages. Finally, two specific sections contain a list of texts and MOOC courses on the topics covered.

The MBM course is available on the university's Moodle platform; all interested teachers and students can freely register. The course is designed according to a lifelong learning style: students can access the materials at any time during their university career, regardless of the year of enrollment, whenever they need them.

The MBM course is an open and flexible teaching-learning tool at different levels. It can be used by different stakeholders (students, teachers, degree programs), with heterogeneous purposes and within different frames. Indeed, the designers created a generic course that serves as a common teaching support for all the degree programs of Università Politecnica delle Marche. Each degree program can duplicate the generic MBM course and modify, integrate, or reduce it according to their specific teachings and student needs. Students can access the course individually and autonomously, using it as a self-assessment or remediation tool. Teachers can direct to it individual students who are struggling with specific topics; moreover, teachers can also use the MBM course as an additional teaching tool for their own course or related activities (such as exercise sessions and tutoring) for all their students.

In particular, for Engineering students, the course is used in three different ways:

- by the teachers of the bridging courses to share materials and to provide students with tests concerning the faced topics;
- by the teachers of first-year courses to guide students with difficulties or gaps in specific topics;
- in "blended mode" within tutoring activities, combining it with "synchronous" activities carried out by dedicated teachers with the help of tutors.

The tutoring activities included thematic meetings on topics chosen by the students from a list proposed by the teachers. During the meetings, the fundamental concepts concerning the topic are recalled and a quiz is proposed and taken to the students (individually or in groups), with the support of teachers and tutors.

The MBM course specific to Engineering, experimented in the last two academic years, has had high participation, both in terms of access to resources and activities and in terms of presence at synchronous activities. The participants have been mostly freshmen: about 700 students out of about 1100 freshmen participated, many more than the participants in the bridging courses. Of these, about 250 students enrolled in the course for the first time during the bridging courses; other 330 in the first half of the first semester; around 80 in the second half of the semester; finally, about 40 during the first exams' session.

We hypothesize that the high participation in the MBM course, especially compared to the participation in the bridging course organized by our university at the beginning of the first-years, could be due to the openness and flexibility of the tool. Indeed, it supports students throughout the first semester (and even beyond) and it can be used autonomously by the students, but also with the support of teachers and tutors. The high participation suggests the effectiveness of the MBM also as a tool for increasing the students' awareness of their skills and learning needs in Mathematics.

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ID 183

“I Saw It On Youtube!". The Role of Science Communication in the Post Digital Era

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Facing the changes occurring in our world, such as climate change or medical-health emergencies, which require new skills to deal with daily issues (EU, 2015). For this reason, it is necessary to promote a more active and responsible citizenship through Science Literacy (SL), an essential part of this process.

SL is the ability to make conscious and well-informed scientific decisions through a critical and reflective analysis process (Akerson, 2018; Reincke et al., 2020; Akcay, 2018; cordis.europa.eu). A solid way to increase SL is Science Education (SE) but, in order to improve its effectiveness, it needs the support of learning and teaching innovation.

A fertile ground for such innovation lies in the connection between SE and Science Communication (SC). Indeed, SC employs entertainment to send messages, creating an edutainment process (EC, 2020) able to foster motivation and engagement for SL. This type of communication frequently takes place through social media, where interactions occur between multiple channels, and interactive, engaging and shareable activities are created (Sandu & Christensen, 2011; Pinto & Riesch, 2017; López-Goñi & Sánchez-Angulo, 2018). SC promotes both SL and Media Literacy (ML), which nowadays are strongly present in our lives (Potter, 2013; Livingstone, 2003; EC, 2007). Hence, the connection between SC and SE can increase the growth of SL and ML, both essential for XXI-century citizens.

It is starting from these premises that our study investigates how SL and ML can be linked to create educational models in a framework of active citizenship. The research unfolds in two phases: the first involved the dissemination of two surveys—one targeting science communicators and the other their followers; the data was analysed with a mixed method (Dahler-Larsen, 2023), across a descriptive frequency analysis for quantitative data and a content analysis in a phenomenological approach for qualitative data, highlighting the participants' experiences (Mortari, 2007). The results allow us to identify the aspects to focus on in the second phase of the research, which involves semi-structured interviews. In this paper, we will report the results from the second step, which wants to investigate users' lived experiences to better understand the role that SC has in their lives and what are the aspects that characterized their experience; consequently, how to promote a stronger connection between SC and SE able to support the development of SL effectively.

The interviews were semi-structured as they facilitated the opportunity to engage in dialogue with respondents, enabling a more comprehensive exploration of topics initially addressed (Kallio et al., 2016). They allowed us to investigate deeply the experiences of both content creators and users (Ruslin et al., 2022), understanding their believes and feelings. Indeed, semi-structured interviews are used in qualitative research since they allow to gather in depth information about interviewees point of view being flexible and adaptably. Precisely, they are based on a template with some fixed questions and

selected topics, which are expanded based on the respondents' feedback (Ruslin et al., 2022). The duration of interviews averaged forty minutes, however it depended on the extent of participants' responses.

Regarding the sampling process, interviewees were recruited from two primary sources. Firstly, individuals who had expressed interest in participating in subsequent phases during the initial stages were contacted. Secondly, the dissemination of the research was also facilitated by both researchers and interviewees themselves through informal networks and social media such as Facebook, Instagram, and LinkedIn. Currently, we collected a total of thirty-four interviews, twenty-two of users of SC and twelve of content creators, which four of them are to be considered emerging science communicators since they do not reach the threshold of 10.000 followers that we defined as an inclusion criterion at the outset of the study.

The interview questions were formulated subsequent to the analysis of the survey data in order to explore the fundamental themes that came out in the first analysis. The questions were customized to suit the specific characteristics and utilization of SC for each group, interrogating them about their personal engagement with SC and its main characteristics, such as communicative style and the presence of a community. Furthermore, users described the assessing of the credibility of information sources and the impact of SC on daily routines, while content creators narrated their utilization of the medium and the potential for fostering dialogue between academia and science communicators.

At this moment, the data analysis is ongoing and follows the same methodology used in the first phase of the research, i.e. content analysis. The first outcomes of this analysis indicate both similarities and differences compared to the results of the previous phase. First of all, as previously highlighted, many participants report the ability to adapt complex content for a non-specialist audience as a key characteristic of SC.

About the specific answers of the two groups, users confirm that following SC contents provides them with practical tools for everyday life, referring both to knowledge and to a scientific mentality that allows them to reflect scientifically for facing daily challenges. Referring to the connection between university and SC, the creators emphasize the importance of an open dialogue between these two realities, which appear to be separate despite the common goal of disseminating scientific outcomes.

Regarding the discontinuities between the first and second phases, the possibility of investigating in depth the thoughts of the respondents reveal a dualism in the concept of community. The first data showed only the positive sides of this phenomenon, such as the opportunity of discussion, knowledge increase and interests sharing. All these elements are confirmed in the second phase too, nevertheless participants introduced a negative perspective of the community. Specifically, both groups described potential risks within the community, such as the formation of closed and stagnant "thought bubbles", which discourage open-mindedness and dialogues with dissimilar viewpoints.

To sum up, the interviews allowed to engage participants and to investigate their experiences in deeply, affirming and expanding the answers from the first phase. Additionally, the growth of sampling demonstrated the interest in the research objective from both producers and users of SC.

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ID 184

Towards Inclusive Higher Education: a Comprehensive Approach to Enhancing Accessibility for Blind and Visually Impaired Students in the TOLC Context

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Abstract

The TOLC (Test Online CISIA) is an online test used by Italian universities to assess the readiness of prospective students for university studies. It's a crucial gateway to higher education in Italy, currently presents a barrier for blind and visually impaired students. This online assessment, delivered through multiple-choice questions, lacks accessibility features that hinder equal participation. The test is administered electronically, and the questions are presented in a multiple-choice format. However, the TOLC test and its preparatory materials are currently inaccessible to blind and visually impaired students. This paper will discuss the importance of accessibility for blind and visually impaired students, and will outline the specific challenges faced by these students when taking the TOLC test. The paper will also propose a number of recommendations for making the TOLC test and its preparatory materials more accessible.

Keywords: TOLC test, Inclusion, Blind student, Higher education, Visually impaired

Introduction

In the dynamic and evolving landscape of higher education, the quest for inclusivity and accessibility has emerged as a central imperative. The pursuit of higher education represents a transformative journey for individuals seeking to expand their knowledge, refine their skills, and contribute meaningfully to society. However, for blind and visually impaired students, this path can be fraught with challenges due to barriers in accessing and participating in educational opportunities. In the context of standardized testing, these barriers can be particularly pronounced, as traditional assessment formats often fail to accommodate the diverse needs of students with visual impairments. The TOLC serves as a crucial gateway to higher education in Italy, but there remains a significant need to further enhance accessibility for blind and visually impaired students.

Method

The methodology employed in this research encompasses a comprehensive literature review, conducted in the format of a scoping review utilizing the PRISMA method, complemented by semi-structured interviews with experts in the field and industry practitioners.
The review was conducted using the following string:

TOLC or *CISIA* AND *accessibility*

The semi-structured interviews involved experts in the field of typhlology, both from the practical and legislative spheres, as well as from the technical field.
The questions focused on the state of the art of the platform's accessibility, the reasons why it is not accessible to screen readers, what has been done so far, and what is being done to address the lack of technology capable of recognizing the autonomy of blind or visually impaired candidates.

Results

While the scoping review yielded 44 results, of which only few met the inclusion/exclusion criteria, the semi-structured interviews produced interesting findings, which can be summarized as follows:

1) A series of regulations that deem it discriminatory to allow access to TOLC exams with the help of a sighted person.
2) An attempt by an Italian research group to make the platform accessible.
3)The platform was not designed with accessibility in mind from the outset.

Conclusions

Building an inclusive TOLC requires ongoing efforts and collaboration from various stakeholders, including academic institutions, policymakers, and disability advocacy groups. By investing in research, promoting awareness, and fostering international partnerships, we can create a truly inclusive testing environment that empowers all students to succeed.

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ID 185

Experiential Learning in Management Education: from Literature to New Technology-Driven Perspectives

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The concept of Experiential Learning (EL) originated in the second half of the 1900s in the United States and claims that students can learn through the experience (Lewis et al., 1994). This concept has been influenced by various scholars throughout history, to name a few, Kurt Lewin, John Dewey, Jean Piaget (Kolb, 1984). Lewin formulated a real Experiential Learning Theory (ELT) by conceptualizing phenomena through formal, explicit, and testable theory in which learning is facilitated by experience, collection of data and observation (Lewin, 1946). Thus, his model is composed by concrete experience, observations and reflections, formation of abstract concepts, testing implications of concepts in new situations. Similarly, Dewey's model considers experience as a way of learning through an active engagement, integrating experience, concepts, observations, and action (Dewey, 1938). Finally, Jean Piaget focused his mind on a model of learning and cognitive development (Piaget, 1970). The first one results as a mutual interaction of the process of accommodation of concepts and the process of assimilation of events and experiences; the second one is characterized by four stages from birth to the age of fourteen-sixteen. This preamble helps to understand how, over the years, scholarly attention has shifted to experiential learning as a new form of learning. According to the ELT: learning is best conceived as a process, not in terms of outcomes, the main focus should be based on engaging students in the learning process, including feedbacks from the educators; all learning is re-learning means that students' beliefs and ideas are not fixed and become useful in facilitating learning; learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world, emphasizes a vision that rewards differences and disagreements; learning is a holistic process of adaptation, goes beyond the result of cognition but includes perceiving, behaving, thinking, feeling; learning results from synergetic transactions between the person and the environment, highlights the importance of the environment around us; learning is the process of creating knowledge, this concept avoids pre-existed fixed ideas but stresses the constructivist theory of learning (Kolb, 1984; Kolb et al., 2009).

Kolb (1984 and 2009) designed the most famous, and most widely used, experiential learning theory, which goes by the name of Kolb's cycle. According to the scholar, experiential learning requires four stages: concrete experience (CE), reflective observation (RO), abstract conceptualization (AC) and, active experimentation (AE). CE and AC are capable of grasping experience while RO and AE are capable of transforming experience. Furthermore, learners should touch all these stages in a recursive way but, at the same time, Kolb Learning Style Inventory identify different learning styles associated with four approaches to learning: Diverging, Converging, Assimilating, Accommodating (Kolb, 1985; Kolb, 2007). Diverging style is a way of learning in which CE and RO are dominant, so people are emotional and good at generating ideas that explains why they prefer working in groups and receiving personalized feedback; in Converging style AC and RO are the main learning abilities, so people good at making decisions and solving problems, hence they prefer to conduct experiments; Accommodating style has CE and AE as dominant learning abilities, people who prefer to deal with challenging experiences and work with others. This Learning Style Inventory theory has been appreciated by scholars and some of them were able to develop this theory and expand by identifying five additional types (i.e., Hunt 1987).

A systematic literature review (SLR) is provided by the author, which aims to identify all empirical evidence that fits the pre-specified inclusion criteria to answer research questions or hypothesis, minimizing biases and providing reliable findings (Davis et al., 2014; Snyder, 2019). Following Snyder (2019), the author embraces four steps in drawing his SLR: first, design the review; second, conduct the review; third, make the analysis; fourth, write the review.

Design the review is clearly relevant and determine the quality of this research, so the author decided to conduct a first scan of the general concept of "experiential learning", starting from the first works and ideas up to the present days to gain general information on the most relevant theories. Then, he made specific research about "experiential learning" restricted in the management's subject area from 2000 to 2024 using two digital academic databases: Scopus and Web of Science. The search terms have been constructed with the following Boolean logic: KEY ("experiential learning") AND TITLE ("education" OR "learning" OR "teaching") in Scopus. (AK="experiential learning") AND (TI="learning" OR TI="education" OR TI="teaching") in Web of Sciences. The query returned 1188 studies, exported in the form of a .csv file, which thus becomes 1018 eliminating duplicates. Exclusion criteria are concerned with the elimination of books' chapters and papers that come from conferences and notes, elimination of all the articles not related to management neither marketing

(i.e., entrepreneurship, accounting, finance, leadership, tourism), elimination of the articles not concerned with educational fields. A screening of the title and abstract allowed excluding non-coherent papers with the purposes of this review.

The author adopted PRISMA 2020 flow diagram to graphically reported the literature selection from the identification step that includes the number of papers found through Scopus and Web of Science, to the final step that contains the final number of eligible studies, manually selected under exclusion criteria.

The purposes of this systematic literature review are specified and so the research questions. The main purpose is to offer a review regarding experiential learning circumscribed to management and marketing topics, going to see what theories and frameworks are most common. RQ1: What do we know about how experiential learning is used for marketing and management education? RQ2: What type of research methodologies has been used to understand the effectiveness of experiential learning in the short and long run?

RQ3: what about the future of experiential learning in face of new technologies (i.e., Artificial Intelligence, Virtual Reality, Augmented Reality, Metaverse…)?

The next step is related to literature review, through which the inclusion and exclusion criteria are deeply documented to get the final number of articles taken into analysis.

The author suggests it is highly relevant to give space to research on practical applications of experiential learning in management and marketing fields and precisely collect practical insights. Experiential Learning Theory by Kolb (1984) emerges as the most widely adopted theory, with some scholars seek to investigate its reliability (i.e., Kayes, 2005; Metallidou et al., 2008) or to develop innovative framework to facilitate experiential learning (i.e., Georgiou et al., 2008; Matsuo, 2015; Ruhi, 2016). Several scholars are focused on studying and reporting on their own lived experiences in the classroom that include adopting simulations (i.e., marketing simulations in Cadotte, 2016; Canhoto et al., 2016; Bolton et al., 2019) or projects in teams (i.e., Bobbitt et al., 2000; Rohm et al., 2019). However, representative samples are often small and difficult to be reproduced, many studies relate to personal experience that comes from teaching and learning dimensions. Some of the recent studies have also focused on the role experiential learning has on gamification (i.e., Skritsovali, 2023) and in the metaverse (i.e., Sinha, 2023).

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ID 186

Online Video Training Ict Course for Support Teachers: a Follow-Up Analysis of Digital Competence and Computer Self- Efficacy Variation

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Abstract

In Italy a one-year postgraduate specialisation course called 'special-needs teacher training' is required for support teachers (Ministerial Decree No. 249 of 10 September 2010). The main aim of this course was to develop specific knowledge and skills covering areas like special pedagogy, legal aspects, and the use of educational technology.

During Covid19 pandemic the course devoted to digital technologies (the so-called ICT-Lab) was delivered in asynchronous mode following a supported online video training approach (Andresen, 2009).

The ICT-lab course was developed into nine modules, each of which dedicated to a specific topic. The adoption of online video-supported training was beneficial for the development of teachers' technological skills and computer self-efficacy (Benigno et al., 2024).

Considering the crucial role that technologies play in the educational context with students with special educational needs and eager to understand how teachers have applied what they learned in the online video-supported training in their professional context, a follow-up research, one year later, was implemented. The aim of the present research is to analyze how the approach to technology use and adoption in the educational context has changed and, whether there have been any effects in teaching practices, following the qualification as a support teacher.

This research discusses an analysis based on the comparison of previous research outcomes (Benigno et al. 2024) and the analysis of a follow-up survey, filled in a year after the end of the course. A total of 61 participants took part in this second phase of the study.

Keywords: Support teachers, computer self-efficacy, outcome expectation, follow-up, digital competences

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ID 187

Virtual Pharmacy: the Evolution of Dispensing Skills Training at Pavia University

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In the contemporary landscape of education, simulation has emerged as a cornerstone of experiential learning, offering a dynamic and interactive approach that allows students to engage in realistic scenarios without the consequences of real-world mistakes. This is particularly crucial in pharmacy education, where mastering the intricacies of dispensing medications requires precision, knowledge, and strong decision-making skills. At the forefront of this revolution is MyDispense, an innovative online virtual simulation software developed by the Faculty of Pharmacy at Monash University. Designed to strengthen key educational objectives in pharmacy practice, MyDispense provides a realistic, risk-free environment where students can repeatedly practice and refine their dispensing skills, ensuring they are well-prepared for their professional roles.

The University of Pavia is pioneering the adoption of this cutting-edge technology in Italy, aiming to create a robust training ground for future pharmacists. Our initiative to integrate MyDispense involves a comprehensive process of localization and customization, including translating the software interface and instructional materials into Italian to make them accessible and relevant to our students. Additionally, a series of case studies reflecting real-world challenges specific to the Italian healthcare system are being developed. Curated by a dedicated team of pharmacists and specialists, these case studies cover a wide range of scenarios, from common dispensing tasks to complex patient interactions.

Under the guidance of professors, students at Pavia University engage in small-group activities designed to enhance their dispensing skills. These groups foster a collaborative learning environment where students can interact with their peers, engage in practical exercises, and discuss their experiences. Structured feedback from instructors helps reinforce learning and address any areas of difficulty. The integration of MyDispense into the curriculum is carefully planned to complement traditional teaching methods, providing a balanced approach to theoretical and practical learning.

Beyond the adoption and integration of MyDispense, the implementation of the Virtual Pharmacy platform at Pavia University incorporates a range of interactive technologies to enhance the learning experience. Interactive whiteboards, for example, are used to display complex information in an engaging and accessible manner, facilitating real-time interaction and collaboration. The physical layout of the learning environment is also designed to promote teamwork and collaborative learning. Flexible seating arrangements allow students to easily form small groups and move around the space as needed, encouraging active participation and making it easier for instructors to provide personalized support to each group. Workstations equipped with computers and other necessary tools ensure that students have everything they need to engage fully with the MyDispense software. The layout also includes spaces for group discussions and presentations, fostering a sense of community and shared learning.

The implementation of MyDispense at Pavia University represents a significant step forward in

pharmacy education in Italy. By leveraging digital innovation, we are setting a new standard for training future pharmacists. The evolution of dispensing skills training at Pavia University through the adoption of MyDispense is a demonstration to our commitment to innovation and excellence in education. By creating a secure and supportive training ground for our students, we are helping to shape the future of pharmacy practice in Italy. Through the integration of interactive technologies, flexible learning environments, and a focus on collaborative learning, we are preparing our students to excel in their professional roles. This initiative not only enhances our educational offerings but also positions Pavia University as a leader in the use of digital tools for pharmacy education, paving the way for ongoing advancements in the field.

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Towards the Construction of an Observational Tool for Interactions Between Children and Ozobots

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The integration of robotics into early childhood education promises to transform teaching methods into more explorative and engaging experiences (Sjoberg & Brooks, 2023). This transformative approach can be realised if we consider play with robots as an educational dispositif (Foucault, 2005; Massa, 1987), in which children produce knowledge. Robots act as educational mediators (Damiano, 1993), serving as conduits between subjects and objects in knowledge production, in interactive contexts characterized by fun and adaptive environments (Bers, 2012), guided by adults and adapted to children's perspectives (Zecca & Bozzi, 2021; Belland et al, 2019; Angeli & Georgiou, 2023; Terroba et al., 2023). From this perspective, engaging with robots can facilitate the acquisition of reasoning and experimental skills, which in turn enhance children's creative abilities, communication and collaboration skills (Mantovani, 2021).

The paper presents the development of an observational tool to study how children aged between three and six interact with Ozobots (tangible programming robots), aiming to understand the cognitive, social and learning dynamics involved in playing with them. It is an observational grid for coding behaviors and situations during play with robots, developed with a focus on sociocultural and ecological perspectives on children's learning.

The research process was informed by a mixed-coding methodological approach, comprising a top-down and a bottom-up phase. During the top-down phase, the concepts of 'problems' and 'heuristics' relevant to the domain were identified. The bottom-up phase involved the identification and development of specific categories to label articulations of thoughts and the interactions with Ozobot.

The top-down phase commenced with a preliminary investigation of the literature which yielded insights into the scope of application of the two concepts (Robertson, 2017; Duncker, 1945; Aiello, 2001; Gaudiello & Zibetti, 2013; Gabriele et al., 2017). The concept of 'problem' that guides this study is defined as a situation in which there is a discrepancy between the current state and the desired future state (Robertson, 2017). In particular, this occurs when a goal is to be achieved through an action, but the means of achieving it are unclear. In instances where the desired outcome cannot be achieved through direct action, the mind is employed to devise a solution: a series of strategic and planned actions, which are deliberately organised to reach a goal or solve a problem. This entails identifying potential actions that can bridge the gap between the current situation and the desired result according to a criterion and method. In this study, the criterion in question is referred to as 'heuristics' (Aiello, 2001). The literature yielded a number of categories of heuristic, as identified through the process of classification. The procedural-oriented heuristics or solution-focused strategy. The task-driven heuristic is based on parameter modifications (trial and error) in order to reach the solution of the problem through implicit reasoning. In contrast, the declarative-oriented heuristic (problem-focused) is knowledge- driven, in which the individual actions applied seek information about the rules of the task. The problem is only solved once the task has been fully understood. Metacognitive-oriented heuristics (problem- focused) are awareness-driven, whereby actions are applied. The process involves a combination of trial and error and logical reasoning, which is employed to identify the boundaries of the task and to assess the individual's understanding.

In the bottom-up phase of the study, a quasi-experimental protocol was employed to refine the categories of problems and heuristics related to playing with Ozobot. The objective was to construct a classification of problem-solving strategies employed by children during programming activities with the robot in question. A total of seven non-consecutive hours of video recordings were conducted of children aged between three and six engaged in playing with Ozobots in their natural environment, either independently or in social groups. The recordings were transcribed in their entirety, providing a detailed

account of the problems encountered and the resolution strategies employed by the children. The ELAN 5.3 software was employed as a tool for the analysis, enabling annotations to be made by selecting the specific fractions of a second during which a particular behavior occurred.

The data collected were thus analysed qualitatively with a thematic approach, resulting in the generation of behavior descriptors. Subsequently, a grounded methodology was employed to group the descriptors according to similarity, with the objective of accurately describing a specific type of event while allowing for the possibility of referring to more than one situation. This bottom-up process led to a classification of 6 types of problems (goal-setting, movement mode, programming, verification, direction, and error detection) and 11 heuristics (observational-intuitive strategy, decomposition strategy, mental simulation, physical-body simulation, direct verification strategy, verbal simulation, strategy of indifference to the problem, listening strategies, pattern imitation strategies, asking for help, and trial and error procedures) typical of interactions between children and Ozobots.

An observational grid was constructed on the aforementioned categories, which could be used to code game and interaction behaviors, and to highlight the relationships between them and between strategies and problems/objectives. Once constructed, the grid was subjected to intersubjective testing, whereby three researchers employed it independently to code the same game situations. The results demonstrated an 80% level of compatibility in coding the same behaviors for all categories.

In contrast to traditional performance-focused evaluations (Bakala, 2021), our analysis prioritises the understanding of the cognitive processes underlying children's behavior when playing with Ozobots. This is done in order to make it a tool for observation, documentation and the design of teaching activities. In accordance with Papert's (1980) constructionist approach, which regards robotic technologies as 'objects with whom to think,' engaging with Ozobots can provide an opportunity to investigate metacognitive reflection (awareness of one's own way of thinking), 'aloud' reflection, and collaborative intelligence (Martinez, 2006). The grid thus also serves as a training tool for teachers, with the objective of intentionally designing educational activities with an understanding of the cognitive, motivational and engagement processes underlying learning.

This approach facilitates the integration of research and practice, providing meaningful and quality experiences for early childhood education and care (ECEC) through robotics. It enables the development of design strategies, observational postures, and documentation tools that support teachers' professional role and action in the classroom.

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Collective Mathematical Discussions Boosted By the Use of Generative AI: a Pilot Study at Primary School

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Abstract

The emergence of Generative AI (GenAI) prompts a re-evaluation of teaching practices in mathematics education. We draw on the concepts of mathematics laboratory, collective mathematical discussion and instrumental genesis to explore the potential of GenAI as a catalyst for meaningful mathematical discourse and knowledge construction. In this paper, we present and discuss the early results of a pilot study conducted in ten 4th-grade and 5th-grade classrooms, in which GenAI was used in synergy with other resources in a laboratory activity designed to foster primary school students' understanding of geometrical transformations. In our study, we investigated the mathematical discussions primary students are engaged with, while they are involved in formulating prompts to be given to a GenAI system and in interpreting its feedback. Results are analysed and discussed to explore the potential of GenAI as a teaching-learning tool that can facilitate mathematical discussions. Preliminary results suggest that engaging students in formulating prompts for GenAI and interpreting its feedback can enhance mathematical discourse and promote the construction of mathematical meanings. Moreover, our study highlights the crucial role of the teacher in orchestrating collective mathematical discussions augmented by GenAI. The teacher's strategic actions, guided by the affordances of the tool and its synergies with other resources, were instrumental in guiding students towards the construction of mathematical meanings.

Keywords: Generative Artificial Intelligence, collective mathematical discussion, mathematics laboratory, instrumental genesis

In recent years, the emergence of Generative Artificial Intelligence (GenAI), exemplified by systems like ChatGPT, can prompt a reevaluation of teaching practices and pedagogical approaches. These innovative technologies are renowned for their ability to generate new content based on learned patterns from input data. Defining educational objectives and developing effective didactical strategies to leverage the potential of these technologies, however, is a critical challenge.

The landscape of mathematics education has been significantly influenced by the technological advancements of GenAI as well. Notably, within mathematics education, GenAI can produce a diverse array of problems and solutions, offering students a rich tapestry of mathematical scenarios to explore (see for instance, Capone and Faggiano, 2024). This potential extends further when considering its application as a catalyst for collective discussion among students, provided they are engaged with meaningful problems and guided to share their approaches and solutions.

Motivated by the potential of GenAI as a teaching-learning tool in mathematics education, our study adopts an educational perspective focusing on its mediation role within collective settings. Drawing inspiration from the concept of a mathematics laboratory, which fosters mathematical construction through structured social activities, we aim to explore how primary students' engagement with GenAI in a collective mathematical discussion (as introduced by Bartolini Bussi and Mariotti, 2008) can influence their mathematical learning process.

The theoretical framework guiding our study is rooted in the Instrumental Approach (Artigue, 2002; Trouche, 2004), underpinned by constructivist epistemologies and socio-cultural mediation theories (Vygotsky, 1978). This approach views instruments as mixed entities comprising both artefacts and the user's utilization schemes, with instrumental genesis describing the developmental process of

appropriating and integrating external artefacts into human activity. Instrumentation involves the artefact's adaptation to support activity within a cultural context, while instrumentalization pertains to the user's formation of schemes for employing the instrument effectively.

To achieve our aim, a pilot study was conducted in ten 4th-grade and 5th-grade classrooms, in which GenAI was used in synergy with other resources in a laboratory activity designed to foster primary school students' understanding of geometrical transformations. Teaching activities have been recorded and analyzed within the framework of the instrumental approach and of the collective mathematical discussions to examine the potential of GenAI in promoting the construction of mathematical meanings.

In our investigation, we focus on the processes of instrumental genesis related to GenAI within the context of collective mathematical discussions. Specifically, we explored how personal schemes arising from interactions with GenAI evolve through peer collaboration during orchestrated teacher-led discussions. This evolution is expected to contribute to students' deeper construction of mathematical meanings thanks to the mediating role of the teacher whose guided interventions can help students generalize their observations, transforming them into mathematical meanings (Mariotti and Maffia, 2018).

Preliminary results show how the engagement of students in formulating prompts for GenAI and interpreting its feedback enhanced mathematical discourse and facilitated various teacher actions aimed at fostering signs' development and meanings' construction. By consistently redirecting students back to the task, focusing on relevant aspects of GenAI usage, and providing synthesis when needed, the teacher facilitated a learning laboratory environment conducive to active student engagement and collaborative knowledge construction.

In summary, our study aims to explore how GenAI can boost collective mathematical discussions and enrich students' construction of mathematical meanings. By investigating the processes of instrumental genesis and peer interaction, we seek to illuminate the transformative potential of GenAI in primary mathematics education, paving the way for innovative pedagogical practices informed by technological advancements.

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Prebunking Strategies in Teachers' Digital Education: results of an Exploratory Survey

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This paper presents the qualitative-quantitative results of an action-research training course that involved 30 primary and secondary school teachers from Istituto Comprensivo 1 and 2 in Mondovì (Asti). The training addressed the topics of digital sources, manipulated images, and artificial intelligence. This training was part of a broader initiative to enhance the digital literacy and critical thinking skills of educators, enabling them to effectively navigate and teach in an increasingly digital world.

The primary objective of this activity was to explore the impact of prebunking techniques, as outlined by Ecker, Lewandowsky, Cook et al. (2022), but with a reformulation proposed by Bruno and Moriggi (2023). Prebunking, in contrast to debunking, aims to pre-emptively expose learners to potential misinformation tactics before they encounter them in real-world scenarios. This approach thus builds a kind of “cognitive resistance” or “immunity-effect” against misinformation.

The training course was designed to provide a meaningful application of this methodological approach to support innovative teaching and learning experiences. The concept of prebunking was originally developed in the psychological field as an "attitudinal inoculation" (Cook, Lewandowsky, and Ecker, 2017). The methodology aims to expose learners to various communicative and linguistic strategies. Through this exposure, learners gain direct experience of the most widespread and effective narratives of unreliable information. The ultimate goal is to foster a critical awareness among educators, equipping them to intercept and decrypt the main deceptive persuasion techniques and constellations of unfounded beliefs prevalent in digital media.

The experimental training commenced with a plenary session, during which the overarching themes and objectives were introduced. This was followed by three immersive workshop meetings, each dedicated to one of the three thematic areas: digital sources, manipulated images, and artificial intelligence. These workshops were designed to be highly interactive, engaging participants in hands-on activities that mirrored real-world scenarios they might encounter in their professional practice.

To assess the efficacy of the training, a pre-training questionnaire and a post-training questionnaire, which were similar in content, were administered to the participants. These questionnaires focused on evaluating the knowledge and skills related to the thematic areas addressed during the training. Additionally, a control group, which did not participate in the training, was also assessed using the same questionnaires. This allowed for a comparative analysis to measure the impact of the training intervention.

The results of this study provide valuable insights into the efficacy of prebunking techniques in an educational setting. The data collected from both qualitative and quantitative measures indicate significant improvements in the participants' ability to critically assess digital information and resist misinformation. Furthermore, the feedback from the teachers involved suggests that the training not only enhanced their own skills but also provided them with innovative strategies to incorporate into their teaching practices, thereby benefiting their students.

In conclusion, this paper demonstrates the potential of prebunking as a proactive approach to misinformation in educational contexts. By equipping educators with the necessary skills to understand and counteract deceptive information, we can foster a more informed and critically aware future generation. The findings from this research contribute to the growing body of literature on digital literacy and provide a framework for future initiatives aimed at combating misinformation through education.

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Reti di scuole e tipologie di mentoring networking. Analisi e validazione dei fattori abilitanti

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Nonostante il valore ad esso attributo, il mentoring tra le scuole che fanno parte di una Rete è ancora poco diffuso e poco studiato (Armstrong et al., 2021; Rossi et al., 2022) perché nella pratica esistono insidie e barriere che spesso ostacolano o impediscono un'attività collaborativa significativa.

Nel 2021 EUN (European School Network), con la collaborazione di numerosi ministeri dell'istruzione europei (Belgio-Fiandre, Croazia, Repubblica Ceca, Ungheria, Italia, Portogallo) e di INDIRE, ha promosso la realizzazione di un progetto, "Mentoring for School Improvement (MenSI)[1]" finanziato dai fondi della ricerca competitiva internazionale, al fine di sperimentare forme di mentoring networking in grado di migliorare l'uso delle ICT nelle scuole. Un totale di 120 scuole, 20 per ciascun Paese, organizzati in 4 cluster costituiti da 1 scuola mentor e 4 scuole mentee.

INDIRE ha preso parte al progetto coinvolgendo le scuole delle Reti di Innovazione, Avanguardie Educative e Piccole Scuole, creando 4 cluster (2 per ciascuna rete) su specifici territori (Emilia-Romagna, Sicilia, Campania e Puglia) e su tematiche concordate, su cui si riconosceva un expertise alla scuola mentor, sui temi della didattica innovativa e digitale (Rossi et al., 2022, Cannella e Laghigna, 2023). Ciascuna scuola mentor, in collaborazione con il gruppo di ricerca INDIRE, ha ideato un proprio *Continuous Professional Development Toolkit*, mettendo a disposizione risorse e competenze al fine di offrire alle scuole mentee, ossia le scuole seguite dalle mentor, una varietà di opportunità di formazione (workshop, atelier pedagogici, momenti di visiting) (Cannella e Laghigna, 2023; Mangione et al. 2024).

Il progetto di ricerca a livello internazionale, che ha adottato un approccio "misto", ha mirato a esaminare le pratiche di insegnamento e apprendimento (Bergroth et al., 2023; Panzavolta et al., 2022). L'adozione di questa metodologia ha richiesto di focalizzarsi sui dati qualitativi per dare importanza alle 'voci' dei partecipanti e condurre una ricerca 'basata sull'azione'. In questo modo, la riflessione professionale degli insegnanti ha permesso di far emergere elementi 'aneddotici' cruciali per l'innovazione e il cambiamento nelle scuole. Sono state combinate diverse fonti di dati (questionario iniziale, intervista semi-strutturata, visite di osservazione scolastica e diari di cluster) per comprendere meglio il lavoro delle 120 scuole organizzate in gruppi cluster.

L'insieme dei "fattori abilitanti" il mentoring è stato ottenuto attraverso un'analisi dei dati su tre livelli di azione dell'ecosistema scolastico oggetto di intervento: il livello della singola scuola, il livello dei cluster di scuole e il livello del sistema educativo nazionale (Mangione et al., 2024). Per la nostra analisi, abbiamo considerato i dieci principali fattori abilitanti identificati a livello di cluster e di

[1] http://www.eun.org/it/projects/detail?articleId=6568808

istituto. In particolare, a livello di cluster, è emersa l'importanza prioritaria di avere un tema comune, obiettivi raggiungibili e accesso alle risorse, sottolineando così la necessità di una collaborazione e di un reciproco supporto tra le scuole (Louis, Kruse, Marks, 1996). A livello di istituto, i fattori chiave emersi, come la leadership, la visione condivisa e le politiche concordate, evidenziano quanto sia fondamentale avere una direzione chiara e un impegno collettivo all'interno della singola scuola (Fullan, 2016). Una leadership efficace può guidare e motivare il personale, mentre una visione condivisa e politiche ben definite assicurano che tutti lavorino insieme verso obiettivi comuni, creando così un ambiente coeso e di supporto per il mentoring (Leithwood, Harris, Hopkins, 2008; Sergiovanni, 1996).

A partire dal contesto internazionale, i fattori che hanno contribuito all'efficacia e al successo di un approccio basato sul mentoring per il miglioramento digitale nelle scuole sono stati rivisitati e validati attraverso un'indagine esplorativa che ha coinvolto tutte le scuole dei cluster italiani coinvolti. Lo studio, di tipo confermativo (Trinchero, 2002), ha preso piede a seguito di un intervento formativo strutturato sulla base del ciclo di Deming (Plan-do-check-act) (Deming, W. Edwards, 1986), con l'obiettivo di validare, a livello italiano, i fattori chiave, denominati "abilitatori", che contribuiscono all'efficacia e al successo di un processo di mentoring tra scuole in rete. Alla somministrazione hanno risposto 81 utenti in totale (sia docenti che dirigenti scolastici), di cui 16 appartenenti alle scuole mentor e n.65 alle scuole mentee. Rispetto ai dieci fattori ritenuti abilitanti, il questionario realizzato da INDIRE è finalizzato a rilevare informazioni in merito alla scala di priorità dei fattori che sono stati ritenuti determinanti per lo sviluppo del proprio cluster e Istituto. La survey prevedeva campi aperti in cui si chiedeva di individuare i primi tre fattori scelti, per ciascuno dei due livelli analizzati, in ordine di priorità e motivarne la scelta, oltre ad avere la possibilità di indicare un fattore alternativo o eliminarne uno rispetto a quelli proposti.

L’analisi dei dati è finalizzata a rilevare se, nel contesto italiano, alcuni fattori sono maggiormente determinanti rispetto al contesto internazionale, se sussistono differenze sostanziali all’interno dei vari ordini di scuola e/o dovute anche alle specificità dei vari contesti territoriali e tra scuole mentor e scuole mentee. L'indagine è stata arricchita da un glossario contenente i dieci fattori chiave che facilitano il mentoring, suddivisi in fattori specifici per il cluster e per l'istituto. Questo glossario aveva l'obiettivo di offrire una guida chiara e strutturata per comprendere e valutare l'efficacia del mentoring nelle scuole, permettendo ai partecipanti di concentrarsi sui fattori più rilevanti per il loro contesto specifico.

Il confronto tra l'indagine internazionale e quella italiana rivela differenze significative nelle priorità e nei fattori che facilitano il successo a livello di cluster e di istituto. Queste differenze riflettono le diverse culture educative, gli approcci pedagogici e le esigenze specifiche dei contesti scolastici. In Italia, c'è una maggiore enfasi sul confronto delle pratiche (Senge, 2000), la disponibilità ad apprendere dagli altri e l'apprendimento attivo (Stoll, Louis, 2007), che favoriscono una maggiore interazione e partecipazione reciproca nel processo di collaborazione e condivisione delle pratiche. Entrambi i contesti riconoscono l'importanza di una visione condivisa all’interno della scuola. Tuttavia, mentre a livello internazionale, si dà maggiore importanza alla leadership e alle politiche scolastiche ben definite, in Italia, si pone un'enfasi maggiore sullo sviluppo professionale continuo e sull'apprendimento tra pari (Lieberman, Miller, 2001), indicando un approccio più collaborativo e orientato al miglioramento professionale interno (Timperley, Wilson, Barrar, Fung, 2007). Le

discrepanze tra le indagini sottolineano quanto sia fondamentale adattare le strategie educative ai contesti locali, compresi quelli all'interno dello stesso contesto nazionale, come ad esempio tra i diversi ordini scolastici. I dati emersi mettono in luce che non esiste un approccio universale per il successo educativo. Le scuole devono identificare i fattori abilitanti più rilevanti per il loro ambiente specifico, adottando strategie personalizzate che rispondano alle proprie condizioni ed esigenze (Fullan, Hargreaves, 2012; Hargreaves, Shirley, 2012).

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ID 193

Recursive Prompting for Generating of Images-Manifesto

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Keywords: Visual Generative AI, Recursive prompting, Images, Manifesto

Recent developments in Artificial Intelligence raise increasingly significant questions about current educational practices. The reference is specifically to Generative Artificial Intelligence (GAI), which, starting from a prompting activity, allows guiding and optimising interaction with AI models to generate textual and visual content (Baidoo-anu & Owusu Ansah, 2023; Alier, García-Peñalvo & Camba, 2024). Studies and research highlight the impact in terms of active and participatory learning, engagement and deep understanding of the topics addressed, and the development of critical and expressive-creative skills (Ali et al., 2021). In fact, the use of recursive prompting (Yang, et al. 2022) in education provides insight into how to formulate precise questions and requests to AI models, enhancing problem-solving and analytical thinking skills. These aspects are prioritised when referring to Visual Generative AI text-to-image and image-to- image tools (Han & Cai, 2023; Combs, Moyer & Bihl, 2024) such as Stable Diffusion, Dall-E and Midjourney. Specifically, this contribution aims to focus on the generation of images manifesto through recursive prompting. The manifesto is a specific textual form characterised by a combination of visual elements (shapes, lines and colours) and/or verbal elements (texts, slogans and titles) aimed at conveying specific meanings. The manifesto is analysed here by taking up the concept of the image-suitcase (Kerbrat-Orecchioni, 1979) within the framework of a semio- pragmatic approach (Odin, 2000). The concept of the image-suitcase, which incorporates, in turn, that of "mot-valise" (Groupe μ, 1970; Fradin, 1997; Bonhomme, 2011) refers to a rhetorical technique in which an image incorporates or condenses several layers of meaning or cultural references into a single visual element. The concept is based on the ability of an image to act as a container for several ideas or concepts, like how a suitcase can contain several objects. The image- suitcase thus not only visually represents a subject, but also evokes a broader set of associations, stories or contexts. This type of image is particularly significant in contexts where visual communication has to convey complex interactions of ideas in an immediate and accessible way. The image-suitcase is in fact the vehicle of different iconic, plastic and figurative meanings

(Fabbri, 2019) that refer to distinct meanings that intersect and whose sense is defined in relation to the context in which it is produced and received (Odin 2011). The manifesto as an image-suitcase condenses what circulates in an expansive and disorderly manner, isolates certain key words and images, the main axes and values of a content/topic (Pezzini, 2008). In this sense, the manifesto generated by and with AI also has a dynamic function within a vast social and cultural discursiveness that brings together different texts and practices as well as the biases involved in their constitution (Fabbrizzi, et al. 2022; Panciroli, Rivoltella, 2023).

Specifically, the contribution proposes an analysis of the generative stories of the images manifesto produced in the educational context and set up within the Manifesto Rooms of the MOdE-Digital Museum of Education, University of Bologna (Panciroli, et al. 2020; Panciroli & Macauda, 2019). These are digital environments in which the visitor can interact with Generative AI tools to create textual, visual, audiovisual and sound content, the meaning of which is then reworked and condensed into the creation of an image-manifesto. Through a recursive prompting activity, the subject prompter increases his awareness of the content under investigation, going on to identify and detail, in each interaction with the AI, the elements that identify, define and contextualise it. The interaction with the AI develops through three strongly interconnected phases, in which the output of one becomes the prompt for the next. In the first phase, in fact, the subject recursively formulates prompts (text-to-text) with the aim of generating a textual output that, in a second phase, it will use to recursively generate visual outputs (text-to-image). In the third phase, these visual outputs are, in turn, used in the final prompting activity (image-to-image) for the generation of an image-manifesto in which different languages come together for the creation of a totality of meaning that can convey specific content with immediacy in reference to a given theme/topic. The outputs generated through the different generative AI tools are set up in a single digital environment, the Manifesto Room of the MOdE, which makes it possible to focus as much on the product, the image-manifesto, as on the verbal and visual contents that enabled its elaboration. The analysis of these generative stories makes it possible to investigate the cognitive surplus (Shirky, 2010) related to the creation of the image-manifesto, produced by and with the AI, with respect to the starting reflection. From this perspective, the Manifesto Room can be an environment in which teachers and educators as well as students can work. For teachers and educators, the Manifesto Room can act as a space for synthesis and communication of their teaching design; for students it can become a space for re-elaboration, in-depth analysis and synthesis of the contents explored and the knowledge learned.

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ID 194

Effimera – Beyond Time. The Use of Immersive Technologies, Game-Learning, Artificial Intelligence for Accessible and Inclusive Enjoyment of Temporary Exhibitions of Contemporary Art

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Abstract

The project "EFFIMERA – BEYOND TIME" aims to utilize innovative technologies such as virtual reality, augmented reality, and artificial intelligence to make temporary exhibitions of contemporary art from the 20th century accessible and inclusive. Starting from the historical context of art exhibitions, the project aims to explore and reconstruct exhibitions from the second half of the 20th century, no longer accessible, such as Concetto Pozzati's first exhibition in 1968. Through research and documentation of existing materials, interviews, and the creation of multimedia content, an accessible web app will be developed for both computers and smartphones, allowing users to virtually explore past exhibitions enriched with interactive, educational, and experiential features. The project aims to serve as a research tool for the history of exhibitions, revive past exhibitions, create connections between museum institutions, make obtained content available, and enable accessible, educational, and engaging art experiences. Project phases include research and documentation, technology and framework development, and testing and evaluation. Technologies used include virtual reality, augmented reality, and artificial intelligence through the implementation of a web app.

Parole chiave:

Accessibility, AI education, interactive education, virtually explore past exhibitions art, contemporary art

The project "EFFIMERA – BEYOND TIME" aims to analyze and make accessible the temporary exhibitions (*F. Haskell, 2000*) of the late twentieth century utilizing advanced technologies for the reconstruction and documentation of artistic events that no longer exist (*C. A. Quintavalle, 2010*). The central case study is the first retrospective exhibition of Concetto Pozzati, held in 1968 in the Salone Farnese of the Pilotta Complex in Parma (*C. A. Quintavalle 1968*). This exhibition marks the beginning of a series of temporary exhibitions that accompany the establishment of the Centro Studi e Archivio della Comunicazione (CSAC) at the University of Parma, founded by Carlo Arturo Quintavalle.

The project is part of the research activities of EXHIBIT-Laboratorio Centro Studi sulla Storia delle Mostre/Research Centre for the History of the Exhibitions at the University of Parma and aims to become an exemplary model for the scientific analysis of ephemeral events, such as temporary exhibitions, through the use of advanced technologies that enable virtual visits. Based on the catalog, archival material preserved at the CSAC, the Concetto Pozzati archive in Bologna, and interviews, the exhibition will be reconstructed using virtual reality (VR), augmented reality (AR), and artificial intelligence (AI) to offer an experience accessible to all audiences. The goal is to create an immersive experience through a progressive web app, allowing visitors to explore the original exhibition using VR, AR, and AI to provide additional information and engaging interactions.

The project has several key objectives:

Research Tool: The project will serve as a study tool for the scientific community, facilitating access to the content created through the research and reconstruction of the exhibition. This includes studying the relationships between the artworks, the structure of the exhibition/historical context, and the connection between audiences, curatorial practices, and the communicative role of the exhibition. **Accessibility:** A particular focus is placed on accessibility for all audiences, including those with visual impairments or without a specific cultural background. The interface will be designed following accessibility guidelines, and field tests will be conducted with specialized associations to ensure the web app's ease of use and the virtual exhibition's accessibility.

Experiential Learning: Utilizing virtual reality and artificial intelligence, the project aims to offer an engaging and stimulating experience, allowing users to immerse themselves in the environment of temporary exhibitions and interact with the artworks through innovative technologies.
Gamification and Interaction: Game-learning elements will be integrated to make the experience enjoyable and engaging. Users will be able to participate in challenges, quizzes, and games related to the exhibited works, stimulating new perspectives and creative interactions.
Creation of Territorial/Artistic Connections: The project also aims to create new connections between the collections of the CSAC in Parma and other cultural institutions in the Emilia-Romagna region, thereby expanding access to and enjoyment of the artworks.
Archiving and Data Collection: The acquired documentation will be alternatively archived and made available to scholars and researchers. Additionally, the data collected from user interactions will provide valuable insights into audience preferences and interests, contributing to the understanding of museum enjoyment.
Enhancing Museum Enjoyment: Data collected from user interactions will provide valuable insights into audience preferences and interests.
Methodologies and Approaches:
The project will develop along several fronts:
Historical/Artistic: A survey of the history of exhibitions, changes in curatorial practices, the role of audiences over time, and the study of technologies for curatorial and artistic research (*Parry, R., 2010*).
Documentary and Technological: Survey, digital acquisition, and study of the existing documentation of Concetto Pozzati's 1968 exhibition, integrated with testimonial interviews and other sources.
Technological Development: The project will focus on creating an interactive virtual environment using VR, AR, and AI to allow visitors to experience the Pozzati 1958-68 exhibition in an innovative way (*Anderson, G. (Ed.)., 2012*). Particularly, as an AI-driven guide could provide contextual information and answer visitor questions in real-time, enhancing the educational value of the exhibit. The AI could also adapt its responses based on the visitor's interests and knowledge level, making the experience more personalized.Additionally, AR overlays might display additional details about the artworks when viewed through a smartphone, tablet or PC. For instance, when a visitor points their device at a particular piece, the AR application could show related sketches, preparatory works, or videos of the artist discussing the work. Moreover, VR can recreate the entire exhibition space, allowing users to navigate through the Salone Farnese as it appeared in 1968. Visitors could explore the exhibition layout, view the artworks in their original placement. For users unable to visit in person, the progressive web app will enable remote access to the virtual exhibition. This app will support both VR and AR functionalities, allowing users to switch seamlessly between different modes of interaction. For instance, they could start by exploring the exhibition in VR and then use AR to delve into specific details of interest.
Through these technologies, the project aims to create a comprehensive and interactive experience that not only brings past exhibitions back to life, but also makes them accessible and engaging for contemporary audiences. By integrating VR, AR, and AI, the project sets a new standard for the documentation and dissemination of ephemeral art exhibitions, bridging the gap between the past and the present and paving the way for future innovations in the cultural sector.
In summary, the project aims to revolutionize the way temporary art exhibitions are studied, understood, and enjoyed by fully leveraging the potential of emerging technologies to make art accessible to all audiences, while simultaneously promoting innovation in the cultural sector.
The digitization of art exhibitions represents an important step towards the democratization of culture, allowing a wider audience to access and interact with artworks, overcoming spatial and temporal barriers and offering engaging and personalized experiences.
In conclusion, "EFFIMERA – BEYOND TIME" presents itself as an innovative project that aims to revolutionize the way temporary art exhibitions are studied, understood, and enjoyed by leveraging the potential of emerging technologies to promote accessibility, inclusion, and innovation in the cultural sector.

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ID 195

Pre-Service Teachers' Initial Use of Generative AI as A Tool to Design and Implement Teaching Activities

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Abstract

In light of the recent technological developments according to which generative Artificial Intelligence (genAI) holds promise in revolutionizing the teaching-learning experiences, our interest is devoted to the use of genAI in mathematics education. We conceive this new technology as every other technology that entered the field of education requiring teachers to be prepared to use it. The notion of instrumental genesis theoretically frames our study, in which we attempt to understand to what extent pre-service mathematics teachers perceive generative AI as relevant to designing and implementing teaching activities. Moreover, we refer to KTMT - Knowledge for Teaching Mathematics with Technology *focusing on the knowledge that guides the way they interact with ChatGPT and the way this interaction shapes their perception of the possible use of ChatGPT to design and implement teaching activities. We drew upon a small pilot investigation developed with seven pre-service mathematics teachers, to whom we asked to imagine possible uses of ChatGPT in introducing the concept of function in an 8-grade class. We adopted a qualitative and interpretative methodology based on audio recording and direct observation of the pre-service teachers' initial interaction with ChatGPT and their discussions. Results reveal the pre-service teachers' challenge to develop a fruitful instrumental genesis that allows them to get to know the technology and to find ways of using it taking advantage of its potential.*

Keywords: Generative Artificial Intelligence, instrumental genesis, KTMT, mathematics

Through the use of systems, like ChatGPT, with their ability to learn patterns from input data and generate new content based on that, the recent technological advancements of generative Artificial Intelligence (genAI) hold promise in revolutionizing the learning experience. However, integrating these innovative tools into education necessitates a fundamental shift in teaching methodologies and students' learning paradigms. This integration results to be particularly challenging in mathematics education, due to the potential bias in the outputs. The solutions that ChatGPT can generate as feedback to a prompt asking to solve a mathematical problem, indeed, simulate a natural conversation, and so they can look convincing and be helpful. However, ChatGPT outputs can also be completely illogic, not easily understandable and/or incorrect. For these reasons, it is extremely important for teachers to personally make experience of interactions with these tools.

Our study is based on the claim that, if to understand the way genAI can transform the learning process there is a need to investigate the interactions occurring when students interact with it, the same principle should be applied when exploring the potential of genAI in transforming the teaching practices. To this purpose, we are interested in studying the pre-service mathematics teachers' initial use of genAI as a tool to design and implement teaching activities. The research question we attempt to answer in our study is: to what extent pre-service mathematics teachers perceive generative AI as relevant to design and implement teaching activities?

To frame our study, we refer to the framework of the Instrumental Approach (Trouche, 2005) according to which an instrumental genesis is needed for someone aiming to use a new tool to accomplish a certain task. The instrumental genesis in mathematics education can be seen as a process in which while the learners' knowledge guides the way the tool is used (shaping the tool), the constraints of the tool shape the learners' cognitive structures (shaping the schemes) and their emergent conceptions.

In our study, however, the subjects are pre-service teachers, and as such they are seen not only as learners but also as teachers. As so, we also refer to the knowledge they need to integrate this technology into their future practices. We consider the KTMT - *Knowledge for Teaching Mathematics with Technology* model (Rocha, 2020), giving special attention to the *Teaching & Learning and Technology Knowledge*. Thus, in studying the pre-service mathematics teachers' initial use of genAI as a tool to design and implement teaching activities we focus on the knowledge that guides the way they interact with ChatGPT and the way this interaction shapes their perception of the possible use of ChatGPT to design and implement teaching activities.

To answer our research question, in this work, we discuss the early results of a small pilot investigation developed with seven pre-service mathematics teachers, to whom we asked to imagine the possible use of ChatGPT in introducing the concept of function in an 8th-grade class. The activity was performed collectively, sharing the screen and discussing the prompts to be given and the feedback received. We adopted a qualitative and interpretative methodology based on audio recording and direct observation of the pre-service teachers' initial interaction with ChatGPT and their discussions.

The knowledge of the seven pre-service teachers comprises the need for mathematics teachers to bridge the gap between the students' spontaneous everyday knowledge of the concept of function and formal mathematical knowledge. Their initial idea, therefore, was to ask ChatGPT to provide them with a real situation that can be modelled through a linear function. At that point, however, they tried to use ChatGPT only as a simple source of information, struggling to move to the design of the teaching activity: their use of the tool failed to reveal new knowledge and build instrumental genesis. Then, they realized they do not have knowledge about what ChatGPT could be good for. Hence, they wrote a first prompt to see how the tool can be used and with the consequent further prompts, they started to develop a first conception of its potentials and limits. This phase of the interaction with the tool can be interpreted as a first step towards the building of an instrumental genesis and the development of knowledge about how to use this technology to teach. However, more interactions and focused activities were needed for pre-service teachers to progress in their professional development, perceiving the extent to which generative AI can result to be relevant to design and implement teaching activities.

Early results of our pilot investigation reveal the pre-service teachers' challenge to develop a fruitful instrumental genesis that allows them to get to know the technology and to develop their *Teaching and Learning and Technology Knowledge.* Although some studies (see, for example: Barana, et al., 2023; Blake, 2024; Capone and Faggiano (to appear)) show worthwhile results, our findings highlight the importance of specific teacher professional education for pre-service mathematics teachers to find ways of using this technology taking advantage of its potential to teach mathematics.

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ID 197

Between Metaverse and Gamification. New Learning Perspectives in University Teaching

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Abstract

In recent times, the attention of scholars, researchers and experts has focused on the metaverse, Augmented Reality and Virtual Reality, technologies that seem to offer new learning possibilities through the creation of highly immersive learning environments. The recent field of exploration known as "eduverse", which sees the use of the metaverse in education, paves the way for significant and participatory teaching experiences characterized by considerable pedagogical potential. Multitasking, networking, distributed knowledge, collective intelligence, simulation, gaming are the characterizing dimensions of the new forms of communicative appropriation and of the informal culture of students, dimensions that require educational systems to change and adapt curricula, practices daily routines and teaching styles. At the same time, the use of playful approaches has increased in order to make learning an engaging and motivating experience. This contribution describes a gamification experience in the metaverse in a university context in order to reflect on the educational potential it offers teachers to set up innovative environments in which physical and digital integrate mutually to encourage experiential and collaborative learning.

Keywords: metaverse, gamification, education, virtual reality

Introduction

The increasingly imperceptible boundary between the analogue dimension of real life and the virtual dimension mediated by technologies (Floridi, 2017) together with the all- encompassing presence of digital applications and the increase in hybrid teaching as a consequence of the Covid-19 pandemic have contributed to tracing a route, now irreversible, which leads in the direction of educational innovation. It sees continuous technological innovation as the main driver for thinking and developing alternative teaching/learning strategies to traditional practices, in order to allow personalized, engaging teaching experiences capable of meeting the different needs of students. In the unprecedented reality we live in, already predominantly dominated by artificial intelligence, new and vital challenges arise which concern the physical, mental, relational health and every area of development of individuals. Education systems, which have the task of training prepared and competent citizens, capable of moving autonomously and critically in a context characterized by high complexity and variability, find themselves facing digital plenitude (Bolter, 2019) and are called upon to adapt quickly to the characteristics of the media ecosystem. The necessity is to introduce virtuous and appropriate teaching practices into the school and university context, suitable for the current world, that of the post-human (Parisi, 2019), namely an unpredictable and fast-paced world where knowledge of the past is quite useless for regulating one's behavior in the present and future. Much more recently, the education technology sector is affected by significant changes due to the appearance of some technological trends that seem destined to have a very strong impact on teaching as well. This is a new generation of technologies represented by: Metaverse, Virtual Reality (VR), Augmented (AR) and Mixed (MR), Blockchain, Non-Fungible Token (NFT), Internet of Things (IoT), crypto currencies and Artificial Intelligence (AI). All these have made possible the growth and development of immersive virtual environments in which knowledge becomes immersion in things, unlike in the past, when knowing was conceived as distancing from them (Colazzo, 2022). Teaching has the possibility of experimenting with new learning methods, which pass through the simulation of reality and the valorisation of bodily and motor experience in cognitive processes: the action is embodied (Baloian & Zurita, 2012) as the user embodies in a virtual body, or avatar, which together with the sense of presence makes the experiences and interactions within the simulated world realistic, as if it were a character in a video game (VanFossen & Gibson-Hylands, 2023). One of the areas closest to the metaverse, to Virtual and Augmented Reality is that of gamification which uses aspects and potential of the game in learning contexts in order to impact motivation and attention, proposing environments that can take on the role of "bridge" between physical and virtual, guaranteeing the educational and didactic continuum necessary for learning (Accoto, 2022). Immersive technologies,

protagonists of the new technological trend, envelop the user deeply on a sensorial level. For those who work in the teaching and training fields, the main question that arises is whether this greater perceptive involvement offered by virtual realities and the new paradigm of the Metaverse entails appreciable benefits in learning, without neglecting the ethical, legal, anthropological and social implications that will result from its use. In an attempt to participate in the answer, the contribution describes an experience of using the metaverse and gamification in a university setting.

Materials and Methods

The gamification experience was created through an immersive environment containing educational materials and a series of "serious games". The environment allowed students to step into the shoes of another, an avatar, or a digital incarnation of themselves. The ability to interact with the environment and virtual objects can have a strong psychological impact on learning (Lombardi, 1997). The playful contents present in the environment have been divided into four sections, corresponding to the respective learning units into which the course program has been divided. The students were able to experiment with quizzes and games with various types of educational purposes created to reinforce the learning of the contents exposed by the teacher during the lessons. The games were designed first and then proposed according to a gradual criterion, with progressively more difficult levels to reach, so as to require an increasing level of challenge and skill and to prevent the rapid achievement of objectives from causing boredom and reducing the student involvement (Goehle, 2013).

Results

The gamification activity in the metaverse stimulated the students' curiosity. They actively participated in the proposed experiences, motivated and rewarded by an innovative approach to the lessons. This approach has contributed to developing a better relational climate and to experiencing the moment of face-to-face teaching and individual study with greater awareness and serenity. The final prize for those first in the ranking, consisting of exemption from a part of the program during the exam, represented a further incentive for participation and interaction.

Conclusions

The gamification activity in the metaverse stimulated students' curiosity. They actively participated in the proposed experiences, motivated and rewarded by an innovative approach to lessons. This approach contributed to developing a better relational climate and to experiencing both in-person teaching and individual study with greater awareness and serenity. The final reward for the top-ranked students, consisting of an exemption from part of the exam program, served as an additional incentive for participation and interaction. The reward given at the end of the experience prevented a loss of interest and engagement during the activity, and it led students to view it as a result of their effort: consequently, it was more rewarding.

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ID 198

The Challenge for Universities to Adapt to Rapidly Changing Conditions of the Digital Revolution: the Case Study of the University of Pavia

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Keywords: Digital Transition, Learning Spaces, Faculty Development, Change Management, UpSkill and ReSkill in Education

825 and 1361: these two dates mark the beginning of the University of Pavia, the oldest university in Lombardy and one of the oldest in Europe. The year 825 saw the emperor Lothair's capitulary, which established in Pavia a school of rhetoric for the kingdom's officials; the Studium Generale, instead, was founded by Charles IV in 1361: a renowned legal and literary school that attracted students from all over Europe. Due to its long and prestigious history, the University of Pavia is a member of the Coimbra Group (CG), an association of only 40 long-established European comprehensive, multidisciplinary universities of high international standard committed to creating special academic and cultural ties in order to promote internationalisation, academic collaboration, excellence in learning and research, and service to society. The CG influences European education and research policy, developing best practice through the mutual exchange of experience. Pavia is a City-University, hosting 21 University colleges (where students live and grow together, exchange ideas and projects); moreover the entire Educational Offer of the university (both Bachelor and Master) is at the present almost entirely delivered “in full presence”. The use of online learning has been experimented delivering 18 MOOCs (on EduOpen, Federica and Iversity), Professional post-degrees Pathways, SDGs courses (delivering Open Badges) and the course “European languages, cultures and society in contact” in the framework of the EU Alliance EC2U (European Campus of City-Universities).

This scenario represents the context of a traditional university that suddenly had to face a global COVID-19 pandemic in February 2020. The efforts to combat the pandemic and its consequences necessitated a radical shift to a distance learning model and a consequent forced use of digital technologies. The University quickly equipped itself with the necessary digital tools and successfully responded to the emergency.

In the post-pandemic period, all the stakeholders of the University (Governance, Faculty, Students and Staff) participated in a general reflection on their experiences and on the use of the potential of digital tools in education.

The Student Representatives showed interest in continuing with lecture recordings implemented during the pandemic and with remote exams, supporting this perspective as a flexibility and customization aspect beneficial to the students; their point was that the request was technically acceptable, feasible and at no additional cost for the University.

The Faculty focused on the quality of teaching, noting the risk that lecture recordings could act as a disruptive element in the longstanding and traditional relationship between teachers and students, potentially leading the latter to skip attending classes. It was also highlighted the diversity in methodological approach between in-person teaching and online and hybrid project-based teaching, underscoring the need for specific training if the decision to use online educational actions was made.

The technical-administrative staff of the University emphasized the inadequacy of the current technological equipment, as it was the result of emergency choices and therefore unsuitable for managing a normalcy that includes potential classes both in-person and online, as well as in mixed or hybrid modes.

It was also highlighted the need for a strategic approach to the technological renewal of both software and hardware infrastructure dedicated to education.
The Governance, having heard all the stakeholders' perspectives and requests, planned its actions to find a synthesis that would satisfy various demands, while respecting the history and the brand of the University, aiming to maintain "a tradition of innovation".
First of all, EU perspective was considered. The EU was promoting the development of a high-performing European digital education ecosystem and was seeking to enhance citizens' competences and skills for the digital transition. For this reason (focused on HEIs), two documents had been released: The Digital Education Action Plan 2021-2027 and the Communication from the Commission on a European Strategy for Universities.
Both of them remarked the relevance to develop skills and competences and promote innovation for the digital transition.
Among others, Institutions and Groups with similar experiences from homogeneous contexts were consulted. A defining element of the action was decided: physical presence in class and participation in the University Community had to be central points.
The Coimbra Group presented the results of a survey among its members, the analysis of which suggested considering 4 interconnected emerging themes/needs: 1) Continuous and gradual introduction of digital technologies in teaching and learning processes 2) Need for technological and methodological training and up-skilling of the Faculty 3) Necessity to enhance internationalization of university campuses 4) Promotion of well-being and inclusion in the University Community.
The University of Pavia substantially shared the vision proposed by the documents above mentioned and managed to implement it in the post-pandemic years as reported in the following points.
1) SW and HW infrastructure for teaching - The process of technological innovation has been conducted centrally. A comprehensive plan for technological upgrading of classrooms has been developed, including the purchase of approximately 150 Touch e-SmartBoards with built-in webcams and onboard OPS PCs, as well as other specific equipment tailored to particular locations. Additional 32 classrooms have been technically modernized through individual projects, and "plug and play" projectors have been purchased, able to automatically negotiate the correct resolution for any device. Two new Educational Centers (Pharmacy and Health Campus) have been inaugurated and opened to the public, along with new Learning Spaces in addition to the two existing ones (KiroLabs Cravino and San Felice). On the software side, the University has identified and purchased a Campus video conferencing license, migrated teaching platforms to the AWS Cloud, and tested short-term purchases of student engagement platforms for use during in-class sessions. Emergency Response Units were also established locally in the Campus to minimize any inconvenience related to technological issues in classrooms.
2) Methodological and technological training for the Faculty - A small group of UNIPV decision-makers attended the course organized by the CRUI (Italian Conference of Rectors) Foundation: "Education Innovation in a digital scenario - Goals, tools, perspectives". Subsequently, decisions were made to offer training courses on new teaching methodologies and technologies to UNIPV Faculty. Participation remains on a voluntary basis, by now: 100 teachers have participated in the first year. Participants in the courses were offered a questionnaire regarding their satisfaction with the initiative and the quality of the courses. They were also asked if there were practical impacts on their classroom teaching after completing the course. All responses were positive. Finally, a Community of Practice on new teaching methodologies has been established.
3) Internationalization of the Campus – UNIPV has long ensured significant international projection with over 400 collaboration agreements with foreign universities and over 700 Erasmus agreements. However, it has recently renewed its participation in the University Alliance EC2U project and is leading the Alliance Digital Pedagogy package. Leading this package will involve organizing workshops, training weeks, and events on the topic with the participation of European stakeholders and experts. The impacts of this international approach will be significant on the entire Academic Community and will serve as a starting point for designing new initiatives.
4) Wellbeing programs for all stakeholders of the Community – The already extensive student orientation and assistance service conducted by COR (*Centro Orientamento*/Student Support

and Guidance Center) has been strengthened with additional funding and operational effectiveness.
The University of Pavia has also enriched this program with four additional initiatives: 1) Funding for Innovative Teaching Projects by Departments – In 2023, a competition was launched among Departments to fund Innovative Teaching projects (up to €25,000 per project, with a total funding of €192,000). The University's 18 Departments submitted 21 projects; 9 were funded. It was decided that this initiative would be re-funded every year.
2) Joining to National Digital Education Hubs projects – The Ministry of Universities has promoted the establishment of three National Digital Education Hubs. Italian universities, therefore, have the opportunity to join one of these hubs to initiate funded actions aimed at improving the higher education system's capacity to offer digital education to all university students, thereby facilitating those who need temporal and logistical flexibility. The initiative's goal is to enhance inclusion and increase the number of graduates in Italy. UNIPV is part of the EDUNEXT group (34 universities and 4 AFAM institutions).
3) Support to the Erasmus+ BIP (Blended Intensive Programme) project – With BIP, students can undertake at other foreign universities study experiences fully recognized in their curriculum within the Erasmus+ framework, offering a unique blend of virtual and physical mobility experiences. Sixteen courses at UNIPV have been opened to this program, and opportunities have been offered for outgoing students at six European universities.
4) Organization of thematic workshops and a National Congress on Digital Learning – In 2023, a workshop titled "Innovating University Teaching - Methodologies, Strategies, and Technologies" was organized on-site. About 100 teachers attended the plenary session, and four plenary reports by national and European experts were presented. Four thematic sub-groups were organized in the afternoon. The lively follow-up of this initiative was fundamental for organizing the following year's ISYDE (Italian Symposium on Digital Education) titled: “Lifelong Digital Learning and Education: promoting flexibility, inclusion, critical thinking and international exchange”. Ten speakers (seven of whom non-Italian) were invited to the symposium, which featured three plenary sessions (one per day) and three parallel sessions per day, with a total of 182 participants and 115 contributions.
From an organizational standpoint, preceded by other initiatives, the "Innovative Teaching" Working Group was established by the Rector in July 2022, including the authors of this article. Its actions and supervision were fundamental for most of the initiatives mentioned above.
In conclusion, it can be stated that the University of Pavia has started to respond to the challenges posed by the new global scenario. At the same time, much remains to be done, especially in fostering a new mindset across all components of the Academic Community. Such processes require time and reflection and cannot be rushed. However, the path has been embarked upon, and the first results are beginning to show. Considering the starting point and the time taken for the mentioned implementations, the achievements are deemed more than satisfactory, although the challenges posed by the rapid evolution of scenarios (i.e. use of Artificial Intelligence) will continue to be increasingly complex.

ID 199

Leveraging AI to Enhance Executive Functions through Mind Brain Education: a Theoretical Analysis

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Abstract

Background: This proposal delves into the pivotal role of Executive Functions in shaping human life and well-being, shedding light on both the beneficial and detrimental cognitive effects of digital tools, especially AI, on human cognition. Aim: The goal is to highlight the impactful role of educational institutions in fostering and sustaining executive functions while also leveraging AI-based educational tools designed to enhance memory, behavioral inhibition, and flexibility on one hand, and to stress that the goal is attainable when educators have well-defined objectives and robust pedagogical frameworks on the other hand. To this end, the transformative potential of Mind, Brain, and Education (MBE) pedagogical approach, grounded in neuroscience insights, is advocated. This approach has been further advanced and validated through research and educational initiatives at Harvard University. Its efficacy can be bolstered by evidence-based models, such as those derived from influential Hattie's meta- analyses providing valuable insights into effective teaching strategies, educational interventions, and factors that contribute to student achievement. Methodology: This proposal employs a theoretical analysis approach, integrating insights from diverse disciplines such as digital technologies, neuroscience, pedagogy, and learning assessment.

Keywords: Artificial Intelligence, Executive Functions, Mind Brain Education, Neuroscience, Evidence-Based.

Extended abstract

According to McLuhan (1967, 1994), no instrument is neutral. This same idea is poignantly highlighted by Crawford (2021), contending that AI, like atlases, portrays the world in a specific manner, reflecting the worldview of dominant powers, rather than neutrality. Moreover, digital technologies have significant potential to harm cognitive abilities by promoting superficial engagement and an illusion of competence (Carr, 2010; Sparrow et al., 2011; Fisher et al., 2015; Roediger & Butler, 2011).

Despite this brittleness of AI and the potential harms it can cause, there is an enthusiastic yet unfounded belief that it will soon replace humans in various cognitive and relational tasks (McQuillan, 2022). But, as a matter of facts, recent research has indicated a decline in the IQ levels of undergraduate students over the past several decades. A comprehensive meta-analysis conducted by Bob Uttl (2022) and his colleagues at Mount Royal University aggregated data from studies spanning from 1939 to 2022. Their findings revealed a steady decrease in the average IQ of college students, from approximately 119 in the mid-20th century to a current average of around 102, just slightly above the general population's average IQ of 100. This trend is particularly noteworthy as it contradicts the Flynn effect (1984), which documented a consistent rise in general population IQ scores throughout the 20th century.

The implications of these and similar findings are profound and institutions of education must reassess and adapt their curricula and academic standards to address the changing capabilities of their student bodies. This evolving landscape of education underscores the need for a more nuanced understanding of what constitutes intelligence and how it should be nurtured and assessed in the modern world.
In this context, having pedagogical models that integrate digital tools to enhance cognitive dimensions with effective teaching practices is crucial. A notable example comes from the Mind, Brain, and Education (MBE) approach by Tokuhama-Espinosa, teacher at the Harvard University, which combines insights from neuroscience, psychology, and education to improve learning outcomes. The core concepts of MBE focus on understanding how the brain learns, with an emphasis on cognitive development and evidence-based teaching strategies (Tokuhama-Espinosa, 2010; 2011, 2021).

Tokuhama-Espinosa's research presents, in fact, a close relationship with Hattie's ranking, a comprehensive synthesis of over 800 meta-analyses relating to various influences on student achievement. Hattie's work identifies the most impactful educational practices, such as cognitive practices, like cognitive task analysis to enhance learning. John Hattie is a prominent figure in educational research, celebrated for his ground-breaking contributions to the field of visible learning. This concept centers on identifying effective teaching practices and assessing their impact on student achievement. Hattie's methodology involves conducting extensive meta-analyses, drawing from an impressive database of over 2,100 meta-analyses, which encompass more than 130,000 studies and involve over 400 million students worldwide. Currently, his ranking comprises 256 influences, encompassing a wide array of factors pertinent to student learning and success (Hattie, 2023). According to this research, cognitive task analysis exhibits the highly promising effect size of 1,29, whereas effect size greater than 0,4 is supposed to accelerate student learning.

In the field of cognitive development, the foundational role of executive functions is to be considered prominent. The term *Executive Function* (EF), obscure only a few decades ago, is now encompassing a widespread use. There is a growing interest in targeting EFs for intervention, as their impairment is now considered a sort of hidden disability. On one hand, it's widely recognized that they are malleable throughout childhood and adolescence. However, few educational approaches capitalize on this malleability and specifically target them for intervention. Empirical evidence shows that few schools have structured learning environments to support their development. (Hill, Serpel and Faison, 2016). EFs, as top - down monitoring and controlling processes, are essential to learning, planning, reasoning, problem-solving, goal-directed action, and self-motivation. There is general agreement that there are three core EFs: they encompass cognitive processes like working memory, cognitive flexibility, and inhibitory control (Diamond, 2013; Miyake et alii, 2000). They are more accurate predictors of academic readiness and life success than IQ or any other performance markers: so, an important need EFs skills curricula is recognized (Blair and Razza 2007; Morrison et al. 2010; Ahmed et alii, 2018).

To address this growing need, we are witnessing on global scale the development of several platforms and applications implementing programs to assess and enhance EFs with the support of AI. Recognizing the essential role of pedagogical and didactic mediation, it's vital to grasp that technology alone cannot ensure skill transfer, and the efficacy of cognitive training programs in this regard remains uncertain. Therefore, the continued involvement of educators and teachers is paramount (Martinez Beltran, 2007).

Bearing this in mind, we present a curated selection of AI-supported tools and platforms aimed at enhancing executive functions. These initiatives arise from both philanthropic and private sector endeavors and represent contributions from various countries. Each entry includes key details such as the product name, primary objectives, access link, and accompanying research link, offering a diverse array of available resources.

ID 200

Enhancing Clinical Training in Pharmacy Undergraduate Education: Improvement of Pharmacy Students' Soft and Hard Clinical Skills

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The work of the pharmacist has always been characterized by a close connection with the patient. After the COVID era, this connection has become even stronger. In Italy, we are beginning to talk about the clinical pharmacist, a healthcare professional with advanced clinical skills who must work as part of an interdisciplinary team with physicians and nurses.

Despite this, Italian universities have always employed a very theoretical didactic methodology, focusing primarily on the acquisition of hard skills, which is not aligned with real-world needs.

In this context, the University of Pavia decided to propose didactic innovation and be one of the few universities in Italy to offer certified professional practical activities during training, stimulating innovation and adapting teaching to the current practical needs of the new roles of community and hospital pharmacists.

Thus, the main objective of this project is to propose a possible innovative didactic method that includes simulations of potential realities with which the student could be confronted in the future in order to implement the acquisition of the specific skills of the clinical pharmacist. In this way, each student, within the Pharmacy and Pharmaceutical Chemistry and Technology courses, could acquire soft skills that they often lack, including communication, leadership, positive attitude and behavior, management skills, teamwork, self-development, and self-improvement.

For the purpose of moving away from traditional frontal theoretical teaching, competence aims were assessed by dividing them into hard and soft skills with respect to the prediction of possible future job scenarios. The essential topics of clinical pharmacy such as patient assessment, medication management and communication skills were then examined to assess the structure, organisation and coherence of the project to facilitate a logical progression of learning. At this point, the simulation was organised by assessing the realism and authenticity of the scenarios to effectively transfer skills to real-world situations, which is why the integration of technology with the use of virtual patients and the heterogeneity of clinical cases was an important factor. Students were involved and then a formative evaluation was carried out.

The University of Pavia has therefore enabled the introduction of courses such as “Evaluation of Minor Pathologies and Remedies” and “Skills in Clinical Pharmacy”, which include practical tests, seminars and training sessions on the essential skills required in community and hospital pharmacy.

During the training courses, students learnt pressure measurement, electrocardiogram examination, administration of vaccines, COVID swabs and all activities relevant to clinical pharmacy. In addition, the student was able to participate in the course to acquire patient resuscitation skills by acquiring the 'Basic Life Support Defibrillation' certification.

At the end of the course, cardio-metabolic-cognitive screenings were organised for the population in order to do prevention, optimise treatment and offer the student a concrete reality by acquiring experience and skills.

In fact, population screenings were organised with the presence of medical and pharmacy students. The patient went to the stands to meet a student in order to carry out pharmaceutical reconciliation, assess parameters such as blood pressure, blood glucose, electrocardiogram, frailty tests and cognitive tests.

In order to give tools also to the professors, training courses were held for teachers on possible artificial intelligence software to set a teaching lesson based on simulations created by the software on possible real-life situations. This approach could allow each student to learn how to effectively use medications and solve a clinical case.

The University of Pavia also entered into a partnership with Paris-Saclay University and Trinity College Dublin to introduce a blended experience during the course, enabling the comparison of European realities and the exchange of teaching methodologies.

At the end of blended experience, the Objective Structured Clinical Examination (OSCE) test was proposed to student groups in order to carry out an assessment of skills to challenge knowledge and strategies learnt during the academic course and the new training courses offered. The project was scored by a satisfaction questionnaire administered to each student.

Throughout all the proposed activities, students encounter several challenges, including engaging in role play, communicating effectively with patients or caregivers using easily understandable terms, applying theoretical knowledge to solve clinical cases, assessing adverse drug effects, drug-drug interactions, and drug-food interactions, and suggesting potential modifications to dosage or drug choices to optimize therapy.

In conclusion, there is a pressing need to promote a change at the didactic level by using a methodology that departs from the concept of "theory" and "frontal lecture" by organising interactive lessons, simulating real clinical cases with which the student could be confronted in the future. It is also important to implement each student's knowledge of adverse drug effects, drug-drug interactions and drug-food interactions.

For example, it was observed that proposing real cases to the students, also thanks to the use of simulation softwares (artificial intelligence), stimulates their critical thinking, reasoning, and thus the acquisition of soft skills. This was also implemented by continuing to propose cardio-metabolic-cognitive screening where students not only had the opportunity to familiarize themselves with real patients and put into practice what they had studied, but also to develop communication skills, which students generally lack, by finding the most effective and simple way to communicate with patients.

The importance of this didactic innovation was also underlined by the increasing participation of the students, who consciously recognise some gaps they would like to bridge: from 20 participants in two years to 100 students per year, for a total of 327 participants in recent years during the cardio-metabolic-cognitive screenings.

Thus, it is crucial to introduce a holistic approach to healthcare, as well as emphasise the importance of interdisciplinary collaboration and effective communication for the acquisition of transversal skills.

ID 201

Clustering and Emerging Mentoring Models

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Abstract

Mentoring in schools is used both as an effective teaching/learning strategy between teacher and learner (Bird, 2001) and for the support of novice teachers (Mullen & Klimaitis, 2021; Lyons et al., 2019). More rarely it has been used in the context of school communities supporting each other, as in the case of mentoring experienced by the schools involved in the MenSI (Mentoring for School Improvement) project. The European Schoolnet consortium coordinated the project which involved 120 schools from six countries [Belgium/Flanders, Croatia, Czech Republic, Hungary, Italy, Portugal]. The main objective of the project was to promote digital innovation in schools using ICT but also, at the institutional level the involvement of small schools and schools located in marginal contexts with disadvantaged students, and to explore and analyze the effectiveness and sustainability of mentoring approaches. This contribution intends to describe the mentoring models that emerged during the experimentation among the Italian schools. After the end of the project funded by Horizon the project was extended for one more year due to the effectiveness emerged by the evidence and by the teachers' and school leaders' voices.

Keywords: Mentoring, Disadvantaged students, Digital Innovation, ICT, Marginal context

Introduction

The project aimed at qualitative research of models, both theoretical and practical, of mentoring and analysis of widespread policies to accompany schools in the use of ICT. The partners employed their school networks for a bottom-up dissemination of innovation through mentoring between schools that served as hubs in the MenSI project.

Research Methods and process

The Mensi project was primarily based on qualitative investigations of models of mentoring theory and practice and a policy analysis of school-wide mentoring approaches.
The sample was chosen according to criteria shared with the project member countries in such a way as to coalesce around the pathway schools with a similar profile both in terms of the use of technologies and in terms of experiences of accompanying experimentation in the use of teaching methodologies.
Based on the school criteria specified by the consortium, the partners have organized the school selection process independently in the 6 MenSI pilot countries (BE, CZ, HR, HU, IT, PT). This has resulted in a total of 24 mentor schools and 96 mentee schools which will work in clusters, each composed of 1 mentor school working with 4 mentee schools. Each country has 4 clusters. The sample of schools taking part in the project was selected from among the schools in the Indire networks (Avanguardie Educative and Piccole Scuole) through a national call for applications in which internationally agreed selection criteria were indicated. The profile of the sample school had to respond to five Indicators (Categories) taken from the SELFIE (Leadership and school capacity for digital innovation; Teacher; Students; Collaboration, partnerships and networking; Digital Resources/Infrastructure) broken down into five criteria for each indicator that made it possible to identify schools with a robust experience of the use of technologies at

systemic didactic level and mentoring skills both inside and outside the school.
From this ideal profiling, four schools were identified as ‘Mentor Schools’ or Advance schools capable of transferring and scaling up digital technology-related innovation in school. At the level of individual teachers, networking and peer-to-peer mentoring - an experienced teacher guiding and supporting a less experienced one - are effective mechanisms for professional development. However, at the whole-school level, these approaches are less widespread despite evidence of effectiveness. 16 “Mentee Schools”
The implementation of the content related to the mentoring processes was left to the choice of the Mentor schools according to the specific experience and expertise of each school. The training of Teachers made use of the Moodle environment. The schools were grouped according to the criterion of belonging to 4 regional clusters. (Emilia-Romagna, Sicily, Campania, Apulia, Lazio and Sardinia). Within each Cluster, a Mentor School/Institute was identified, which subsequently guided the actions of the other Institutes involved in the role of Mentee. The activities of the 4 clusters were set up following the planning of the 4 phases of the Deming Cycle (Plan-Do-Check-Act).

Emerging mentoring models

School-to-school mentoring entails holistic, active collaboration between two or more establishments for specific purposes, such as professional development, to overcome isolation or overall organizational improvement. Such mentoring often takes place through school networks but there can be large differences in outcomes, depending on factors such as whether participation is voluntary or compulsory, instigated externally or internally, or recognised and supported by education authorities. It is therefore important to understand better how ‘top-down’ and ‘bottom-up’ approaches work and to explore different incentives and rewards that can motivate schools to become engaged in whole-school peer learning.

Teacher training made use of the Moodle environment. The users were registered and grouped according to the criteria of belonging to 4 Clusters. (Cluster 1 Emilia Romagna, Cluster 2 Sicily, Cluster 3 Campania, Cluster 4 Puglia, Lazio and Sardinia). Each Cluster was characterized by one main theme on which the research action carried out in the following months was focused. The activities of the 4 clusters were set up following the planning of the 4 phases of the Deming Cycle (Plan-Do-Check-Act) and were independently timetabled, setting up the events-meetings at agreed times and intervals based on the needs of the members of each cluster, under the guidance of the Mentor School. For each phase, a Cluster-specific Webex meeting was scheduled.. These activities were also enriched with moments of asynchronous communication.

The comprehensive Mentor schools selected for the mentoring process emphasized the importance of the involvement of the School Leader as part of the process ensuring an overall vision and as a driver of change capable of analyzing the processes initiated for improvement and facilitation of formal and informal exchange. In the Bobbio school, the vision was elaborated by the staff who determined the institute's planning (plan) then shared it with the school board. In Giovanni XXIII Mentor School the School leader. The lower secondary schools pointed out the importance of identifying Mentor teachers who can analyze training needs and encourage colleagues in sustainable activities, considering their proximal development and creating conditions for professional growth that are challenging and stimulating.The schools indicated what tools were needed to plan and monitor the mentoring process, in addition to the sharing of a planning form, the logbooks and the SWOT analysis scheme were important for documenting the activities.

To scale up the innovation in the school a large number of participants must be involved. To produce a systemic change it is necessary to arrive at a cyclic cascading process over time that fosters the growth of the school community. It is necessary for the teachers involved to be open to exchange, to Benchmarking, learning from the experience of others, picking up the strengths of the best colleagues to adapt them to their own reality, and to Benchlearning, learning from the strengths of other organisations, seeking inspiration for one's own work and learning from the mistakes of others, trying to avoid them. These elements are valid between colleagues from the same school but also within the exchange between schools the visiting of schools is fundamental, as it allows one to enhance one's own experiences and nurture other school visions. The tools for planning, initiating and testing the mentoring process turn out to be a fundamental part of the process.

In the secondary schools, Mentor schools included ICT in the curriculum and/or school pedagogy in their support process. The schools highlighted the importance of sharing resources and the readiness to learn from others. According to ISIS Europa, the cluster becomes a 'producer' of collective knowledge, reflections and professional practices that become resources. ISISS Majorana reports for the sharing and exchange of resources, the use of apps and dedicated platforms but also videos, collaborative lessons, use of augmented reality, storytelling, hyperdocs and shared templates.

Findings and conclusion

The evidence collected at the end of the two-years project funded with Horizon allowed the research team to identify two main aspects. Firstly teachers' collaboration increased in terms of exchanging teaching resources and sharing good practices in a systematic way. This approach had an impact on the scaling up of digital innovation. The second aspect that evidence highlighted is the fact that digital innovation can be a driver of change if it is not an isolated event but requires a systemic approach that comes from the bottom, and involves all the school community. The effectiveness of the project activities led the research group to ask for an extension of MenSi main activities supporting it with internal funding.

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ID 202

Didactic Innovation for the Development of Skills in Clinical Pharmacy and Clinical Pharmacotherapy Practice

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University of Pavia recently introduced a didactic innovation in its pharmacy and medicine courses to enable the acquisition of new clinical skills required by the professional world. The university was one of the first Italian universities to introduce didactic innovation in these courses to allow students to improve the theoretical knowledge learned during their studies and apply them in their practices. With this new approach, the students get a chance to learn the new dynamic approaches based on interaction and comparison with professors from all over the world.
Therefore, in collaboration with the professors, students can assess the skills and knowledge learned while using them to fill in the gaps so that they are prepared to take action thoroughly in any real-life context.
During this study, the importance of "professionalising and promoting new teaching techniques" is acknowledged which allows the students to obtain the necessary clinical skills alongside theory, research and new approaches worldwide.

The proposed didactic activity can be divided into three main parts.

The first part involves presenting a "case report" using a digital medical record to provide objective and pharmacological anamnesis information about a patient. This enables students to understand the patient's overall condition. The lecturer assumes the role of the caregiver/patient, while students participate by asking essential questions to establish a therapeutic plan. At the end of the lecture, students' hypotheses are compared with the actual actions taken by health professionals, allowing them to learn from the details missed or mistakes identified.
The second part of the activity is innovation. It involves a role-play simulation of a multidisciplinary team (MDT) scenario. Each student is assigned a specific role and provided with a personal script to study privately for 10 minutes. The roles include the patient, caregiver, general practitioner, specialist physician, pharmacist, and an observer.

The patient's role is to empathise and ask healthcare professionals for explanations of technical/scientific terms often taken for granted, while the caregiver supports the patient and the health professionals through the use of information simulating a real scenario. The general practitioner assesses the patient's health status and refers them to the appropriate specialist, who investigates the diagnostic question. The pharmacist evaluates the prescribed therapy. The observer appraises the MDT performance in terms of communication, language use, ethics, and collaboration. The observer can participate three times during the MDT performance, after which the students can discuss any issues.
At the end of the simulation, the observer provides feedback on what could be improved.
The third and final part consists of students creating pre-class clinical case quizzes. These cases are then presented and discussed, with additional support from an AI tool called Zorgscenar.io, which simulates patient scenarios and provides insights for evaluation and further discussion.

As said before, this project was one of its first throughout Europe and the first in Italy. Thus, there were several challenges identified, both through student reflection and observer assessment of the role play. Overall, many of the issues that are faced relate to the communication method used by the students during role play as “healthcare professionals (physician or pharmacist)” towards “colleagues”, “patients” and “caregivers”. The language used by the physicians and pharmacists was too scientific and professional, resulting in a lack of understanding from the patients and caregivers as they are not supposed to follow medical terminology. Communication between colleagues was also problematic, with difficulties in proactive interaction and idea exchange. The discussions and the decisions among the professionals were made in front of the patient and the caregiver, which caused tension and discomfort in both parties. The physicians and the pharmacists couldn’t evaluate the case thoroughly while the patient and the caregiver were afraid and nervous. The evaluation of the clinical case had gaps in biological values, causing delays in the role play and hindering communication among colleagues. Problems also arose in the analysis of the clinical case, drug therapy reconciliation and therapeutic optimization because of the issues stated above.

In this context, the real importance of the multidisciplinary team (MDTs) was highlighted, as the pharmacist's gaps regarding pathologies and biological values were filled by the presence of the physician, and the physician's gaps regarding drug-drug interactions and adverse drug events were clarified by the pharmacist.Thus, proactive communication in a multidisciplinary team was found to be crucial for a critical exchange of ideas and a proactive collaboration.
Although there were many issues faced during this project, as students we were able to see the potential in the MDT concept. We believe that, with enough practice, this concept can start and spread through the medical world with great benefits to both patients and professionals. In order to achieve this, the change must start from the university education. Therefore, we can clearly state the importance of a didactic innovation; involving students in active learning through case discussions, role-playing and the development of critical thinking - all by involving the creation of a true multidisciplinary team.

Didactic innovation should promote the organisation of lectures on communication with patients, caregivers and all other healthcare professionals in order to learn how to be a “translator” of scientific language, how to give bad news and how to work in a team in which each member has a role and a specific responsibility of that role (pharmacist, doctors, nurses, patient, caregiver... etc). Those lectures, which should be organised regularly throughout the course of study in order to create correlations with practical training and theoretical knowledge, will consist of :

- Role-plays between pharmacy, medicine and nursing students (as done with Prof. Pouls in our project),
- Study of realistic clinical cases discussed in practical lessons (starting from early years of education with efficient background of patients, involving both the professors of medicine and pharmacy),
- Collaboration with AI (accepting the presence of AI and working in collaboration with it as another “discipline”, turning AI to our own benefit).

Other than the inclusion of new practices into the courses within the university, it is important to consider MDTs in a world-wide perspective. MDT practices in the world, especially within Europe, should be explored and studied in order to bring the best innovations to the University of Pavia and Italy. In order to achieve this; the units of MDT (pharmacists, doctors, nurses, etc.) can gather

together with the students in order to find the most suitable model to perform in real life. We suggest this could be done via seminars, panel discussions and workshops that are engaged within the medicine/pharmacy programmes and held obligatory as the part of a specific chosen subject. More into this, inter-institutional projects could take place in order to widen the students' perspectives from all around Europe and the world.

Furthermore, in the future, we expect that new digital teaching methodologies will be presented through multimedia channels, enabling students to improve knowledge and strategies acquired during their course of study.

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A Simple Extension to Make Teacher Interactions Visible During Lessons in Interactive Programming Environments

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Abstract

When learning how to use interactivity in the computer programming classroom, students can find it challenging to follow along when the teacher is presenting interactive steps on an overhead projector. This especially true when it's unclear whether the behavior shown on the projector is due to an interaction activated by the teacher or to an animated sequence. To address this issue, we designed an extension to be added to the programming environment. In this study we implemented it for two famous block programming languages such as Scratch and Snap where interaction is an important element. By using this extension teachers can easily activate, position, time, and adjust transparent icons on the stage that show keyboard and mouse interaction and make it clear which interaction element has been activated and for how long. Compared to other systems, like using tools designed for the specific operating system used in the classroom, the proposed extension is more flexible as it can be used in all operating systems where the programming language is available and, moreover, the same project can be used by both the teacher to show the effect of the interactions during the lesson and by the students to learn specific types of interaction without being bothered by annoying icons superimposed to their running projects. By using this extension, teachers can create a more engaging and less frustrating learning environment for their students.

Keywords: visible interaction, interactive programming language courses, Snap, Scratch

Extended Abstract

Interactivity is an important element of modern programming languages designed for creating apps and games. However, when teaching interactivity in the classroom, educators often struggle to effectively demonstrate how an app or game responds to specific interactions using an overhead projector. Simply describing what key(s) will be pressed, or when the mouse will be clicked, or how long it will be dragged, doesn't sufficiently clarify to students how the interaction functions. Following along with an interactive project on an overhead projector can be challenging for students, particularly when it's unclear whether the project's behavior is due to teacher-initiated interaction or a programmed animation sequence. Even using mouse highlights, such as pressing the CTRL key on Windows computers, isn't entirely effective, as students must simultaneously listen to the teacher and observe the screen, hindering their comprehension.

The solution to this problem lies in allowing students to clearly visualize both the outcome and the precise type and timing of interactions on the screen. This enables them to use their vision alone to fully understand the interaction without distraction, facilitating a deeper grasp of its meaning.

Various systems and tools, such as AutoHotKey, have been suggested to display specific overlays on the screen, illustrating the user's interaction with the environment. However, an operating system-independent tool has yet to be proposed. Consequently, transitioning between operating systems necessitates teachers to utilize and configure different tools, even when demonstrating interactive programming environments available across multiple platforms or online.

In response to these challenges, we have designed and implemented a support tool for two widely used visual interactive programming environments for beginners: Scratch (http://scratch.mit.edu) and Snap (http://snap.berkeley.edu). While Scratch benefits from a well-designed and documented addon system, ScratchAddons (https://scratchaddons.com/), which functions as a browser extension and fulfills many needs of computer programming teachers (Federici et al., 2023) even for LD students (Federici et al., 2022), Snap offers a comprehensive API for working with GUI elements (Moenig and Romagosa, 2024), along with a specific extension called BloP (Federici et al., 2015), which already includes mechanisms for quickly implementing a visualization system for keyboard and mouse interactions. Leveraging the BloP extension enables the visualization system to be entirely implemented using Snap's block language, facilitating easy customization for teachers that are not aware of Snap's internals.

Our extension allows teachers to easily activate and configure how key icons and mouse pointer icons appear on the Stage (the GUI element used by Scratch and Snap to display running projects) during interaction. These icons provide clarity on:

- which key or key combination has been pressed and for how long
- whether the mouse button has been pressed and released
- whether the mouse pointer has been simply clicked or it had been used to drag an element on the Stage

These features aid students in better understanding how the project responds to various actions initiated by the teacher, enhancing their ability to follow explanations.

The extension proves particularly beneficial for real-time interaction with projects. By displaying icons on the stage during interactions, students can more easily follow along and minimize misunderstandings. Furthermore, the extension enables teachers to adjust icon position, timing for fade in/out effects, and transparency to suit their and their students' needs, offering flexibility crucial for effective teaching across different scenarios.

In summary, this new extension is a valuable addition to Scratch and Snap for classroom use. It equips teachers with a simple yet powerful tool for presenting interactive projects effectively. Beyond facilitating student comprehension and engagement, it enhances the learning experience and deepens understanding of programming concepts. By leveraging this extension, teachers can cultivate a more engaging and less frustrating learning environment for their students.

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ID 204

Engaging and Interactive Strategy to Train for Pharmacy Practice

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Keywords: Case study, Pharmacy Education, Dispensing and Counseling Skills, Role play, Teamwork

The always more relevant role of the pharmacist brings new challenges and opportunities requiring constantly updated and innovative didactics.[1] Role-playing in patient care scenarios is a useful active learning strategy improving knowledge and communication skills of students.[2]

Since 2018, role-playing and active learning in the 5-year doctor Pharmacy curriculum at the University of Pavia favor the acquisition of dispensing and counseling skills, essential in the professional world, through the creation of practical cases at the bench in pharmacy. In the context of the "Applied Pharmacology and Over-The-Counter Drugs" course, at the fourth year of the Pharmacy curriculum, the classes (around 150 students in total) are organized in small groups (4-6 persons/each), composed by "pharmacists" and "patients and/or caregivers". Each team has an appropriate time (e.g., 2 weeks) to discuss and create a real life-based case starting from pharmaceutical/medicine provided by the teacher. Then, in half a day and in a classroom, each team makes a setting and plays its own case (either alive onsite or online/by a recorded video), like at the pharmacy bench. Teams are allowed to choose playing one or two practical cases, starting from either a medical prescription for a specific drug or the symptoms referred by the patient(s). Each scenario is then immediately discussed and valued by a jury composed by pharmacologists, physicians, pharmacists, based on 1) the clarity and realism of the representation; 2) the accuracy, precision, and appropriateness of the information provided by the "pharmacists"; 3) the originality of the dialogs and situations; 4) the number and complexity of themes/topics presented by the players. For each aspect, the evaluation is based on a 5-point Likert scale (1 = poor to 5 = excellent). In all cases - alive mise-en-scene or recorded video - the debate and the correction of errors are extemporaneous, taking advantage of the complementary and multidisciplinary experiences of the evaluators; their comments offer to the student useful opportunities to optimize the dispensation, to improve knowledge in pharmacology (and beyond), to understand the physicians' choice and prescriptions, and to be more aware of the future pharmacy practice. This experience takes place just before the beginning of the practical internship in pharmacy; its main goal is to improve training for both the dispensation of drugs – with or without a medical prescription – and counseling; besides, it aims to enhance students' confidence in public speaking. Cases presented and final discussion offer a precious opportunity to raise awareness of the pharmacist's key role in compliance improvement, prevention of drug-drug interactions, prescription appropriateness, disease prevention. This activity comprises topics discussed during the "Applied Pharmacology and Over-The-Counter Drug" course as well as previous or parallel Pharmacology courses, allowing the students to improve their

knowledge and connection of the concepts learnt along the Pharmacy course. Taking into a special account specific themes (e.g., fragile categories of patients, SALA drugs, generics, interactions between drugs and diet, lifestyle, low compliance due to multiple causes), this initiative contributes to the global health of patients, being aware students of peculiar and critical situations.

This on-site activity is transmitted on Zoom to favor the participation of students abroad, video recorded, and then uploaded to a password-protected website, as didactic material of the course. During the lock-down for the Covid-19 pandemia, the initiative was carried online only, and it contributed to maintain social interactions among students who had to set up a common video by playing each from own house/studio. Along these six years, most students participated to this voluntary didactic activity, and their feedback was extremely positive: they refer that it promotes teamwork and collaborative learning, inclusion, engagement of students from other countries and cultures, a more empathic and self-confident attitude of the players, critical thinking and greater motivation to study, fun of attendees, and in some cases even higher scores at the final examination (besides, the teacher rewards each participant with 1 point bonus in the final exam score).

The classes/students change every year, thus allowing the creation of new cases and original dialogs, with updated information also regarding the type of dispensation or other formal aspects. Our findings generated ideas for activity changes, e.g., providing in advance videos from previous years may help current students to learn about their peers' experiences; giving micro-playing assignments on specific topics during the course may favor critical-thinking and creation of adequate scenario;[3] increase the use of technology and informatic support for a high-quality final recorded video; including actual patients as evaluators of a scenario, as experienced in the past, to improve the realism of the activity.

Last, but not least, the long series of cases played during these years represents a useful and rich source of inspiration to build up the "Virtual Pharmacy" project, a digital innovative didactic strategy based on the MyDispense simulation software that is being created for the first time in Italian version just at the Department of Drug Sciences of the University of Pavia. The two methods are complementary and innovative tools to engage, motivate and train students for pharmacy practice.

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ID 206

Il peer feedback come leva per il miglioramento della comprensione del testo nella scuola primaria

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Riassunto

La ricerca in ambito pedagogico-didattico, negli ultimi anni, ha focalizzato la sua attenzione sulle opportunità derivanti dalla partecipazione degli studenti ai processi valutativi, aprendo la strada al costrutto di "valutazione per l'apprendimento", inteso come evoluzione del più noto concetto di "valutazione formativa". Porre al centro del momento valutativo gli alunni risponde, infatti, al duplice scopo di far maturare loro un grado di consapevolezza maggiore rispetto agli oggetti di apprendimento e, allo stesso tempo, di guidarli nello sviluppo di una personale *literacy valutativa* (Ducan & Buskirk-Cohen, 2011). In questo stesso scenario, le ricerche hanno evidenziato il ruolo principe del feedback nei processi di apprendimento (Black & William, 1998) e, in particolar modo, hanno inteso sottolineare i benefici derivanti dall'implementazione, nella progettualità didattica, della valutazione tra pari (Marzano, 2023). Nonostante tali evidenze, le ricerche empiriche sulla valutazione fra pari risultano piuttosto limitate in ambito scolastico e restano perlopiù relegate all'ambiente universitario. Alla luce di queste premesse, questo lavoro approfondisce la pratica del peer-feedback nel contesto della scuola primaria con lo scopo di indagarne gli effetti prodotti sulle capacità di lettura e sintesi degli studenti.

Parole chiave: peer-feedback; valutazione; literacy valutativa.

Peer feedback as a lever for improving reading comprehension in primary school
PEER FEEDBACK AS LEVER FOR IMPROVING READING COMPREHENSION IN PRIMARY SCHOOL

Abstract

In recent years, research in the pedagogical-didactic field has focused its attention on the opportunities arising from students' participation in assessment processes, paving the way for the concept of "assessment for learning," understood as an evolution of the better-known concept of "formative assessment." Placing students at the centre of the assessment moment serves the dual purpose of increasing their awareness of learning objects and, at the same time, guiding them in the development of personal assessment literacy (Duncan & Buskirk-Cohen, 2011). In the same scenario, research has highlighted the central role of feedback in learning processes (Black & William, 1998) and, in particular, has emphasized the benefits of implementing peer assessment in didactic planning (Marzano, 2023). Despite these findings, empirical research on peer assessment is still limited in the school context and mostly confined to the university environment. Considering these premises, this work delves into the practice of peer feedback in the context of primary school with the aim of investigating its effects on students' reading and synthesis skills.

Keywords: peer feedback; assessment; assessment literacy.

ID 207

Digital Communication and Hybrid Intelligence: the Impact of Generative AI on Lifelong and Recurrent Higher Education

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Keywords: AI generative, lifelong learning, learning on the job, Master, digital communication

Abstract

The aim of this paper is to underscore the significant elements of an approach to lifelong and recurrent higher education that enables the best possible response to the impact of generative AI on intellectual and creative professions. For the analysis, reference will be made to professions in digital communication, which consistently experience conditions that tend to precede and extend into other professional domains. For these professions, generative systems are delineating the coordinates of a veritable paradigm shift that impacts the foundations of the professional dimension. These systems can function as true intelligent assistants, offering new modes of information retrieval and producing code, images, videos, text, voice, and music. In this perspective, a set of references emerges for the professionalizing higher education of universities, for the design and management of Master's programs, especially those related to digital communication. These references pertain to: the relationship between the breadth of fundamental knowledge and the depth of specialized knowledge; the acquisition of general knowledge and operational skills in co-designing and implementing with the aid of systems, both individually and in groups; the anticipation of the most innovative forms of on-the-job learning; and the forms of connection between Master's programs and the Third Mission.

In an era characterized by the pervasive and relentless impact of digital innovation, learning and knowledge dissemination have long been the focus of analysis by economists, sociologists, and scholars of organization, work and professions. Many researchers from these disciplines, albeit from different perspectives, not only emphasize the crucial importance of continuous education for economic and social development but also agree that it represents a fundamental and defining aspect of future education.
The aim of this paper is to underscore the significant elements of an approach to lifelong and recurrent higher education that enables the best possible response to the impact of generative AI on intellectual and creative professions.

For the analysis, reference will be made to professions in digital communication. For these professions, AI generative systems are delineating the coordinates of a veritable paradigm shift that impacts the foundations of the professional dimension.
In the professional field of digital communication, there is a systematic experimentation with generative AI systems that can function as true intelligent assistants, offering new modes of information retrieval and producing code, images, videos, text, voice, and music.
Their systematic use embodies the concept of hybrid intelligence, representing a new relationship between humans and machines in intellectual and creative production. Achieving quality results with these tools requires critical thinking skills, strong domain knowledge, specific competencies, and solid practical experience.
Professions in digital communication, which have been significantly and rapidly impacted by all digital innovation, serve as a particularly useful reference for discussing lifelong and on-the-job learning because they continue to experience professional dynamics that progressively extend to other work sectors. In that field, factors are at play that progressively extend to other professional domains: technology evolving from tool to

an organic cultural component of an interdisciplinary approach, project culture, instability, precariousness, and rapid obsolescence of knowledge.
In Web and digital communication companies, regardless of their size, learning by doing takes on forms reminiscent of apprenticeships and is combined with entirely contemporary forms, such as participation in peer-to-peer-based communities of practice. This hybrid corporate training, which relies more on coaching and mentoring than traditional educational actions, strengthens not only «and perhaps not even primarily [...] transferred knowledge and skills, but, rather [...] metacompetences, contextual competences, and the reinforcement of professional identity. It is these factors that make the difference between a traditional worker and a 'knowledge worker'.» [Cesaria, 2008, p. 124]. Furthermore, hybrid forms of on-the-job learning are closely tied to the professional context and professional identity.

In this perspective, a set of references emerges for the professionalizing higher education of universities, for the design and management of Master's programs, especially those related to digital communication.
Firstly, the nature and outcomes of interaction with these systems recommend that the breadth and robustness of fundamental knowledge be more carefully cultivated than the depth of specializations.
Design skills must encompass both general issues of interaction with systems and concrete co-design and co-implementation experiences with these systems. This approach allows for the growth and testing of knowledge, critical thinking skills, and judgment autonomy along with operational capabilities.
The ability to collaborate with systems must grow alongside that within the working group, which remains the key to the success of any design activity, particularly in digital communication.
The educational path should prepare individuals for engaging in the most peculiar and innovative forms of on-the-job learning, such as participating in communities of practice. Attention to the concrete dynamics of the professional dimension is an essential tool for intervening in the educational process, the effectiveness of which can be enhanced by foreseeing forms of connection between Master's programs and the Third Mission.

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ID 208

Higher Education Crisis - Will Technology Save Us or Finally Finish Us Off?

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Keywords: Higher Education, Generative AI, Futurism, Online Learning

In recent years, university education has navigated a complex landscape, striving to be innovative yet safe, inclusive yet selective, and thought-provoking yet metricised. This trend was already underway in Western higher education before the COVID-19 pandemic, which further accelerated shifts in educational and cultural practices. Amidst these challenges, the rapid development and widespread adoption of digital technologies, especially generative AI, present both monumental opportunities and formidable challenges. This talk seeks to explore whether technology will be the saviour of higher education or its ultimate disruptor.

The introduction of tuition fees in some European countries and the rise of consumer perspectives in higher education have transformed students and their parents into active consumers, demanding value and often influencing curricular content (Civera et al., 2021). This is exemplified by movements like "Decolonise the Curriculum," initially started by students at the University of Oxford to diversify curricula and increase representation (Winter et al., 2024).

Technological advancements have made education consumers expect convenience similar to online shopping, a stark contrast to the traditional complexities of accessing higher education. Meanwhile, the student demographic is becoming increasingly diverse. Universities are expanding their global outreach, partly to maintain prestige and partly in response to the rising education standards in countries like China and India, which are now producing more local graduates. Within their home contexts, universities are urged to act as agents of social mobility by broadening access to diverse student groups. This involves collaborations with schools and colleges, offering bridging courses, and tailoring offers to students' backgrounds.

The pivot to online learning during the COVID-19 pandemic marked a significant shift. It catalysed an evolution in digital and pedagogic practices, pushing forward online and hybrid learning models that might have otherwise taken decades to mainstream. Most universities are now investing in developing entirely online courses and adapting to a potentially permanent shift towards hybrid learning for their face to face courses, amidst the uncertainties of global travel and the precarity of faculty employment characterised by short-term contracts and increasing industrial action. The online and hybrid learning model, necessitated by the pandemic, is here to stay. It has fundamentally changed the landscape of higher education, with many universities choosing to commercially partner in this space with Online Programme Management companies. Into this world in November 2022 stepped generative AI, and in particular chatbots such as ChatGPT, with rapidly evolving capabilities empowered by Large Language Models. These pose significant challenges and opportunities. The technical report on the GPT4 model showed it can easily handle many traditional assessments used in higher education (Achiam, J. et al., 2023). The models continue to evolve and their use isn’t easily identifiable.

The initial reaction to this within the higher education sector within the UK has been mixed. At the grass roots level, academics are both excited and wary of the challenges tools like ChatGPT pose in regards to traditional forms of assessment for example (Mapletoft N. et al., 2024). Yet most can see these technologies will have a lasting impact, and to maintain relevance with employers and with their students universities need to work to educate, evolve and embrace these systems in teaching, learning and assessment (Russell Group, 2023).

Digital technologies, such as generative AI, promise to enhance learning through personalised and adaptive learning systems that can cater to individual student needs, thereby improving educational outcomes. However, the integration of technology in education is not devoid of challenges. It disrupts traditional teaching methods and could potentially lead to significant displacement within the educator workforce. Ethical issues such as data privacy, algorithmic bias, and the digital divide pose significant risks, as does the environmental impact of the use of such systems. Additionally, there is a growing concern about the erosion of the identity and autonomy of educators and learners in a highly digitised context.

In this talk we will explore these seismic changes by comparing them to other changes which at the time were thought to pose existential threats to higher education and consider the lessons learned before bringing this learning to bear on the challenges and opportunities presented by generative AI. In this exploration, we'll consider how universities are becoming more agile through often partnering with a variety of companies working in the digital and online learning arena and contemplate the necessity of this. We'll move on to talk about current examples of how research into teaching and learning is broadening our understanding of the potential benefits of generative AI including how AI is transforming teaching methodologies, assessment procedures, and the personalisation of learning. As we prepare our graduates for employment, we'll examine how higher education can adapt curricula to prepare students for a future where AI will play a central role in the workplace.

We'll conclude with some thoughtful recommendations for higher education institutions to adopt a critical and ethical approach to technology integration through embedding the concept of critical digital literacy through their curricula.

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ID 209

How can Digital Methods Help Professionals Meet the Challenges of the SDGs?

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Keywords: pedagogical innovations, green transitions, faculty development, lifelong learning

Digital education covers a wide range of methods for using digital technology, as expressed in the topics for this Symposium. We could add many more topics, but in this talk I will focus on pedagogical innovations, green transitions, faculty development, and on lifelong learning as the principal sector.

The significant contribution that digital education can make is to improve both the quality and reach of education. Currently, 66% of the world's population has access to the internet, of whom >90% use a mobile device to do it (Forbes 2024). Access is expected to rise to 99% by 2029, far faster than our human political systems will be able to organise the buildings for universal basic education, which is the UN Sustainable Development Goal for Education for 2030. The digital divide will remain an issue, due to the inequalities of provision of energy, quality of device, and cost. However, for HE we must be resolutely focused on improving the quality of the digital education we provide, and moreover on using its reach to help us meet the monumental challenges of the UNSDG framework not just for SDG4 on education, but overall.

The potential for digital education to make an effective impact on student learning - in all sectors – has never been fully optimised by educators, and yet the potential is growing every day, with more powerful and more challenging technologies being developed at a pace that completely outstrips our capacity to learn how to use it well. How do we rise to this challenge?

My proposal is that we do it collaboratively. In science and scholarship university staff are experienced in working together to advance knowledge and understanding, primarily through research journals and conferences – increasingly run online. We could work in a similar way to develop teaching community knowledge of how to optimise digital education. We do have the technology to support professional collaboration among teachers. The talk will introduce the CoMOOC model, a 'co-designed massive open online collaboration', using MOOC platforms to organise the process of collaboration. That is a reasonable equivalent of the journal process. The equivalent of the journal paper is clearly not a journal paper. We could not ask overworked teaching academics to produce, or even read, journal papers on the latest way of using the latest technology in their teaching. However, we have developed an equivalent digital space, the Learning Designer. The talk will also introduce this online tool for supported development of learning designs that make optimal use of digital technologies, enabling teachers to build on each other's work, test and share improved designs, and do it in a simple and efficient way.

Working collaboratively in this way, as professionals seeking to keep pace with digital opportunities, we could potentially enlist the whole global teaching community in driving our own innovation – not being assailed by the latest whim of the tech giants, but driving our own innovation.

But what would count as using digital methods optimally? The talk will argue that the significant value is the active and social learning they can support – this is what distinguishes them from other educational methods. There is now a vast library of impressive websites, documents, images, videos, and podcasts on the internet that give learners access to the topics they want to learn, but they are just that, a library. The process of learning complex ideas and high level skills demands much more. It requires the continual processing of concepts and practices in relation to an intended goal, and they need help with how to do that. Digital methods can be interactive: they can adapt to and evaluate learner input for active learning, and can link learners in communication for learning through discussion, and can provide the tools for digital creativity for collaborative learning through both practice and discussion. Fundamental to the process of learning is this iterative series of goal-oriented actions with feedback from both the digital environment and from other learners. The

Conversational Framework, based on a century of educational research, formalises this process.
It is important to develop our digital innovations on a foundation of the research on what it takes to learn. This part of the talk will illustrate the point in terms of contrasting types of digital interactions, to show how well each one supports the iterative processes of active and social learning in comparison with learning through a library. Using the simple digital tools of CoMOOCs and the Learning Designer it then becomes feasible, not just for university faculty development, but for all schoolteachers, and trainers throughout business and society, to collaborate on developing our responses to the digital opportunities now and in the future.
Finally, we return to the overarching question of how digital methods can help professionals meet the challenges of the SDGs. The UNSDG framework presents a powerful challenge to universities across the world. Universities are responsible for developing the future professionals, who will have to contend with redeveloping existing goals and practices if we are to ever to manage the Green Transition by controlling the destructive climate crisis... among other emerging world crises. More than that, we also have to provide lifelong learning for all the current professionals contending with these issues, helping them to use the research the universities are producing. Therefore, HE has a key role to play not just for universal basic education but for lifelong learning across all the other SDGs as well.

The future imperatives would therefore be to:

1) trust the teachers!
2) use the technologies we have for teacher professional development in innovative digital education.
3) and for professional collaborations on sustainability.
4) invite education leaders in all sectors to recognise the unique role teachers have here.
5) give them the time and the incentives to collaborate on pedagogic innovation, as we do in science on every other kind of innovation.

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UNSDG web site https://www.undp.org/sustainable-development-goals

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Digital Citizenship as a Public Policy in Education

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Keywords: digital citizenship, inclusion, digital education

What is Digital Citizenship?

With the increasing influence of the Internet in our everyday lives, society needs to answer new questions and face new challenges. Fake news, hate speech, cyberbullying, grooming, the use of personal information through algorithms and unethical uses of algorithms and AI, are key issues for the 21st century.

However, the Internet also has an enormous potential and offers great opportunities. Schools and teachers can teach how to use social media to promote inclusion and prevent cyberbullying. Schools and the teachers can use technology to teach how to search for and use reliable information on the web and avoid fake news. Schools and teachers can use the Internet to promote pluralism and diversity against discrimination and hate speech. Schools and teachers can explain how algorithms work and teach about the way they use the personal data left by the users on the web. Schools and teachers can use the Internet to promote collaborative work, creativity and participation. Schools and teachers can use technology to teach computational thinking and programming and prepare students for the 21st century jobs they will have when they graduate. All of this is precisely what *Digital Citizenship* is about.

A digital citizen is able to understand the principles that govern the digital world, to analyse the place of technologies in society, their impact on our daily lives, their role in building knowledge and their uses for social participation. A digital citizen knows how to make a reflexive and creative use of the Internet, both for critical analysis and for democratic participation.

Digital Citizenship for Digital Inclusion

For many years, digital exclusion was explained only by the lack of access to the Internet. The challenge, then, was to promote connectivity among students from all social and economic conditions. Even today, in Latin America, it is necessary to talk about unequal access to technologies and the Internet. A Digital Citizenship that is not inclusive, ends up deepening marginalization and exclusion. Without inclusion, it is not possible to build a truly equitable and universal Digital Citizenship program.

While access is still a fundamental issue and it is an essential condition to promote digital citizenship, the lack of devises and technology among students, have been further exacerbated. And it minimized the lack of competences and practices. In the 21st century, there are new digital gaps, which go beyond access. They are based on *skills and practices*. Not having the skills to make full use of the possibilities that technology brings is a new and potentially more insidious form of exclusion.

No doubt, access is the departure point. *Without access, only those economically privileged will be digital citizens.* But access cannot be the arrival point as well. What matters is not access in itself, but what the person is able to do with it. In other words, the challenge in the 21st century is to promote students´ use of technologies to understand the digital universe, to incorporate new competencies, and to create new opportunities. *Access to technologies without the competencies to critically use them, is not enough to enter the knowledge society*.

UNESCO echoes the interest of Ministries of Education in Latin America, who agree that Digital Citizenship is a fundamental answer to many of the new questions, problems and challenges in the 21st century. Therefore, UNESCO launched *a Digital Citizenship Programme in Latin America, so Digital Citizenship becomes an educational public policy, for all countries in the region.*

Teachers are key actors for incorporating Digital Citizenship in the classroom. Teacher training is therefore, essential for Digital Citizenship to become an education policy. Only if Ministries of Education decide to incorporate Digital Citizenship in initial teacher training, can Digital Citizenship become a public policy.

ID 211

ChatGPT as a Crisis Management Ally: Enhancing Support for Pre-Service Teachers

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Keywords: ChatGPT, Pre-service teachers

Introduction

This paper introduces an innovative approach to leverage ChatGPT as a crisis management tool for pre-service teachers during school placements. The research focuses on providing real-time assistance in classroom management and enhancing professional relationships with mentor teachers. It addresses the lack of support for pre-service teachers caused by the inherent difficulties mentor teachers face in balancing coaching and assessing duties, as well as mediating generational communication differences by integrating cutting-edge technology into teacher education.

To explore the potential of ChatGPT as a supportive tool, pre-service teachers were guided to insert carefully curated prompts related to classroom management and professionalism into ChatGPT. These prompts were designed to test the quality of responses and advice generated by ChatGPT during course learning activities. The data collection process involved both quantitative and qualitative methodologies to gather comprehensive insights into the participants' perceptions of the effectiveness of ChatGPT as a crisis management tool.

Methods

perceived efficacy in handling classroom crises and their satisfaction with the support received from ChatGPT. Likert-scale questions were utilised to quantify the level of agreement with various statements regarding the tool's utility and effectiveness.
Qualitative Data: Focus groups and one-on-one interviews were conducted to collect detailed feedback about the participants' experiences. These discussions aimed to uncover nuanced perspectives on the interactions with ChatGPT, including any perceived benefits and limitations of using such a tool in real-time teaching scenarios.

Summary of Findings

Quantitative Data

The findings from this research highlight the significant role that ChatGPT can play in crisis management for pre-service teachers. Quantitatively, there was a notable increase in confidence among participants in managing classroom disruptions and professional relationships after using ChatGPT. Participants reported statistically significant improvements in confidence levels post-placement.

Qualitative Data

In focus group interviews, participants expressed a range of emotions and detailed various instances where the AI tool had significantly impacted their teaching experience.

Immediate Assistance:

"During a challenging interaction with a disruptive student, I consulted ChatGPT for advice. The suggestions were immediate and practical, allowing me to handle the situation with confidence."

Enhanced Preparedness:

"ChatGPT helped me anticipate potential classroom issues. I felt better prepared and less anxious about facing the complexities of classroom dynamics."

Reliability:

"I found myself questioning the reliability of some responses, especially when dealing with sensitive issues. It’s crucial that the advice not only be prompt but also contextually accurate. Most of the time I needed to make marginal if any corrections."

"While the advice was generally helpful, there were times when the responses didn't fully align with my specific situation. More tailored advice would have been more beneficial”.

Conclusion

These firsthand accounts underscore the practical utility and the areas for improvement in employing ChatGPT as a support mechanism. The pre-service teachers' feedback highlights the importance of refining AI tools to better address the unique and dynamic challenges of classroom environments.

ID 212

Exploring the Integration of Non-Traditional Digital Tools in Education

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Abstract

In recent years, especially during the COVID-19 health crisis, digital tools for education have proliferated. Interestingly, some digital tools not originally designed for educational purposes can also be effectively repurposed. This presentation highlights two such examples to illustrate enhanced student engagement and attention. The first example is Twitch, a live video streaming platform mainly used for gaming. During the health crisis, educators successfully repurposed Twitch for course presentations. Compared to the university's traditional video conferencing platform, Webex, Twitch facilitated greater student interaction due to its relative anonymity and increased familiarity among students. The second example involves using the Minecraft video game for teaching project management. Sessions conducted using Minecraft showed significantly higher levels of visual attention and engagement from students compared to standard tutorial sessions. This demonstrates the potential of video games as powerful pedagogical tools. In conclusion, these examples underscore the importance of rethinking digital tools in education. They show that unconventional platforms and video games can significantly enhance student engagement and attention in the classroom. Educators should remain open to new technologies' possibilities to adapt and enrich students' learning experiences. These perspectives pave the way for innovative teaching and learning methods that effectively integrate digital tools into education.

Keywords: video game teaching, streaming platform, non traditional digital tools, students' attention

Introduction

In recent years, especially during the COVID-19 health crisis, there has been a proliferation of digital tools for education. Traditional platforms designed specifically for teaching and pedagogy have become essential. However, it's noteworthy that certain digital tools not specifically dedicated to teaching can also be used effectively for educational purposes. In this presentation, two examples are provided to illustrate student engagement and attention when using these digital tools.

Use of Twitch for Course Presentations

Background on Twitch

Twitch is a live video streaming platform primarily used for broadcasting video games. It has gained immense popularity, attracting millions of users worldwide. The platform offers features such as live chat, which allows viewers to interact in real-time with the streamer and other viewers. This interactive element makes Twitch a dynamic and engaging medium well known of students.

Adapting Twitch for Education

During the COVID-19 health crisis, educators sought innovative ways to maintain student engagement. One such innovation was repurposing Twitch for course presentations. Unlike traditional video conferencing tools like Webex, Twitch provided a more relaxed and familiar environment for students. The relative anonymity offered by Twitch chat enabled students to participate more freely, without the fear of being judged by peers or instructors.

Benefits of Using Twitch

The use of Twitch for educational purposes revealed several advantages:

1) Increased Student Interaction: The interactive chat feature facilitated lively discussions and immediate feedback

2) Familiarity and Comfort: Many students were already familiar with Twitch, reducing the learning curve associated with new platforms
3) Anonymity: The ability to use pseudonyms allowed students to engage without fear of embarrassment, fostering a more inclusive atmosphere

Implementing Minecraft for Teaching Project Management

Introduction to Minecraft

Minecraft is a sandbox video game that enables players to build and explore virtual worlds made up of blocks. It promotes creativity and problem-solving skills, making it an unexpected but valuable educational tool.

Using Minecraft in Education

In the context of teaching project management, Minecraft was employed to create an immersive and interactive learning experience. Students were tasked with collaborative projects within the game, simulating real-world project management scenarios.

Outcomes and Observations

The sessions using Minecraft demonstrated significantly higher levels of visual attention and engagement from students compared to standard tutorial sessions. Key observations included:

1) Enhanced Engagement: The interactive nature of the game captured students' attention more effectively than traditional methods
2) Collaboration and Communication: Working together in a virtual environment fostered teamwork and improved communication skills
3) Practical Application: Students could immediately apply theoretical concepts in a simulated project environment, reinforcing their learning

Conclusion: Rethinking Digital Tools in Education

Key Takeaways

These examples underscore the importance of rethinking the use of digital tools in education. They demonstrate that unconventional platforms and video games can enhance student engagement and attention in the classroom. The key takeaways from these case studies include:

1) Openness to Innovation: Educators should remain open to experimenting with new technologies to find effective ways to engage students
2) Adaptability: The ability to adapt non-traditional tools for educational purposes can enrich the learning experience
3) Student-Centered Approaches: Leveraging platforms familiar to students can increase their comfort and willingness to participate

Future Directions

The successful integration of Twitch and Minecraft into educational settings paves the way for new teaching and learning methods. Future research and experimentation could explore other digital tools and platforms that might offer similar benefits. By staying attuned to technological advancements and student preferences, teachers can continue to innovate and improve educational outcomes.

In conclusion, the adoption of non-traditional digital tools in education has the potential to transform the learning experience. By harnessing the interactive and engaging nature of platforms like Twitch and Minecraft, educators can create more dynamic and effective educational environments. This approach not only enhances student engagement but also prepares them for a future where digital literacy and adaptability are essential skills.

ID 213

Microcredentials and Lifelong Learning in Higher Education: European and International Perspectives

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Abstract

Micro-credentials have gained attention in public policies in the last few years. This paper, the scope of which is on micro-credentials in higher education with a particular focus on the European perspective, will explore the key policy documents in the European context and analyse how the higher education sector is working on an overall framework for designing, delivering and recognising micro-credentials. This paper analyses micro-credentials in the three areas of qualifications frameworks, recognition and quality assurance, with a reference to digitalization.

Keywords: Micro-credentials, Higher Education, Recognition, Quality Assurance, Qualifications Framework

In the last years micro-credentials have gained attention in public policies, and also in the higher education sector in the European Higher Education Area (EHEA) and in the European Union (EU). They are seen as an innovative way to support skills development, lifelong learning and inclusion in higher education.

In the Rome Ministerial communiqué, the joint declaration signed by the Ministers in charge of Higher Education in the EHEA in 2020, micro-credentials were seen as a way to develop or update skills and competences at various stages of life, and to make the EHEA more innovative. The EU Skills Agenda (2020)[1] identifies micro-credentials as a way to up-skill and re-skill professionals, to value learning outcomes and to increase permeability and flexibility between different education sectors and pathways. The same value of upskilling and reskilling is referred to the EU Digital Education Action Plan (2021-2027). The importance of adult learning is reflected by one of 3 targets defined by the European Pillar of Social Rights Action Plan (2021), stipulating that at least 60% of all adults should participate in training every year[2] (in 2022, the share of people aged 25 to 64 in the EU who had participated in education or training in the previous 12 months was 46.6%[3]).

In the European Education Area (Feb. 2021)[4] micro-credentials are seen as a way to diversify the student population and to make higher education more inclusive by 2025 by supporting lifelong learning and providing more flexible and modular learning opportunities.

In 2020 and 2021 the European Commission were working on defining the European Approach to micro-credentials, with a common definition of micro-credentials, presentation of building blocks, and a roadmap of actions for their development and adoption in Europe[5]. In June 2022 the Council Recommendation on a European approach to micro-credentials for lifelong learning and employability[6] was adopted, containing the definition and the standard elements to describe a micro-credential, the conditions to support development of an ecosystem for them, and indication on how to deliver on their potential. The role of universities in developing micro-credentials to obtain skills for the green transition is also referred to in the

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[6] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022H0627(02) European Commission (EC) Communication on a European strategy for universities.[7] The same approach is also referred to in the Council recommendation "Europe on the Move" – learning mobility opportunities for everyone", where micro-credentials are seen as one of the way to support learning mobility[8]. On a global scale, there was the effort to offer a policy analysis of the phenomenon and to find a common definition of micro-credentials by UNESCO[9]. In the document "Beyond Limits. New Ways to Reinvent Higher Education"[10], on one hand, the lifelong learning approach, aimed at serving the diverse education needs of youth and adults, is one of the six major challenges that need to be overcome in "reinventing Higher Education". Short courses and micro-credentials are seen as a vital way to tackle the educational needs of adults at different stages of their personal and professional lives. On the other hand, flexible learning pathways, recognition, mobility, and internationalization are one of the 9 ways to navigate towards 2030.

> While the analysis of policy documents shows some recurrent patterns in the conversation around micro-credentials, analysis of the literature on micro-credentials by region shows that the emphasis on increased flexibility for learning and the promotion of lifelong learning as well as employability is a specific perspective for Europe, while in other regions the topics associated with micro-credentials are more focused on employability, closing the skills gap, and supporting workbased training and continuous professional development, as it is in Asia-Pacific for instance[11] (Van der Hijden, Martin, 2023). Some authors argue that this geographical difference could be linked to the socio-cultural context and the extent to which education is positioned as a private or public good[12].
>
> Policy documents at European and international level identify the flexibilization of higher education and micro-credentials as a way to support inclusion, access to education for a wider range of learners and a reduction of inequalities in access to education and training for adult learners. But a coherent regulatory and transparency framework in higher education in Europe and beyond is seen as key for their uptake, development, recognition, and also to assess their impact (OECD[13]; Lantero, L. et al.)[14]

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ID 214

Science Communication as Culture

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Abstract

In recent decades there has been extensive reflection on the ways in which science communication should be conceptualized. In this contribution we emphasize the importance of a cultural approach that frames it primarily as a meaning-making process and not only as a set of activities aimed at disseminating specific notions. This perspective allows to go beyond the limits of the debate on "deficit or dialogue" as the main frames of interpretation of the public communication of science.

Keywords: science communication**,** culture**,** models, media ecosystem, conversation.

Science communication: in search of a definition

The expression "science communication" does not have a universal meaning. Recent evidence of how extraordinarily diverse the field is can be found in the volume *Communicating Science, A Global Perspective* (Gascoigne et al., 2020), the result of a unique effort to offer a comprehensive look at the history of science communication in 39 countries scattered across the planet. In the 40 chapters and nearly 1,000 pages of text representing the cultural perspectives of the global South and North, we are confronted with reconstructions and different terms to indicate the many reasons and modes of public exposure of science. Instead of "science communication" in some countries we find, for example, more often the word "vulgarization" or expressions such as "public understanding of science," "cultivation of scientific temper," locutions that express different views of the role of science in society.

A multifaceted set of places, practices and points of view

A concept introduced a few years ago by scholars Sarah Davies and Maja Horst (2016) to capture the current richness and complexity of public communication of science is that of the ecosystem, i.e. the set of all "organized actions aimed to communicate scientific knowledge, methodology, processes or practices in settings where non-scientists are a recognized part of the audience" [*ibidem*, p. 4]. Within the ecosystem there are some established niches and some emerging ones. Among the former: conference and popular books in which individual scientists and communicators are the protagonists; the mass media, with the long tradition of journalism, documentaries and programs devoted to science on TV, radio, newspapers and then the web; science museums or the more modern *science centers* based on experiential learning; festivals and events; communication campaigns aimed at raising public awareness of issues such as preventive health, environmental protection, and energy efficiency. Those that have established themselves in more recent decades, however, include: participatory methods for involving citizens in research and decision-making, with particular reference to *citizen science*; online platforms of various types, from social media to those on which to make podcasts and videos; the world of games, both digital and tabletop; science talent-shows or formats in which popularization and entertainment are mixed up; festivals, science cafes, researchers' nights, and communication initiatives of scientific institutions.

The notion of an ecosystem makes it possible to capture the heterogeneity of connections between the world of research and the multiple actors in science communication. In fact, in addition to those doing research, the great diversity of participants in these processes, such as policy makers, activists, ordinary people, journalists, universities, and nongovernmental associations, becomes evident. It also emerges very clearly that science communication is something much more multifaceted than a simple top-down transfer of knowledge aimed at increasing public appreciation for science. Goals can vary and overlap with each other. Stirring up discussions, entertaining, attempting to influence opinions, including the perspectives of non-scientists in collective choices or knowledge production, and telling stories through a variety of channels are all motivations that are now part of the characteristics of the ecosystem. In all the activities described,

science communicators also take on different roles than the more classical one of translators. Information workers, content creators, authors, editors, scientific animators, researchers and artists can indeed act as intermediaries, educators, facilitators, experts. The ways in which the public encounters science are also the most diverse: contact with it can be through fascination, amusement, learning, interest in critical thinking or sense-making but also through contestation or denial. These observations bring us to two aspects less considered by the tradition. The first has to do with the role that exposure to science plays in satisfying not just educational but also specific emotional needs and in shaping broader social and psychological processes. The second has to do with the development of democratic citizenship.

Science communication is "how society talks about science"

The ecosystem approach proposed by Davies and Horst not only takes all these aspects into account but also favors a cultural interpretation of the communication of science. In other words, rather than referring to "the transfer of certain facts - the nature of DNA, the scientific method, or whether vaccines cause autism - it is instead something about how certain groups or societies explain the world" (Davies, Halpern et al., 2019, p. 3). That is, it should be understood as a set of activities aimed at the sense making, at the social production of meanings attributed to science, as well as the public dissemination of specific notions.

Massimiano Bucchi and Brian Trench, two of the leading international scholars in the field further emphasize the cultural approach and propose to consider science communication as "a social conversation about science" (2021). This is a broad and inclusive definition that refers to the pervasiveness of science in everyday conversations and popular culture, as evidenced by its long-standing use in film, comic books, novels, literary genres, as well as in pop and rock songs, theatrical performances, and visual arts. Instead of focusing on whether communication is “deficit or dialogue” and studying how knowledge *moves*, more interactive modes are thus emphasized that include everything that is said about science in society (Bucchi and Trench, 2014), also its spontaneous use in mass culture.

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ID 215

Media and Artistic Literacies to Promote Social Change through Dialogue in the Global South

Isabella Rega

Bournemouth University, Poole (UK)

This keynote discusses the interplay between artivism and media literacy in the Global South to promote social justice. It does so by presenting three digital artivism projects developed with young activists based in Brazil, Kenya, UK, Tunisia, Bangladesh and Turkey. It analyses these three cases with an agentive theory of change for media literacy, composed of four elements: Access, Awareness, Capability and Consequences. This approach opens up reflections about how media literacy can (i) promote the creation of virtual and physical dialogical spaces for your people, (ii) contribute to the sharing of memories and histories to shape new common narratives about past, present and future, and (iii) assemble unforeseen media territories for dialogue thanks to the dialogical affordances engrained in the digital artifacts.

The first project at stake is the AHRC project eVoices: Redressing Marginality, and in particular the experimental animation "Portrait of Marielle", created by young artivists affiliated to PAWA254 in Nairobi to celebrate the life of Marielle Franco, an important human right activist and city councilor born in the favelas of Rio de Janeiro and killed in 2018: https://vimeo.com/301618386

The second project is the AHRC project DA-RE (Digital Arts for Refugee Engagement) in which young Syrian refugees in Turkey and Rohingya refugees in Bangladesh shared and reflect on their past traumatic experiences and presented their own narratives on their lives and their present using a variety of media, such as poetry, photography, and film: https://www.bournemouth.ac.uk/research/projects/da-re-digital-arts-refugee-engagement

The third project is Dual Netizenship, a British Council project in which a group of young filmmakers from the UK and Tunisia produce a movie together, working purely online over the course of 12 weeks. The co-produced movie هر | BLOSSOM, challenges the audience to see how, despite the different cultural and socioeconomic contexts, these young artivists share the same struggles, emotions, and have the same values: https://www.youtube.com/watch?v=Qjf9FbYKTV0

The conceptual framework used to analyse these three experiences is a theory of change for agentive media literacy to these experiences. This theory is composed of four interrelated elements through which change occurs: from access to awareness to capability and to consequences (McDougall and Rega, 2022). ***Access*** occurs when citizens are literate enough to make informed decisions about what to access within the media ecosystem and possess the necessary skills to use the media and digital technologies available to them. ***Awareness*** occurs when media literacy enables people to have a critical perspective of how media and information represent people, events, issues and places. Media literacy helps to understand how the media environment we engage with is constructed, who owns or controls different media sources and how digital and social media is governed, designed and manipulated. ***Capability*** refers to the use of media literacy more actively for particular purposes in our lives, rather than as passive consumers of information and content. This includes getting directly involved in the media ecosystem as media content creators. Increases in media literacy level, thus, can also lead to new capabilities for civic engagement through digital media and increased employability through the gaining of creative and/or digital skills. Finally, consequences relate to the contributions that media literacy can make to bringing positive social changes. ***Consequences*** occur when people engage in media literacy actions that can make a constructive and positive impact on the media ecosystem, in their lives and

on the lives of others.

The talk will first delve into exploring *capabilities* promoted by the three cases at stake and discussing spaces, contexts and strategies to nurture these capabilities, and then will turn to reflect on *consequences*, by discussing them in the framework of artivism projects that combine artistic and digital capabilities of young people with a clear social justice desire. Three aspects, in terms of consequences, emerged: (i) first of all the establishment of dialogical spaces for young people, connecting young activists and artivists in the Globa South(s), and nurturing Freirean empathy, which represents a political solidarity project in which we take the side of the oppressed (Freire, 1972); (ii) these dialogical spaces enable to mobilization of memories and histories to create new collective and shared memories with transformative potential (Medrado and Rega, 2023); (iii) the dialogical affordances remains with the digital artifacts and give space to the creation of unforeseen media territories for dialogue beyond the borders of the projects and the lives of the participants (Rega, Medrado, and Callus, forthcoming).

Acknowledgements

This talk gathered the work done with several colleagues along the years Andrea Medrado and Paula Callus, who worked in the AHRC International Network eVoices: Redressing Marginality, and Julian McDougall, who worked in the British Council project DualNetizenship, and led the AHRC project DA-RE – Digital Arts for Refugee Engagement. The references show how this talk is based on the work done with them, and therefore is a collective effort.

None of this would have been possible without several other colleagues at PAWA254, Museu da Maré, Gate of Sun, Maltepe University, University of Chittagong, Boubli and Fully Focused Productions who took part in those projects and the artists and activists who are the authors of the digital artifacts discussed in this talk, all the names can be found in the links provided.

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ID 216

Digital and Lifelong Learning: towards another University

Dario DA RE

Università di Padova, Italy

After the Roman Catholic Church, universities, Italian ones in particular, represent the oldest institutions in the world. Over a span of 800 years, numerous changes were introduced, including those carried out by Napoleon, who on the one hand limited the autonomy of universities, but on the other hand began a process of secularization that led universities to emerge from the sphere of influence of the Catholic Church, assume a state organization, and invest even more in scientific thought. There have been several other reforms at historical moments, such as the Gentile reform or changes in rules, but no change has been as radical and paradigmatic as Napoleon's. After two centuries, it is necessary to rethink our university, taking into account that the socio-cultural and economic context has profoundly changed, and changes are continuous and increasingly rapid. In particular, we are facing a technological evolution determined by the introduction of AI models that no longer only involve the world of research but permeate that of teaching and the organization of universities themselves. To analyze this changing context, I propose a simple SWOT analysis, which is useful in distinguishing between the internal and external forces that place the university system at a crossroads. The decision must be made quickly for it to be incisive and effective.

Strengths

- Rootedness in the territory that recognizes Universities as prestigious and authoritative structures much more than any other institution or training company
- Scientific accreditation at the national and international levels with the production of over 120,000 scientific publications every year that guarantees quality research and innovation activity with internal implications in research and teaching and external ones, allowing cultural growth of the country
- Organizational capacity and resilience widely demonstrated during Covid 19 and made even more evident with the results coming from the projects linked to the National Recovery and Resilience Plan (PNRR)
- Technological capacity with the adoption and integration of synchronous and asynchronous communication technologies into the Learning Management System platforms to make both in-person and online lessons more dynamic, interactive and engaging.
- Internationalization processes that, for example in the case of Padua, now see 10% of enrolled students coming from abroad and over 15% of study programs delivered in English.

Weaknesses

- The limits of public administration with the inability to operate in the markets for goods and services, and in the area of recruiting human resources with flexibility and timeliness force Universities to settle for the national service provider. In current strategic choices, it is not possible to enter into a contract with the best company from a qualitative and economic point of view, and one must settle for signing agreements with the company that has chosen to register on the various national e-procurement platforms.
- The employment contracts of technical-administrative staff, with a subdivision into categories almost concentrated in two bands, reduce the expectations of professional and economic growth of the staff and also result in a lack of appeal of the job offers practiced within the University.
- Legal norms are no longer able to keep pace with technological and social change and are unable to flexibly contemplate the need for change that not even the autonomy of each University can compensate for and find alternative methods.
- The technological and political limits in managing student careers and the difficulty operating in a mobile, rapid, and integrated mode, with the presence of multiple software solutions through which the entire academic organization is also managed
- The bureaucratic and cultural difficulties in proposing training not necessarily linked to the formal recognition of a qualification but which demonstrate real skills and can create professionalism.
- The lack of unity and coordination between Universities, although the precious work of Crui and Codau should be highlighted, while it is hoped that the benefits and results in terms of sharing good practices can soon be seen through the development of the projects linked to the PNRR called Digital Education Hub.

Opportunities

- The importance of responding to requests coming from the territory where there are thousands of private, regional, and provincial training structures. The training needs of the territory require a dual mode of training paths: on the one hand, to guarantee the possibility of attendance for age groups beyond the classic 19-25 and engaged in the world of work; on the other hand, to allow companies to recruit personnel or update existing employees.
- The ability to respond to specific requests coming from the world of school and teachers who require, on the one hand, a path of improvement on the subject and, on the other hand, the introduction of innovative teaching methodologies compatible with the world of school.
- Creating synergies and exchanging paths with foreign students and teachers, especially those coming from emerging countries.
- Spreading the culture of inclusion to simplify teaching methods, thereby increasing quality and effectiveness.

- Investing in artificial intelligence models both in teaching and in the organization as a whole
- Universities hold a fundamental scientific knowledge heritage to train models in order to limit both biases and hallucinations characterizing all AI systems by putting guardrails based precisely on criteria of scientific reliability.
- Using AI solutions we can rethink our organizational models to transform the processes of managing teaching both in the initial orientation phase and in the promotion of study, intermediate, and, finally, in the management of post-graduate studies.

Threads

- The decrease in university enrollments is a constant in almost all universities, especially in the South.
- The ongoing decline in births for almost 20 years has been profoundly changing the demographic composition of society with deep implications throughout the world of education.
- Online universities are responding to the demands of the territory in a rapid, flexible way with the possibility and ability to issue degrees with the same formal value.
- The ease with which online universities modify their organization by operating in a private regime, creating ad hoc and even extemporaneous processes in order to respond to changes in training practices even before there is a legislative framework, thus anticipating times and contemplating change.
- After the progressive privatization of the national health system, the world of culture and academic education is also being called into question in our country, and this is not a threat but a final consideration.

ID 217

Learning for Life – Empowering Professionals

Ir. W.F. van Valkenburg

Executive director TU Delft Extension School

Introduction

Delft University of Technology (TU Delft) is the oldest and largest public technical university in the Netherlands located in Delft. The university is specialized in science, engineering and design. With eight faculties TU Delft educates more than 26,000 students (Bachelor and Master) and 3,300 PhD students.

Foundation of the Extension School

In 2014 the university started an innovation programme on open and online education. The goal of this 2-year innovation program is to realize a 24/7 TU Delft Extension School, modelled after the Extension School of Harvard, that bundles the open & online education of TU Delft for a world-wide population of learners and students.

This programme has been very successful and has been renewed two times, before in 2021 the ***Extension School for Continuing Education*** officially became and independent organization with the university corporate office.

One of the tasks of the organization was to develop a Lifelong Learning (LLL) strategy for the whole university, focusing on all modes of delivery, not just online. In 2023 the LLL was officially approved by the Executive Board and gave the Extension School the responsibility for all LLL offerings of the university.

The ambition of the university is connecting our education and research expertise to offer LL to meet the societal challenges, or to gain knowledge and skills on key-enabling technologies. And have an impact on our initial education. The mission is to provide adult learners with quality and accessible learning opportunities for professional and personal development throughout their lifetime within the context of Science, Engineering, and Design with an aim to build a better society together.

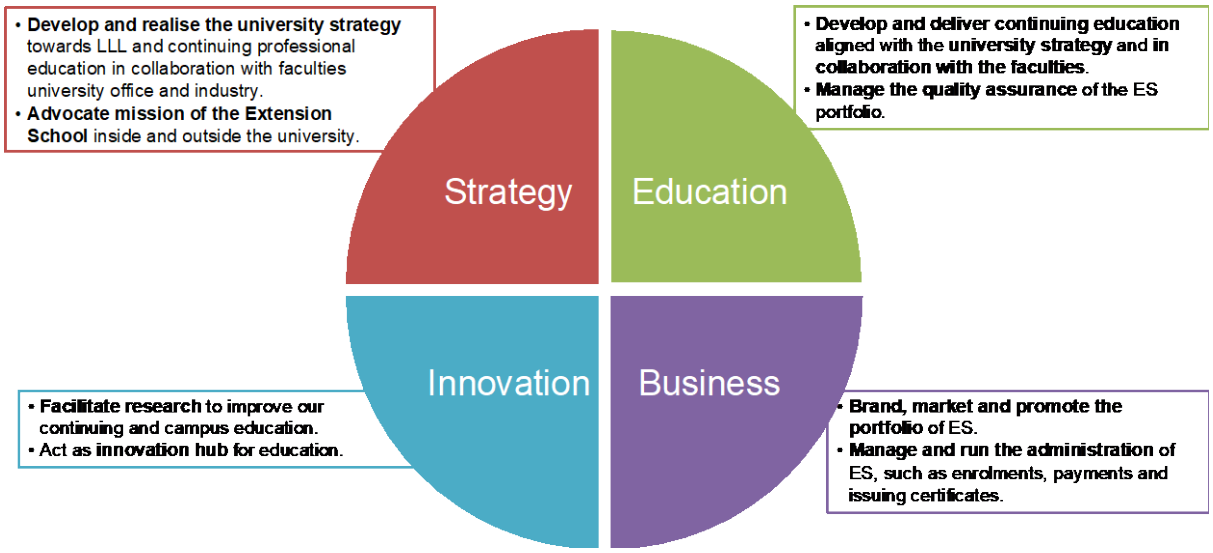
The core values describe the key components of TU Delft lifelong learning (TU Delft, 2023):

- Providing **quality education** in an inclusive learning environment for adult learners to develop themselves in **all phases of their professional life**.
  We strive for world-class education for a target audience that has an academic thinking and working level.
- Engaging in **LLL partnerships** and giving back to society.
  We are committed to meeting societal challenges to have an impact for a better society. We can do this in collaboration with existing partnerships we may have with the business community, government, and education organisations.
- Offering a **variety of relevant courses and programmes** in Science, Engineering, and Design locally, nationally, and internationally.

We aim to offer a LLL portfolio that complements our education and research expertise in which we have built up a world-wide reputation.

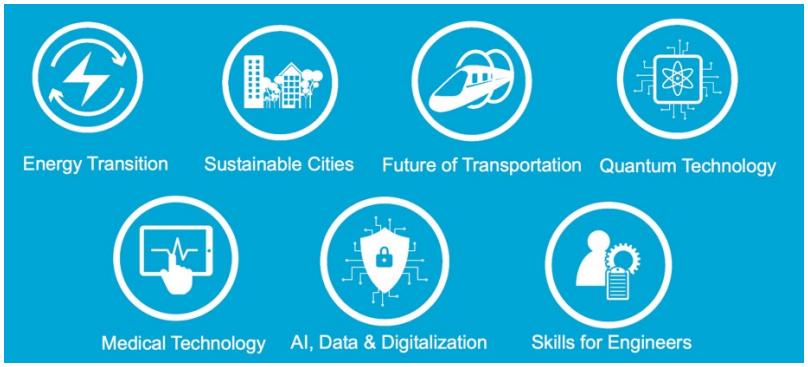
- Developing **new innovative models** for LLL opportunities.
  We continue to innovate in this field finding new ways to meet the needs of our target audience. This will ensure we stay relevant with key developments in the Netherlands, Europe and beyond.
- Advocating **active learning** by **committed and diverse lecturers and experts** in their field.
  We recognise that lecturers have a key role to play in lifelong learning and aim to have committed lecturers that are trained to develop and teach lifelong learning.
- Striving for **independently validated,** formal LLL.
  We aim to be a recognised provider of LLL, and this means ensuring that we have a good quality framework in place.
- Being a **trusted partner and provider** of LLL.
  Our LLL offerings should be of high quality and recognised by learners, businesses and other partners operating in the field of LLL.

The core tasks of the Extension School focus on four directions as shown in the image below:



Products and Portfolio

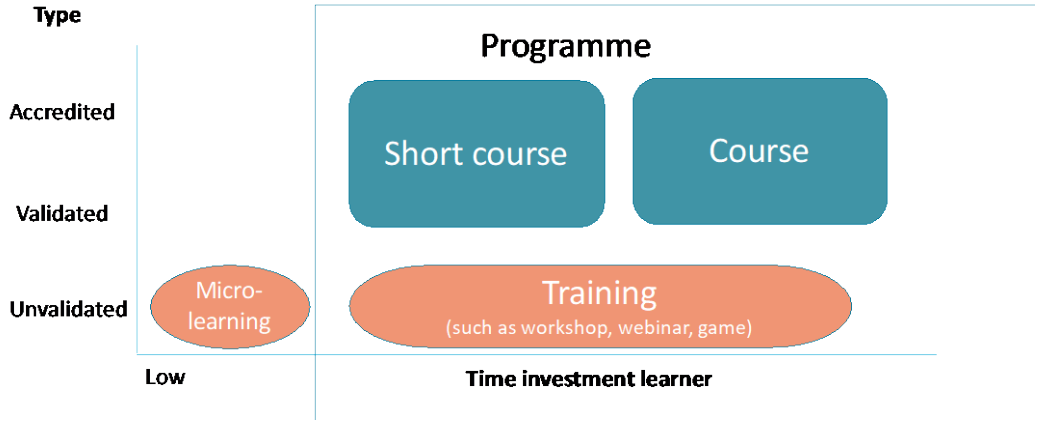
The main focus of the Extension School always has been on scalable open and online education organized around seven strategic themes as shown in the image below. The Extension School develops courses which can be combined into short and stackable programmes.



The scope of our portfolio continues to focus on online education, but now also includes a blended and F2F portfolio. To structure our offerings we distinguish three types of LLL activities:

Unvalidated	Validated	Accredited Validated
✓ It is formal learning	✓ It is formal learning	✓ It is formal learning
✓ Some form of admission (payment or registration)	✓ Some form of admission (payment or registration)	✓ Some form of admission (payment or registration)
✓ Some form of recognition (certificate of attendance)	✓ Some form of recognition (certificate, diploma, etc)	✓ Some form of recognition (certificate, diploma, etc)
✓ There is some form of quality assurance (e.g., a survey after the event)	✓ There is a quality assurance **process** (e.g., COB)	✓ There is a quality assurance process
	✓ Some form of **assessment** (during or at the end of the activity)	✓ Some form of assessment (During or at the end of the activity)
		✓ Externally **accredited** (e.g., NVAO, professional body)

These types are combined with their time investment into product categories:



In the table the different product categories are specified:

Characteristics	Micro learning	Workshop	Short Course	Course	Programme
Form of learning	Formal learning				
Study load	<3h	>3h	4 – 50 hours	>50 hours	Sum of the modules (>1)
Certification	Unvalidated (Certificate of Attendance)		Validated or Accredited (Certificate)		Validated or Accredited (Certificate or Diploma)
Issued by	TU	TU	TU, edX, FL	TU, edX	TU, edX
Mode of delivery	Online	All modes			
Quality Assurance	Basic		QA process or accreditation		
Level	Foundation/Advanced/Experienced				
Assessment	No		Yes		
Pace	S or A	S	Synchronous or Asynchronous		
Examples	E-learning, (recorded) webinar or lecture	Training, workshop, business game, summer school	MOOC, ProfEd, Architecture course (PE), post-graduate course, Masterclass	MOOC, ProfEd, OAC, Architecture course (PE), post-graduate course, Masterclass	PCP, Professional Master, Post-Master, MicroMaster

New Developments

Innovation is part of the core tasks of the Extension School. That the LLL activities are less regulated by government policies, gives us the opportunity to try out innovation easier and

much faster. Certainly for our online offerings, we have a tendance to try out new tools and developments. A couple of new developments to mention are:

Artificial Intelligence

All organizations are experimenting with AI. The university has a large research programme on AI and we collaborate with them to develop relevant courses. Our AI portfolio is divided in two focus areas:

- Developing AI
- Using and applying AI

The first is focused on the software engineers that are developing AI applications, the second one is more focused on learners working in different industries and figuring out what AI means for their industry.
The Extension School is using AI in their own operations:

- **Learner Support**: personalized AI support for students and teachers anywhere, anytime.
- **Course Development**: select and use tools to support teachers in developing new courses.
- **Course Translations**: making courses available in multiple languages to enhance the accessibility.

Digital Credentials and Microcredentials

The Extension School is one of the founding institutes of the Digital Credentials Consortium. The Consortium is advancing the use and understanding of portable, verifiable digital credentials in higher education through open-source technology development and leadership, research, and advocacy. The activities of the consortium focus on supporting the development of open standards, mapping of the ecosystem, developing open source software to support digital credentials and publishing whitepapers.

The Extension School is also participating in a national project on microcredentials. A Microcredential (MC) is a digital certificate that allows learners to demonstrate the knowledge and skills acquired after successfully completing a small unit of education. It clearly describes the learning outcomes, educational level and scope of the course or programme – and adds a quality mark, as it is bound to a recognised quality framework. Last year the Extension School offered MCs for our first couple of courses and the first MCs were issued.

Impact

In 10 year, the Extension School has developed 253 courses and 47 programmes in seven portfolio themes. More than 4 million learners enrolled in our courses and more than 100,000 courses certificates and 5,00 programme certificates were issued.
The activities of the Extension School were externally recognized with more than 34 awards and prizes. Most outstanding is that the Extension School has won the edX Prize three times out of seven times it was issued. With over 150 edX partners and more than 4,000 courses this is a big achievement.

Conclusion

What started as a small innovation programme has become a strategic activity of the university included in the strategic agenda of the university. The challenge is to continue to innovate and have an impact on our learners, on society and our own university.

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