Research Article

# Education, Artificial Intelligence, and the Digital Age

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**This paper aims to examine and elucidate the factors influencing the current educational model within the realms of artificial intelligence and the digital era. Additionally, it delves into an analysis of education models that leverage innovative learning tools to address the challenges faced by a society in a state of constant adaptation and change.**

**The research methodology involves empirical research and an in-depth analysis of specialized scientific literature, encompassing both traditional and progressive educational models. Special attention is given to tools specific to the digital era, such as educational platforms, software, and recent advancements like ChatGPT. Expert opinions on these emerging learning tools were sought, and open questions were posed on ResearchGate to gather diverse perspectives.**

**The findings underscore the significance of collaborative efforts between universities and industry, the necessity of adapting educational curricula to align with emerging job roles in the era of artificial intelligence, and the promotion and utilization of innovative tools in academic settings. This, in turn, aims to ensure the practical application of acquired knowledge in the economic landscape, fostering the development and sustainability of the economy and society on both local and global scales.**

**The originality and value of this work lie in its contribution to identifying learning models from specialized literature, proposing a model tailored to our university education system, and emphasizing that artificial intelligence serves as a supportive resource in education. It optimizes processes without replacing the creative aspects of teaching staff, thereby contributing to the attainment of exceptional academic outcomes.**

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## 1. Introduction

It is evident that education models undergo continuous transformation influenced by various factors, particularly in the context of the dynamic digital era and the ongoing evolution of artificial intelligence (AI). This necessitates a constant adaptation to the changes brought about by technology across all fields. Digital technologies, with AI at the forefront, play a significant role in reshaping the educational system. This contribution is manifested in the improvement of knowledge acquisition, streamlined learning processes (optimized work times and results), rapid access to information (facilitated by research tools and bibliometric analyses), and the personalization of learning experiences and models. The focus is on tailoring knowledge to individual student abilities and aligning them directly with the ever-changing job market.

The transformation of the educational process through software applications has dual effects. Firstly, it stimulates teachers through dialogue and the utilization of software tools to optimize knowledge processes. Secondly, it drives the adaptation of software development experts towards meeting the current requirements of the academic environment. This adaptation is facilitated through machine learning, employing specialized languages such as natural language processing (NLP).

In terms of skill development and the use of interactive informational resources through AI, the integration of real-world communication scenarios has become essential. Students' utilization of AI-driven informational resources for knowledge acquisition has grown dynamically over the past decade, shaping the core of communication skill development and fostering critical thinking. This evolution traces back to the 1970s with the introduction of the Eliza model, a pioneer in chatbot projects and text-based dialogue systems.

Utilizing AI-based education models requires individuals to acquire the necessary knowledge and skills. Previous models of AI literacy treated AI technologies as general learning tools, often overlooking specific nuances. Regardless of the AI models employed in the educational process, it is imperative that they align with the specificities and demands of the discipline.

In this study, we draw on specialized scientific literature to identify learning models that align with the current digital era and cater to the needs of contemporary generations. The central focus is on adapting educational tools to societal needs, a critical aspect of any model within the educational process.

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## 2. Review of the scientific literature

Of course, to develop a deep understanding of the current model of education in the university environment, in the context of the digital age, it is important to consult a variety of bibliographic sources. Starting from this consideration, we exemplify our research based on specialized literature, as follows: in the work (Davidson C.N, 2022), the author presents the current challenges and opportunities in higher education and also proposes a revolutionary perspective on university education. Also within this work, (Davidson C.N, 2022), supports the need for a new theory that defines the education model, as well as clear applicative elements oriented towards academic performance and less on the score obtained by the student on the evaluation test, offering- and thus the student, the possibility to adapt to the existing changes in the labor market and with clear objectives of both personal and societal performance. In this work, Davidson C.N, 2022) proposes solutions regarding the restoration of the entire process of higher education and suitable for each type of academic institution. In our quest to identify bibliographic resources that support our scientific argument for optimizing educational processes in the university academic environment, the paper (Nyquist JG at all, 2013) addresses how technology can be integrated into the learning process and how to maximize its impact in university education. Moreover, in the work (Nyquist JG at all, 2013)"Strategies for the universities of the future" there are surprise elements of change from education oriented to local needs, to the availability to train the young generation, to global mobility, based on the elements of knowledge cognitive oriented towards global societal needs. (Nyquist JG at all, 2013) sends an exhortation for decision-makers in the university environment to support teaching staff and transfer the act of knowledge and training to the digital age (of the Internet). It is reconfigured by the authors (Nyquist JG at all, 2013) how the campus of the future will look for students, especially in the field of higher medical education which will be subject to major challenges, challenges that we are experiencing today in the academic environment, respectively what skills must to have the medical student in the digital age. In the context of the COVID-19 pandemic, educational models and practices have seen a rapid transformation and adaptation to this new context. (Vásquez Astudillo, M., 2020) analyzes from a methodological point of view and based on different knowledge tools (digital platforms, hybrid learning, online and other adapted forms) pedagogical models, but especially the practices used by teachers in the entire educational process. The Blended Learning model (Vásquez Astudillo, M., 2020), which was not only promoted but also implemented at the university level ten years ago, in which the teaching and learning process was based on tools both for online teaching and and for the classic system (in the room with the students), depending on the cases analyzed, as well as depending on the terrors addressed. Moreover, (Vásquez Astudillo, M., 2020), supports the way of teaching in the classroom with all the digital support tools for students, the teacher having multiple roles, as a designer of a study, as a student-centered lesson guide, as a facilitator based on the software used, but especially by the manager of the discipline in the act of knowledge. The model (Vásquez Astudillo, M., 2020), we could suggest that it represents a bridge between industries and university academia. (Cavanagh, S.R.,2016), the paper explores the role of emotions in the learning process and how they can be integrated into the current university educational model. Moreover (Cavanagh, S.R., 2016), it supports the orientation of the student in the knowledge process towards those values that will determine his orientation both in the professional field (giving the student knowledge, the desire to learn), but above all it shapes his character (developing and critical thinking) using emotions as teaching practices, exemplifying with cases in which the author was involved, (Cavanagh, S.R., 2016), supports the fact that in addition to the seminificative side of the act of teaching, the fun side is equally important, supporting through association concepts and determination of the student through emotions to knowledge. (Davidson C. N., at all, 2009) the paper explores the significant changes brought about by technology in higher education and how institutions must adapt. (Kachra R, at all, 2020), examines the impact of the COVID-19 pandemic on higher education and teaching and learning models. (Garrison D. R., at all, 2007), provides a detailed analysis of hybrid learning models and the principles that underlie them in higher education. Moreover, (Garrison D. R., at all, 2008), addresses the tools of efficiency in the act teaching in the university environment, with specificities oriented to different disciplines. (Garrison D. R., at all, 2009), presents in the paper also certain scenarios based on which he developed the fundamental research, namely the redesign of teaching models and with an adaptability and a transformation at the level of the curriculum in the university academic environment. (Conole G., 2013), explores how technology and open resources can transform education in the university environment. It is known to us tutors that for almost 20 years, technologies (including those specific to internet search engines) have influenced the way we identify bibliographic sources, prepare certain scenarios in our studies, and implicitly prepare educational curricula, especially in the university environment and its orientation towards industries. (Conole G., 2013), supports the fact that access to work in a computerized network is a fact, and the computer is the work tool in the act of knowledge. Moreover, (Conole G., 2013), emphasizes the existence of multiple technologies that universities have in equipping the material base, and teachers use them to optimize the educational process, as well as to achieve interactivity between teacher and student. (Conole G., 2013) claims that due to the multiple technologies, it is essential how the act of learning is designed and how we guide the student in the effective use of these technologies and which allows them to combine the knowledge acquired at the university with the multiple existing educational courses in open space, thus helping (Conole G., 2013) to rethink the entire learning process, thus making mixed learning possible (Conole G., 2013).

The comprehensive approach of our work led us to highlight some of the existing studies in the scientific literature in the field of education, especially in the process of rethinking the current training models in the university academic environment in the context of the digital era. Moreover, it is evident that

since the end of last year, multiple debates have been focused on the ChatGPT tool as a support tool in the learning process, especially in the current digital age. Therefore, in the specialized literature we have identified several reference works on ChatGPT. Education in the context of the digital age is a topic of major interest in the specialized literature. This literature explores how digital technologies and digital transformation influence learning and teaching processes. (Bates A.W., 2022) and (Bates A.W., 2019), provide practical guides for teachers and instructors on how they can integrate technology into the teaching and learning process effectively. (NMC, 2017), this year's report analyzes emerging trends and technologies in higher education, providing an overview of changes in the field of digital education. (Lankshear, C., at all, 2008) explores digital literacy concepts and practices and how they affect learning in the digital age. (Garrison, D. R., at all, 2008) provides a detailed analysis of blended learning and how technology can be effectively integrated into the university environment. (SCHMEINK, L., 2016) and (Westera W., 2013), explore the extent of the changes brought by digital technology in society and in education. (Gabriel, M. At all, 2012) highlights the importance of adopting digital technology in education and argues for a pedagogy suitable for the digital age. (Lo, C. K.at all (2017) reviews research related to the flipped classroom teaching model and how technology has influenced this concept. (Means B., at all, 2009), United States Department of Education report of Americas summarizes research on online learning and its impact on academic outcomes. (Helsper, E. at all, 2009) addresses the myth of the "digital native" and assesses concrete evidence on how young people use digital technology for learning. (Xu Di. at all, 2019), which addresses the challenges and benefits of online learning, with a particular focus on higher education (Conole Gráinne, 2013).

## 3. Research methodology

Research methodology tools the learning process in the context of the digital age and involves a systematic, well-structured approach to investigate and understand how digital technology influences learning. Therefore, within the research methodology we aimed to identify in the scientific databases SCOPUS, WoS and Elsevir which are the determining factors of the learning models in the context of our research topic. Furthermore, in July 2023, we launched an open question on the ResearchGate research platform (being a direct survey-based research method) namely "How do you see the evolution of artificial intelligence in the fields of education and finance?" What is the equilibrium model (HR and AI)?" with the aim of directly knowing the opinions of specialists in the field. Another research tool was given by the analysis of the specialized literature to identify the learning models supported in different works presented by the specialists in the field, i.e. an exhaustive review of the existing literature on learning in the digital age was carried out and theories were identified, relevant patterns and trends. The data with the opinions of the specialists (direct interview) were collected through the ResearchGate platform. The analysis of the answers formulated by the experts was done using specific tools and techniques, such as thematic analysis, respectively content analysis. The interpretation of the answers, the evaluation and validation of the results of our research, were valid and reliable, based on the existing data in the specialized scientific literature, as well as through the answers of the experts involved.

This research methodology is simplistic and can be adapted to the specifics of our research, given the fact that it is based on classic tools for identifying learning models in specialized scientific literature and with elements specific to the question structured and addressed in our research. Moreover, the feedback we received from experts in our research field ensured the validity and relevance of our work.

## 4. Results and discussion

In order to define learning models and outline our own option in the context of this research, it is particularly important to know for learning programs in the context of artificial intelligence (AI) what are the factors that influence and shape the way education is designed, delivered and experienced. Here are some of the most important factors that have a significant impact on these programs:

1. *Technological Advances in AI:* Technological progress in the field of AI influences the development and implementation of learning programs. Data analytics, machine learning, and natural language processing capabilities are constantly evolving, opening up new possibilities for personalizing and enhancing the learning experience.
2. *Accessibility of technology:* The availability and accessibility of devices and internet connections are key factors in being able to implement technology and AI-based learning programs. Disparities in access can create inequalities in education.
3. *Students' needs and preferences*: Students have different needs and preferences in how they learn. AI can be used to customize learning materials, pace and teaching style to best suit the diverse needs of students.
4. *Labor market requirements:* Changes in labor market requirements influence the development of learning programs. Universities and educational institutions must take into account the skills and abilities needed to prepare students for future careers.
5. *Government regulations and policies:* Government regulations and policies can affect the development of learning programs in the context of AI, from cybersecurity standards to regulations on personal data protection and access to education.

6. *Financial resources:* The budget available for education and technology can influence the level of accessibility and quality of AI-based learning programs. Appropriate investments can lead to the development and implementation of more effective and innovative programs.
7. *Capacity and training of teaching staff:* The involvement and training of teachers and trainers in the use of AI-based technology and tools is essential for the success of learning programs.
8. *Ethics and data security:* Protecting students' personal data and addressing ethical issues related to the use of AI in education are important concerns that can influence how learning programs are developed and implemented.
9. *Feedback and continuous evaluation:* The reception and feedback of students, as well as the continuous evaluation of the effectiveness of programs, play an important role in adapting and improving them along the way.
10. *Institutional culture and values:* The values and culture of an educational institution can influence decisions regarding the implementation of technology and AI in learning programs.

All of these factors must be considered when developing and implementing AI-based learning programs to ensure they are effective, accessible, and ethical (Manta O, 2023). In our paper we start from these factors mentioned above, and which of course will influence our option, the research team, on a learning model, we first define the knowledge of the key aspects of the education model based on AI and which are models of learning in different universities internationally, patterns identified through our research:

1. *Personalization of learning:* AI can analyze each student's behavior and performance and provide personalized recommendations for teaching materials, learning pace and teaching style. This helps to maximize individual progress and develop each student's specific skills.
2. *Teacher Assistance:* AI can assist teachers in grading papers, classroom management, and creating educational content. It can also provide useful analysis of student performance and suggest more effective teaching strategies (Arize, Chuck, 2023).
3. *Access to educational resources:* AI can contribute to the creation and distribution of high-quality educational resources, such as interactive online courses, tutorials and tailored educational materials. Thus, access to quality education can be ensured in any geographical location.
4. *Innovations in the assessment process*: AI can revolutionize the assessment process by using more accurate and objective methods, such as automatic assessment of tests or written papers, thus reducing subjectivity in assessment.
5. *Lifelong learning:* AI can facilitate the development of lifelong skills by providing courses and learning resources tailored to individual needs and changing labor market demands.
6. *Ethics and Security:* In implementing AI in education, it is essential to pay special attention to ethical and security aspects. It is important to ensure the protection of students' personal data and to avoid discrimination or prejudice in AI recommendations.
7. *Developing AI skills:* Education should also include learning about AI and developing the skills needed to understand and use AI technology responsibly.
8. *Collaboration between humans and AI:* It is important to emphasize that AI should be a resource that supports human efforts in education, not completely replace them. Teachers and students should collaborate with AI to get the best results.

In conclusion, the implementation of artificial intelligence in education can bring many benefits, but the issue related to ethical and security aspects must be approached with care and attention. An AI education model should focus on personalizing learning, supporting teachers, and promoting access to quality education for all.

Education is a dynamic field that has seen significant evolution over the years. The analysis of the specialized literature as structured above in the paper, brought to the fore different models of education, based on their specific elements from a theoretical point of view and with their implications for teaching and learning. By analyzing the existing literature, we can gain a comprehensive understanding of various approaches to education.

### *The traditional education model*

The traditional education model, often referred to as the "sage on stage" approach, has been the dominant teaching method for centuries. It involves a teacher-centered approach where instructors impart knowledge to passive students. Although this model has been criticized for its lack of student engagement and critical thinking, it continues to be prevalent in many educational settings.

### *Progressive education model*

Progressive education models, such as those advocated by educators such as John Dewey, emphasize active learning and student-centered approaches. These models prioritize experiential learning, critical thinking, and problem solving. Research has shown that progressive education can increase student motivation and engagement.

### *Online and blended learning models*

With the advent of technology, online and blended learning models have gained prominence. These models use digital tools and the Internet to deliver education. Online learning allows for flexibility, personalized instruction, and access to a wide range of resources. Blended learning combines online and in-person instruction, providing a hybrid approach that combines the benefits of both.

### *Constructivist and socio-constructivist models*

Constructivism and socio-constructivism focus on the idea that learners actively construct their knowledge through interaction with their environment and peers. These models emphasize collaborative learning, group activities, and the importance of social interaction in the learning process. They align with contemporary educational theories that emphasize student engagement and autonomy.

### *Competency-based education*

Competency-based education models emphasize the acquisition of specific skills and competencies rather than traditional grades or credits. Students progress at their own pace and assessments are based on demonstrated competence. This model is gaining popularity, especially in professional and higher education settings.

### *Models of cultural and inclusive education*

Cultural and inclusive education models promote diversity and equity in education. These models recognize the importance of considering the cultural background, individual needs and abilities of students. Culturally responsive teaching and inclusive education practices have become essential components of modern education.

It is essential that, in addition to the models identified in the specialized literature, we know the opinion of specialists in the field. This was also the real reason for launching the open question on the researchgate network, and to which we had different reactions and answers, respectively: (Hasan, S., 2023) clearly states that the future belongs to AI in multiple fields of activity, including education, being clearly motivated by the optimization of processes and the reduction of costs through the accuracy of operations and the limitation of risks. Moreover, a redaction of the desired service quality is also clearly mentioned. (Arize, C., 2023), which through the given answer highlights the fact that the progress made in AI education and finance is evident, directly contributing to student progress and performance, with student-centered and personalized learning elements of their skills and capacity, as well as with a good automation of the administrative elements specific to the act of knowledge. (Arize, C., 2023),"The HR-AI balance model is a concept that aims to integrate the strengths of both human resources and artificial intelligence. The equilibrium model is designed to ensure that AI is used to augment human resources rather than replace them (Tong L, at all, 2022). The balance model is based on the idea that AI can be used to automate routine tasks, while human resources can focus on more complex tasks that require human reasoning and decision-making."

Artificial Intelligence made and makes the academic environment as connected as possible to the direct needs of industries (SCHMEINK, L., 2016), therefore the learning model in the university environment currently starts from the cooperation between universities and industry, which is essential to promote innovation, economic development and to prepare students for the demands of today's labor market. This collaboration can take many forms and bring benefits to both academic institutions and businesses (Westera W., 2013). Here are some ways universities and industries can cooperate:

1. *Collaborative research projects:* Universities and companies can work together on research projects aimed at developing new technologies, products or solutions to industrial problems. These projects can attract additional funding and contribute to the advancement of science and technology.
2. *Internships and Internships:* Companies can offer internships and internships to students to develop their practical skills and gain field experience. This gives companies an opportunity to identify and recruit talented young people.
3. *Customized training programs:* Universities can develop customized training programs to meet the specific needs of an industry or company. This may involve developing tailored courses or certification programs.
4. *Exchange of experts and resources:* Exchange of experts and resources between universities and companies can facilitate the transfer of knowledge and skills. Companies can benefit from academic expertise, while universities can gain access to advanced resources and equipment.
5. *Research and innovation centers:* Universities and companies can establish joint research and innovation centers to tackle complex problems and develop cutting-edge technologies. This can attract government funding and financial partners.
6. *Technology transfer:* Universities can help transfer technology to companies, facilitating the commercialization of products or services based on academic research.

7. *Events and conferences:* Organizing joint events and conferences can promote dialogue between universities and industry, facilitating collaboration and the exchange of ideas.
8. *Competitions and collaborative projects for students:* Universities and companies can organize competitions and collaborative projects for students, giving them the opportunity to apply their knowledge in a real context and solve practical problems.

The model that we appreciate is as anchored as possible in economic realities, is given by the *collaboration between universities and industry* (Vásquez Astudillo, M., 2020) and which can contribute to the development of a better trained workforce, to academic and industrial innovation, and to the advancement/welfare of society as a whole. It is important that this collaboration is based on trust, transparency and respect for ethical and academic standards. Moreover, the development of artificial intelligence (AI) systems in the context of learning programs has had a significant impact on the transformation of education. These systems can enhance learning, personalize the learning experience, and provide more effective educational resources. Here are some key aspects of developing AI systems in learning programs:

1. *Adaptation to individual needs:* AI systems can analyze data about each student's progress and preferences and provide tailored content. This helps ensure that students can learn at their own pace and that resources are appropriate for their knowledge levels.
2. *Personalized recommendations:* AI systems can make recommendations for learning materials, courses or exercises based on students' past performance and their learning goals.
3. *Adaptive learning:* AI can adjust the difficulty or pace of exercises to suit each student's skill level, ensuring continuous progress (Xu Di at all, 2019).
4. *Automated grading:* AI systems can automatically grade papers, tests, and exercises, providing instant feedback. This reduces the burden on teachers and gives students the opportunity to improve their skills in real time.
5. *Support for teachers:* AI can help teachers in planning lessons, identifying specific needs of students and providing recommendations to improve the teaching process (Zhang, R., at all, 2022).
6. *Natural language-based learning:* Natural language-assisted learning technologies allow students to interact with AI systems through natural language, thereby facilitating access to information and real-time assistance.
7. *Simulation learning:* AI can be used to develop realistic simulations and interactions for hands-on learning in fields such as medicine, engineering or natural sciences.
8. *Engagement and stress monitoring:* AI systems can detect students' engagement levels and provide feedback on their stress or anxiety levels, thereby helping to manage their well-being.
9. *Data analysis to improve learning programs:* AI can analyze data collected during the learning process to identify trends and help educational institutions improve their programs and streamline resources (Zhao, L., at all, 2022).

The learning process in the context of current challenges can benefit from the use of tools and technologies that facilitate access, efficiency and flexibility of learning. Here are some key tools that can be helpful in this regard:

1. *Online learning platforms:* Such platforms as Moodle, Blackboard, Canvas or Google Classroom allow educational institutions to create and administer online courses. They provide the ability to upload teaching materials, organize activities, assess students and facilitate communication between teachers and students.
2. *Video conferencing tools:* For distance or hybrid learning, tools such as Zoom, Microsoft Teams, Google Meet or Skype can facilitate real-time communication between teachers and students. They allow for online lessons, discussions and group collaborations.
3. *Massive Open Online Courses (MOOCs):* MOOCs such as Coursera, edX or Udacity provide access to online courses in various fields. These are often created by prestigious universities and can be followed globally.
4. *Content Management Platforms:* Tools like WordPress or Joomla can be used to create and manage online educational content, including blogs, websites or interactive learning resources.
5. *Content creation tools:* Camtasia, Articulate Storyline, Adobe Captivate and others allow teachers to create interactive learning materials such as video tutorials, presentations or simulations.
6. *Digital Libraries:* Access to online resources such as PubMed for medical sciences, JSTOR for academic research or ProQuest for diverse databases provides students and researchers with a wide range of materials and sources of information.
7. *Online collaboration tools*: Google Docs, Microsoft Office 365 and other online collaboration tools facilitate teamwork and sharing of documents and projects in real time.
8. *Adaptive learning platforms:* These use artificial intelligence to personalize the learning experience, providing students with exercises and materials tailored to their skill level and learning pace.

9. *Online assessment tools:* Apps like Kahoot!, Quizlet or Edpuzzle allow teachers to create interactive online tests, surveys and assessments to monitor student progress.
10. *Time management and organization tools:* Apps like Trello, Asana or Google Calendar can help students and teachers organize their learning activities and manage their time efficiently.

These tools can be used to address current challenges in education, such as distance learning, personalization of learning, and online collaboration. However, it is important to ensure that the use of these tools is consistent with learning objectives and that students' needs and preferences are taken into account in order to create an effective and motivating learning environment.

In the realm of models identified in specialized scientific literature, it becomes evident that the structures predominantly manifest as AI dialogue systems tailored for English as a foreign language (EFL) (Zhai C. and Wibowo S., 2023). Regardless of the academic content under development, the assessment domains crucial to shaping our AI dialogue systems in EFL encompass Pedagogical Effectiveness, interaction mode, foundational design principles, considerations regarding cultural and social domains supporting the learning process, and the satisfaction of users with AI solutions throughout the learning journey (Zhai C. and Wibowo S., 2023).

(Zhai C. and Wibowo S., 2023) illustrates, in the figure below, the specific components involved in enhancing the interaction competence of EFL university students.

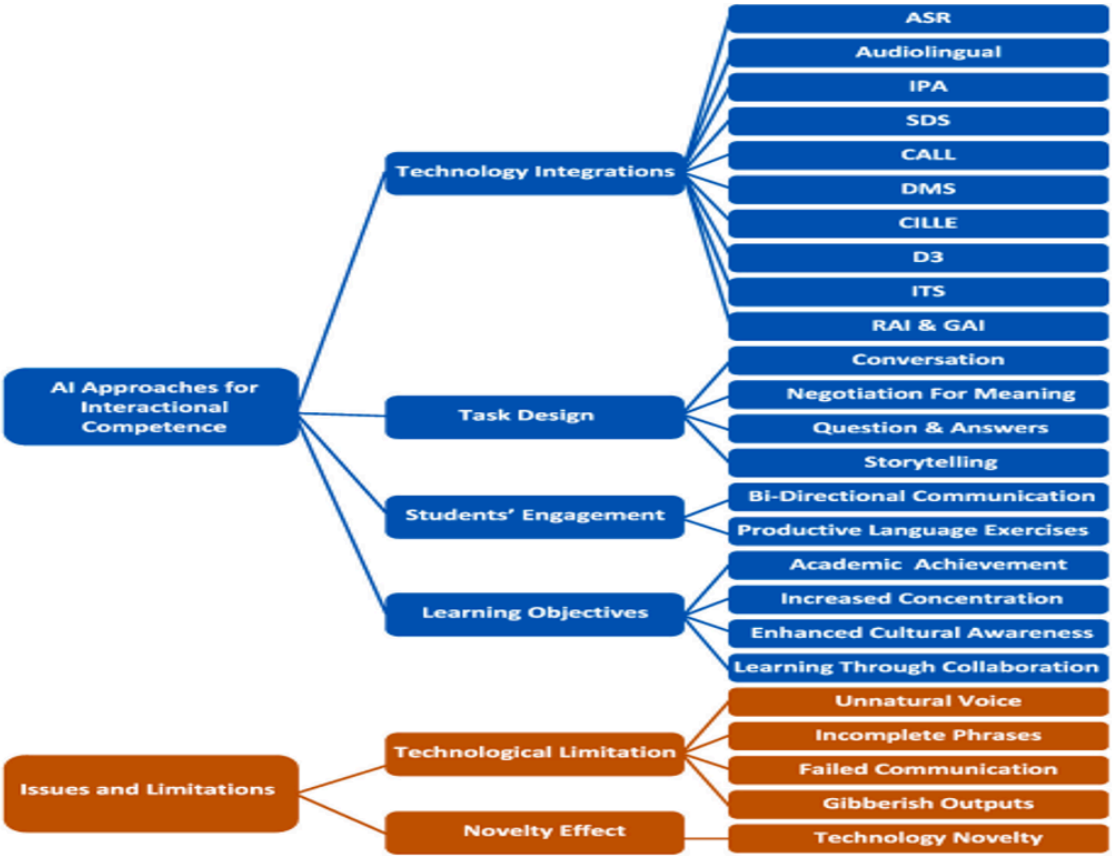


**Figure 1.** The specific elements of the EFL model proficiency improvement process

*Source:* (Zhai C. and Wibowo S., 2023)

These resources can provide a solid foundation for understanding the evolution and impact of digital education in the context of the digital age. It is important to continue to explore the literature to stay abreast of the latest research and trends in this ever-changing field.

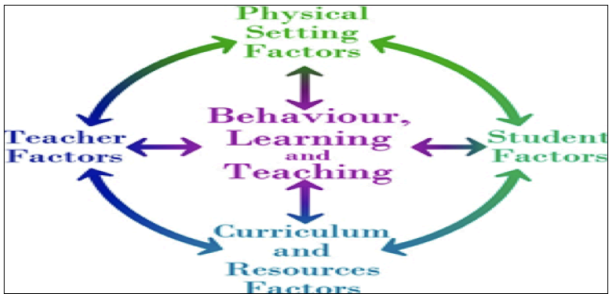


**Figure 2.** Factors influencing the education model

*Source:* Persistent misbehaviour challenges teachers more than student violence and aggression, Anna Sullivan, 2014

In the educational model, a crucial element lies in the approach to teaching and the learning tools tailored to the students. An exemplary instance of such a learning model is exemplified by La Moonee Ponds Primary School (MPPS), where their philosophy underscores the importance of each student achieving a high level of proficiency across all curriculum-specific areas based on individual abilities. In alignment with this philosophy, the institution recognizes the unique talents of each student and guides them towards acquiring personalized knowledge. Moreover, the philosophy places a strong emphasis on acknowledging and respecting excellence through academic rewards, fostering the development of personal confidence in each student. The student-centered curriculum is designed to instill confidence, openness, critical thinking, stimulation, positivity, and a thirst for knowledge, with the explicit goal of guiding each student along the path of learning. This program aims to empower students to actively contribute to societal development, fostering qualities of being active, determined, positive, and confident individuals in both academic and societal values (Means B., et al., 2009).

In tandem with models and the influencing factors, it becomes apparent that, in the digital age, literacy dimensions of digital interaction take precedence in knowledge acquisition. For instance, the study conducted by Carolus A. et al. (2023), based on expert consultations, identifies various categories representing distinct dimensions of literate interaction with voice-based AI systems. The model proposed by Carolus A. et al. (2023) integrates three key aspects: knowledge, skills, and abilities that collectively shape the literate interaction of users with voice-based AI systems.

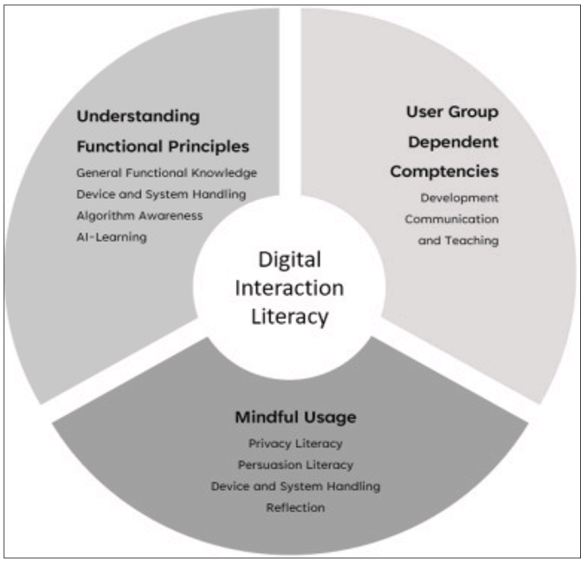


**Figura 3.** Introducing the Digital Interaction Literacy Model (DIL Model)

*Source:* (Carolus A., et al., 2023)

The educational framework within this institution commences with a comprehensive examination of existing international models, which are then tailored to fit institutional realities. The outcomes of this research are incorporated into the Institutional Strategic Plan, with a clear emphasis on

enhancing student knowledge (Cavanagh, S.R., 2016). This involves elevating the quality of education and directing it towards fostering performance, determination, and engagement, along with prioritizing personal and societal well-being.

The learning model at MPPS delineates teaching and learning procedures, as well as policies at the institutional level. All these specificities are defined and geared towards a collaborative educational model, thereby contributing to the establishment of a high-performing educational environment.


**Figure 4.** The MPPS learning model

*Source:* MPPS

This learning model contributes to a positive community influence, with effective orientation towards the economic environment of the engagement area, based on four key priorities:

✓ *Excellence and performance in the act of teaching and learning;*

✓ *Performed management and leadership based on professional skills;*

✓ *Positive climate at the institutional level for learning;*

✓ *Involvement of all community actors in the learning process.*

It is obvious that for any of the education models in the context of the digital era, orientation has a double value, respectively: the use of all tools to raise the personal performance of students and the involvement of the community to connect the academic environment to the economic environment (Manta, O., 2021), their involvement being, moreover, the basic pillar for societal well-being at the local level and implicitly at the global level.

It is essential to know based on the specialized literature which are the most relevant support initiatives, and which support education models to help increase the results of student performance, well-being and engagement in learning, and these are:

✓ *Building excellence in practice*: teachers, principals and schools will work together to share knowledge and ideas, develop and strengthen approaches to teaching and assessment, build a culture of collaboration, master the use of learning interventions and student data and will improve feedback for students and staff.

✓ *Curriculum planning and evaluation:* Schools will embed a culture of curriculum planning and evaluating the impact of learning programs and adjusting them to suit individual student needs so that students can reach their potential. Schools will strengthen their use of assessment data and student feedback to assess student progress, monitor the impact of teaching, and adjust learning programs and interventions (Nyquist JG, at all, 2013).

✓ *Building leadership teams:* Schools will strengthen their succession planning, build the capacity of their leadership teams to use evidence and proven coaching and feedback methods, build a culture of trust that focuses on improvement, and strengthen the induction of new teachers into professionals. their school's learning culture.

✓ *Empowering students and building school pride:* Schools will develop approaches that give students a greater say in decisions that affect their learning and school life. The whole school community will engage with students so that they have a voice in their learning and participate fully and proudly in school life.

✓ *Setting expectations and promoting inclusion:* Schools will work in their communities to implement a shared approach to support the health, well-being, inclusion and engagement of all students, including setting behavioral expectations, building teachers' understanding of positive classroom behavior and practices engagement and ensuring students have the tools and skills to develop positive and self-regulating behaviors.

✓ *Building Communities:* Schools will strengthen their capacity to build relationships with the wider community by partnering with the community sector and providers, strategically use existing community resources and capacities and increase services provided 'inside the school'.

Schools will realize the value of harnessing the full capacity of the community and parents to collectively encourage student learning and improve student achievement. At the national level, there is a clear need to rethink learning models in the context of artificial intelligence based on the data below, respectively:

| | 2011/ 2012 | 2012/ 2013 | 2013/ 2014 | 2014/ 2015 | 2015/ 2016 | 2016/ 2017 | 2017/ 2018 | 2018/ 2019 | 2019/ 2020 |
|---|---|---|---|---|---|---|---|---|---|
| ***No. higher education institutions, of which:*** | 108 | 107 | 103 | 101 | 99 | 97 | 95 | 92 | 90 |
| **- state property** | 57 | 56 | 56 | 56 | 56 | 56 | 56 | 55 | 55 |
| **- private property** | 51 | 51 | 47 | 45 | 43 | 41 | 39 | 37 | 35 |
| ***No. faculties, of which:*** | 614 | 596 | 590 | 583 | 567 | 560 | 554 | 545 | 546 |
| **- state property** | 410 | 405 | 405 | 403 | 409 | 405 | 406 | 406 | 407 |
| **- private property** | 204 | 191 | 185 | 180 | 158 | 155 | 148 | 139 | 139 |

**Table 1.** The network of university institutions in the period 2011-2020

*Source: Data taken from the Statistical Notebooks on Higher Education, INS, 2012-2020*

Regarding the data presented in the table 1, the following are highlighted: no. of higher education institutions: the total number of higher education institutions decreased from 108 in 2011/2012 to 90 in 2019/2020; the number of state-owned institutions decreased gradually over the years, from 57 to 55; the number of private institutions decreased from 51 to 35 over the same period.

Regarding the number of faculties: the total number of faculties decreased from 614 in 2011/2012 to 546 in 2019/2020; state-owned faculties decreased from 410 to 407, while private faculties decreased from 204 to 139.

There is a general trend of reduction in both the total number of higher education institutions and faculties. The number of private institutions and faculties shows a more significant decline compared to state-owned ones. It would be interesting to investigate the reasons behind these changes, such as shifts in educational policies, economic factors, or demographic changes.

| | 2011/ 2012 | 2012/ 2013 | 2013/ 2014 | 2014/ 2015 | 2015/ 2016 | 2016/ 2017 | 2017/ 2018 | 2018/ 2019 | 2019/ 2020 |
|---|---|---|---|---|---|---|---|---|---|
| *No. students in undergraduate education, of which:* | 539,9 | 464,6 | 433,2 | 411,2 | 410,7 | 405,6 | 408,2 | 402,7 | 407,4 |
| **- state property** | 399,5 | 364,9 | 354,0 | 345,3 | 351,5 | 350,1 | 352,3 | 348,5 | 351,7 |
| **- private property** | 140,4 | 99,7 | 79,2 | 65,9 | 59,2 | 55,5 | 55,9 | 54,2 | 55,6 |

**Table 2.** The number of students enrolled in university units, bachelor (thousands)

*Source: Data taken from the Statistical Notebooks on Higher Education, INS, 2012-2020*

Starting from these concrete and corroborated data and the events that accelerated the readjustment of learning models in the university environment, as well as its orientation to the economic environment and to a labor market in a reset of jobs in the context of the digital era.

Regarding the data presented in the table 1, the following are highlighted:

✓ total undergraduate enrollment: the total number of students in undergraduate education fluctuated over the years, ranging from 411.2 thousand in 2014/2015 to 539.9 thousand in 2011/2012. There's a slight increase in recent years, reaching 407.4 thousand in 2019/2020.

✓ state property vs. private property: the majority of undergraduate students are enrolled in state-owned institutions. State property enrollment ranged from 345.3 thousand to 399.5 thousand. Private property enrollment is generally lower but has also experienced fluctuations. It ranged from 54.2 thousand to 140.4 thousand.

There is an overall trend of fluctuation in undergraduate enrollment, with a slight decrease in the mid-years followed by a gradual increase. State-owned institutions consistently enroll a larger number of students compared to private institutions.

The gap between state and private property enrollment appears to be narrowing in recent years. Factors influencing these trends may include changes in educational policies, population demographics, economic conditions, and the attractiveness of private vs. state-owned institutions.

This analysis provides a snapshot of the dynamics in undergraduate enrollment over the specified period. Further investigation into the mentioned factors could offer a more comprehensive understanding of the observed trends.

This is why, once again we reaffirm the fact that Artificial Intelligence (Zhang, R. at all, 2022) has led each of us actors involved in society to reorient and re-adapt to the current context, and the academic learning model to be as connected as possible to the direct needs of industries (Zhao, L., at all, 2022), and the cooperation between universities and industry, to support a sustainable multidisciplinary, transdisciplinary, interdisciplinary and pluridisciplinary development (NMC, 2017).

## 5. Conclusions

In conclusion, the academic landscape, encompassing education and research, undergoes constant evolution. The literature review reveals a myriad of specifics, models, concepts, and approaches, highlighting the dynamic nature of knowledge teaching and modeling. This study explores scientific literature, shedding light on diverse educational models—traditional, progressive, online, and inclusive—each presenting distinct strengths and challenges.

The paper provides an overview of AI applications, starting with technological applications of dialogue systems for English as a foreign language (EFL) in university education and progressing to models based on dimensions of digital interaction literacy. The influence of decision-making processes on AI tools used in teaching, as well as the resources derived from ResearchGate network responses, is discussed. These tools, employed in the context of the digital era, contribute to positive cognitive skill-based learning.

Choosing an educational model requires careful consideration of educational goals, student needs, and contextual factors. The model proposed by Vásquez Astudillo (2020), aligned with the demands of national and global economies, is endorsed. As educators and researchers delve into these models, the future of education emerges as dynamic and responsive to societal change, intricately linked to economic realities at various scales.

While AI integration in education brings significant benefits, it necessitates a responsible and ethical approach. Protecting students' personal data and ensuring the elimination of discrimination are pivotal aspects in developing and implementing AI systems. It is underscored that teachers remain

indispensable, with AI serving as a supporting tool rather than a replacement.

### *5.1. Theoretical and Practical Implications*

From a theoretical standpoint, this systematic review of specialized studies serves as a foundational tool for approaching a teaching model based on AI tools. This is applicable not only in language learning but also in technologically funded fields. In the global context of the digital age, the risk of communication barriers in foreign languages can impede transcultural participation. However, dialogue systems offer an opportunity to enhance students' learning experiences, contributing to overall knowledge and performance. The use of AI tools optimizes the teaching routine by providing instant feedback, answering questions on discussion forums, and aiding in information retrieval. This approach allows teachers to focus on supporting student-centeredness, critical thinking, and problem-solving skills. In turn, students can efficiently access needed information, fostering personalized guidance, a priority in the digital age, and contributing to effective, student-oriented learning for societal development.

### *5.2. Limitations and Possibilities for Future Research*

Limitations include the absence of detailed statistical data on each identified learning model, which prompts our research team to further explore the field of university academic training. The analysis acknowledges limitations in the interactive practices at the authorities' and educational institutions' levels regarding the acquisition and harmonization of AI systems.

Future research aims to delve into practical transpositions of the plethora of bibliographic resources. Ongoing efforts will identify and present interaction practices at a multidisciplinary level, offering new data and arguments specific to learning models in the digital age, the green age, and other emerging challenges influenced by the remarkable progress of artificial intelligence. Harnessing this progress judiciously is crucial for improving student achievement, academic progress, and societal well-being.

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