Extrinsic and Intrinsic Personalization in the Digital Transformation of Education

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AI Education, Personalization in Education, Digital transformation in Education, Innovation in Higher Education.

Abstract

AI arrival promises to solve the needs of personalization in education. The following paragraphs aim to shed light on the concept of personalization by providing a philosophical conceptualization that enables an analysis of its scope and applications within the framework of the digital transformation of higher education. The paper explains the reasons why the goal of personalization is so deeply rooted in the digital transformation. It also describes the five meanings attributable to the concept and details their philosophical underpinnings. This helps clarify the distinction between the extrinsic and intrinsic orientations of personalization, which, in turn, allows to apply this distinction within the framework of the digital transformation of education.

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1. Introduction

Digital transformation of education fosters personalization by multiplying the thresholds of choice and promoting the adjustment to the student's own interests. Adaptive platforms can also accommodate learning activities according to the time and place available to students, adapting them to the pace at which they wish to undertake their own learning.

More than 10 years ago, in 2012, Bill Gates gave a speech at the *Annual Conference of the National Association of Independent Schools* (NAIS), the contents of which were later collected in the article *Technology's Promise to Education: Personalizing Learning* (Gates, 2016). There, he highlighted the personalizing scope of gamification of learning projects, and of certain educational platforms with large-scale impact.

Years later, in 2017, a group of Oxford professors founded Woolf University, considered "the world's first Blockchain University". Woolf's founding objective was to promote personalized teaching and learning by combining this technology with the traditional tutoring system that its founders practiced at their university of origin:

> "Our ambition is for Woolf to configure an unprecedented revolution in the history of the university. But in essence, Woolf makes possible the oldest and most venerable form of human education: direct, personal and individual learning. Woolf's goal is to make that transformative experience available to everyone (Woolf University, 2017: 4).

That same year, Harvard Business Review published an article titled *How IA and data could personalize higher education* (Rouhiainen, 2019). The article identified the potential of using artificial intelligence for the development of adaptive learning platforms, as well as its aspiration to achieve close and individual support.

The irruption of generative AI in 2022 deepened the expectation about the personalizing scope of AI. With the arrival of LLMs (Large Language Models), new alternatives for interaction between students and machines are created. The question arise about of the role of teachers and the possibility of personalizing learning by AI tutors engagement within adaptive platforms. As Salman Khan, creator of the Khan Academy platform and the AI chatbot Khanmigo, states:

> "The platform offers every person an opportunity to engage deeply in the education process in entirely new ways. Among other things, it provides a personalized and patient tutor that focuses on the learner's interests or struggles and empowers educators to better understand how they can fully support their students. (Khan, 2024: 34)

These few examples illustrate the recurrence with which promoters of educational innovation have trusted for years in technological progress to promote personalized learning. The association between digitization and personalization has not changed since then. On the contrary, it has become a kind of commonplace in Anglo-Saxon academic literature.

Evidently, it is essential to ask about the meaning of the concept of "educational personalization" in the context of the current digital transformation. It is also important to investigate whether this understanding is equivalent to that given by some Ibero-American pedagogical traditions in previous decades. This is not an easy task. On most occasions, the notion lacks clarity or precision. "Personalized learning has been conceptualized and put into practice in many different ways, which has resulted in a lack of consensus on the definitions and terms used in the field" (Vanbecelaere et al, 2020: 1794). As Bulger says:

> "It is not surprising that personalized learning has become fashionable, symbolizing the potential of using data in education. The scope of its definition is broad, and alludes to concepts such as "student-centered instruction" or "instruction adapted to the individual needs of students" that are traditionally used to reference a solid teaching practice, placing it under its

> constantly expanding umbrella. Technology-enabled personalized learning incorporates varying degrees of adaptation or personalization of the learning experience through applications and/or network platforms. And, however, there are no established standards for describing or evaluating to what extent a learning experience is personalized, and the difference between responsiveness and adaptability is often not considered in product descriptions. Independent evaluations of the level of personalization or its effectiveness in improving learning outcomes are scarce. This raises two important questions: 1) What categories of "personalization" are implemented in these technologies and 2) to what extent does "personalization" really contribute to the achievement of educational objectives? (Bulger, 2016: 3-4)

The following paragraphs aim to provide a philosophical conceptualization that enables an analysis of the notion of personalization, its scope and applications within the framework of the digital transformation of higher education. This paper builds upon recent work that outlines the general guidelines for this exploration (Bellomo, 2022: 7033; Bellomo, 2023: 183) and delves into the five meanings or levels of personalized education that will be examined in the following paragraphs. It also distinguishes between the two main orientations that educational personalization can take – extrinsic and intrinsic – and identifies their predominant influence on each of the five meanings or levels mentioned.

The chapter is structured as follows: a) It explains the reasons why the goal of personalization is so deeply rooted in the digital transformation; b) it describes the five meanings attributable to the concept of personalization and details their philosophical underpinnings; c) it distinguishes between the extrinsic and intrinsic orientations of personalization, and applies this distinction within the framework of the digital transformation of education; d) finally, it establishes the ways in which new innovation trends meet the expectation of delivering personalization in its extrinsic and intrinsic orientations and analyses the role of teachers in this context.

The main conclusion is that technological innovations in education primarily promote extrinsic personalization, which needs to be complemented by actions or initiatives that foster intrinsic personalization. Furthermore, that teaching function is, in some sense, replaceable by technology, but in another sense, it is irreplaceable. This becomes evident not only when considering the teacher's role as a “curator,” but also their disciplinary, motivational, and moral exemplarity.

2. The notion of *personalization* in the context of digital transformation of education

The concept of “personalized education” became popular in Latin America in the early 1980s thanks to the influence of Víctor García Hoz, a Spanish expert on Experimental Pedagogy. García Hoz was the founder of the Spanish Society of Pedagogy and a professor at the Universidad Complutense de Madrid. He visited Latin America on many occasions, establishing regular bonds with educational authorities in several countries. As result of these exchanges, his thinking exerted a significant influence on public and private educational domains at the higher education system as well as school systems. His influence has drawn divergent opinions from various specialists given its explicit identification with Catholicism (Garatte and García Clúa, 2016; Rodríguez, 2016).

Strictly speaking, for García Hoz, “personalized education” is not synonymous with “personalization of education.” In his *Introducción General a la Pedagogía de la Persona*, he describes the relationship between the two concepts and points out that “personalization of education” refers to the educational process from which “personalized education” itself develops. The latter is the result of the former (García Hoz, 1993: 34; 1992: 194). From his perspective, *singularity*, *openness*, and *autonomy* represent essential elements for the definition of personalized education (Palacios et al., 1989; García Hoz, 1994, 1993, 1972). *Singularity* refers to “the possibility that schoolwork and

relationships promote the development of each student according to their own capacity, interest, and learning pace, and considering the family and social circumstances of their personal history" (García Hoz, 1972: 8). This operational meaning of singularity is based on a deeper understanding of the term. Singularity, in this deeper sense, is constitutive of the essence of the person, and implies a qualitative distinction "by which every human being is different from others" (1981: 34). This fact explains the relationship that various authors find between personalization and inclusion (Perochena and Coria, 2017, Gallego Jiménez and Otero Rodriguez, 2020; García, 2012) and the consequent rejection of exacerbated educational homogenization:

> "The 'average student' or the 'homogeneous group' are nothing more than educational superstitions. Education is carried out in each person according to their peculiar characteristics; and the reason for personalized education is precisely to attend to personal differences in development, within a common educational stimulation (Bernal Guerrero, 1999: 20).

As for the notion of *autonomy*, García Hoz (1972) defines it as "the possibility of participation of students not only in their realization but also in the organization and programming of activities, in such a way that students can exercise their freedom of acceptance, choice, and initiative" (1972: 8). Finally, the notion of *openness* brings together a series of features of great importance, also attributable to the very definition of the human person:

> "The concept of person adds to the idea of man, the meanings of dignity, biological and moral unity, ethical character, conscience and freedom, singularity and mastery of life itself. All these notes are synthesized in the "openness to reality" which, in turn, is consummated in joy, in a double origin: activity is both a relationship with things, and coexistence, a relationship with people". (...) "Precisely the person, a consequent principle of activity, is the factor capable of giving moral unity, that is, truly human unity, to all the acts of a man's life (García Hoz, 1994: 194).

Within this framework, personalization of education makes possible the main objective of human development: the flourishing of one's own life (García Hoz, 1994: 200). Human flourishing implies the satisfaction of needs and aspirations common to other people, as well as to individual expectations and desires (1994: 191).

Strictly speaking, García Hoz's defense of personalization does not arise *ex nihilo*, but within the framework of a broader and older tradition that dates back to classical Greek philosophy, assimilates components of medieval personhood metaphysics (inherited from Thomas Aquinas and Boethius), and also incorporates influences from French, Italian, and American personalism (1992: 194). However, personalized education has also been promoted by many other outstanding educators anchored in other philosophical worldviews, such as Rousseau, Maria Montessori, John Dewey, Helen Parkhurst, or Benjamin Bloom, just to mention a few prominent figures.

This Latin American pedagogical tradition offers an interpretation of the concept of personalized education that differs strongly from that prevailing in the Anglo-Saxon tradition (Pérez Guerrero and Ahedo Ruiz, 2020: 154). The latter is linked to concepts that emerged from the new marketing theories adopted in the early 20th century by public policies in countries such as England (Hartley, 2007; Peters, 2009). In this context, education that offers students opportunities for choice, or that adjusts times, places, and itineraries according to their needs and preferences, is considered personalized. The concept is also associated with the effort made by teachers to adapt teaching methods to the student's particularities, to develop detailed preventive reports on individual performance, and to generate individualized interventions that promote learning.

This circumstance is not accidental and explains itself in good part by the inertia that digital transformation processes have on human activities. As stated elsewhere (Bellomo, 2022: 7031), there are six pillars of digital transformation that stimulate the rejuvenation and rise of

personalization[1]. These pillars are: user orientation, the phenomenon of Big Data and artificial intelligence, ubiquity, the centrality of platforms, and the demand for digital design by default (Digital By Design).

The influence of these pillars in learning or teaching processes gives shape to a series of phenomena that are reconfiguring educational systems. The user orientation prerogative of digital transformation constitutes the cornerstone on which these processes are based and seduces many contemporary educators who have been fighting for student empowerment and the resignification of teaching practices for the development of active learning. However, the orientation and scope of this prerogative does not necessarily match with those raised within humanist pedagogical conceptions such as García Hoz´s or others.

The concept of Personalization 4.0 refers to the set of efforts developed within the framework of the digital transformation of education to achieve the individual development of students, that is to say, the personalizing ideal of education (Bellomo, 2023: 169). Personalization 4.0 fosters the use of certain technologies or resources and installs certain mandatory practices. Below, some of these are reviewed without any claim to exhaustiveness, solely for the purpose of understanding the scope of this personalizing claim:

- a) The gamification of education promotes the use of micro-incentives (badges, scores, rankings, etc.) to promote students' extrinsic motivation. In this way, it intends to avoid the distraction and boredom typical of digital overabundance (Rivas, 2019: 80, 165, 180).
- b) Intelligent Tutoring Systems (ITS) use chatbots based on generative AI to promote different types of interaction more or

[1] The identification and characterization of these pillars is ours, although it resembles that of Barbara Ubaldi when applied to digital transformation of public administration (Ubaldi, B., 2020: 186-187)

less structured models. There are one-to-one response chatbots like Chat GPT or Gemini, and open collaborative learning systems like dialogue-based tutoring systems. Some of the most sophisticated, use a Socratic method and guide students to answer questions or challenges generated by AI with the intention to promote problem-solving on their own. Studies developed in 2021 indicated the commercial availability of more than 60 ITS developments (Miao et al., 2021: 19). The current development runs at a great speed, according to *Research and Markets* (2024). According to recent studies, the global EdTech Market raised up to 14,16% between 2019 and 2020 because of pandemic and it is expected to keep growing at a rate of 18% per year between 2024 and 2030.

— c) Assessment also promises to be transformed by the contribution of AI. During decades, open-source platforms have allowed teachers to design assessments that generate automated feedback. Nowadays, new AI developments automate the design of these tasks and adjust them to the level of progress of each student. They can also provide automated feedback to the students. The prerogative of these automation efforts, according to their promoters, is to free up teachers' time from routine tasks and help them to concentrate on personalized follow-up of the students (UNESCO, 2023:10).

— d) Platforms are digital spaces that bring together the contribution of several of the innovations mentioned above. Kerssens & Van Dijc (2021) refer to the phenomenon of "platformization of education" to characterize this concentration of resources and efforts in massive online formats. Their volume of users has been increasing in recent decades, generating a quantity of data whose mining excites data scientists. By appealing to them, it is possible to generate adapted and adaptive itineraries, multiplying the thresholds of choice, ensuring that content and activities are adjusted to individual

times, modalities, and interests, and facilitating the management of administrative processes.

— e) The large-scale availability of data on student performance challenges data scientists from another point of view: A crucial application of AI in education management is the development of early warning systems (EWS) to identify students at risk of dropping out. These systems analyze data on key indicators such as academic performance, attendance, and behavioral issues to flag students who may need additional support. Traditional EWS have shown promising results in reducing dropout rates, and the integration of AI techniques can further enhance their predictive accuracy and timeliness (Molina et al., 2024: 23). However, their extensive use is subject of ethical challenges and risks (Holmes, Bialik & Fadel, 2019; UNESCO, 2023).

There are many other available technologies aiming to promote personalized teaching: robots that stimulate learning for people with disabilities, language teaching tools, teachable agents that decode student explanations and give feedback, as well as immersive virtual or augmented reality environments. The scope of these tools is increasingly novel and attractive, even when experts warn for the need of exerting "cautious optimism" when considering the effectiveness of their implementation in the current state of the development (Molina et al., 2024: 9).

Besides this practical warning, it is essential to carry out an analysis of the philosophical assumptions that inspire these developments in order to recognize to what extent this personalization is legitimate or complete. To be able to carry out this analysis, it is necessary to make a prior discrimination of the different meanings attributable to the notion of personalization in order to identify –for each of them– what is the level of potential or real contribution of the digital transformation to personalized education.

3. Meanings of personalized learning

We can identify five meanings given to the term "personalization" by contemporary pedagogical literature. While arising this distinction, the effort to deliver a comprehensive synthesis will lead us to more clarity at the cost of sacrificing differences or nuances that we can find within each sense (which should allow us to identify new connotations and expand the number of meanings of the term).

Naturally, the different meanings relate to each other, although not in a linear way. This is because the concept of "personalization" is not univocal, but analogous, as is the case with the concept of "health". This is why the notion of personalization can be assigned to different activities or educational resources, with meanings that are partly the same and partly diverse. On many occasions, the understanding of one sense demands or supposes that of another.

Medieval tradition calls this type of analogy "analogy of intrinsic attribution"[2], insofar as one of the senses it the one to which the rest are ordered or refer to (as means to ends). Later, it will be indicated which is the "main analogue" to which the remaining "secondary analogues" refer.

The analogical nature of the concept of personalization explains that, sometimes, the understanding of one meaning demands or presupposes that of another. In fact, one deep and exhaustive apprehension of the concept of personalization integrates all these partial meanings.

Personalized learning in the sense of "opened-to-choice education"

Many of those who refer to the personalizing impact of technologies highlight precisely their potential to enable choice on the part of students:

[2] For the analysis of the different types of analogies, see Díaz Dorronsoro, R., *La analogía*, en Fernández Labastida, F. y Mercado, J.A. (editores), *Philosophica: Enciclopedia filosófica online*. Recovered from: http://www.philosophica.info/archivo/2010/voces/analogia/Analogia.html

they enhance the possibility of choosing learning modalities, promote the customization of curricular pathways and facilitate the autonomous management of time and supplies (schedules, bibliographic material, etc.).

This vulgar and general meaning of the concept of personalization is strongly widespread and echoes an equally established demand for the flexibility of traditional teaching structures and modes, generally conceived as too rigid or static. This first broad meaning of personalized learning demands specification when being operationalized, because human choice necessarily involves the need to clarify its aim or direction. This leads us to the second meaning of personalized learning.

Personalized learning in the sense of "tailored-education"

The second sense considers individualization or *singularity*, that is, the possibility that the educational activity and relationships allow the development of each student according to their abilities, interests and learning rhythms, also taking into account social and family circumstances, as well as to your individual story. The notion relates – not without certain limits – to García Hoz's singularity reviewed above. This sense of personalization also seeks to break with the homogenizing inertia of traditional educational systems and their normalizing effect.

The "customizing" aspiration of digital transformation is expressed in many ways, although one in particular has become very topical with the rise of *stackability* in higher education (Bayley & Belfield, 2017). This notion refers to the possibility of following a personalized training itinerary based on the choice of independent, complementary and sequential modules. Thanks to stackability, students can choose – to the extent permitted by institutional or local regulations – not only the topics that best fit their interests, needs and inclinations, but also the duration and scope of their partial studies. This type of curricular organization has proven to be relatively successful in vulnerable populations (Daugherty et al., 2023) and has spread due to the increasingly widespread use of the "credit" system.

Adaptive learning platforms also add their contribution to respond to the expectation of individualization that inspires this second meaning. Based on the use of AI applied to teaching-learning processes, they try to apply its adaptive capacity to adjust the teaching proposal to the particular learning style of each student. If a sufficient volume of data is collected, "adaptive systems help close achievement gaps, introducing variety in the classroom, providing real-time data related to student needs, and enabling spaces for instructors to develop individualized interventions." (Li et al, 2019: 45).

In the context of these platforms, as students progress through a lesson, they may see information presented in various ways, tailored to their learning needs. The systems *learn* from student interactions and then adjust the path and pace of learning (Moskal et al, 2017).

It is evident that ensuring personalization in the first of the aforementioned sense (possibility of choice) does not guarantee personalization in this new sense, although it constitutes a necessary condition. A student, for example, may opt for a training pathway that does not respond to his or her deepest interests or needs, for example, leaning towards approval facilities that a certain curricular space provides over others. In short, given the possibility of choice guaranteed by the first sense, it is necessary that the choice alternatives presented adjust as closely as possible to your needs or interests.

Personalized learning in the sense of "closed accompanied" education

The concept of "close accompaniment" admits an extended and vulgar meaning that refers to the efforts delivered by organizations and educators in order to make the student feel comfortable and assured by personal orientation, comprehension and support. The scope of these efforts is broad, and include communicational, administrative, logistical and academic dimensions. Tutorial action of teachers has a starring place among the academic dimension. It has been broadly reviewed and explained both in the school level (del Río Sadornil, D. and Codés

Martínez González, M. 2020) and at the higher education level (Wisker, G. Exley, K. and Antoniou, M., 2008).

The issue of close support in education is subject of debate since the emergence of AI-based tutoring systems. Can a machine ensure a satisfactory response to students' expectations and demands for support? A priori, the answer requires knowing what these expectations and demands are, which vary according to their level of maturation, the specificity and level of difficulty of the discipline in question, the personal and institutional context, among other factors. At the moment, there is no consensus regarding how much more effective or deficient digital tutoring is with respect to those developed in human intercourse (Bellomo, 2023: 138-140). There is an urgent need to better explain what is meant by personalized accompaniment, as well as verify to what extent a causal relationship can be established between the modalities of accompaniment and the learning results actually achieved. For now, and for the purposes of this reflection, it is important to raise the question about the replaceability or irreplaceability of the human person of the teacher in educational practice. This question will be analyzed in the last section.

Personalized learning in the sense of "active learning" or "self-regulated learning"

Different contemporary trends highlight the importance student leadership and engagement in their learning processes (Gattegno, 1987; Scott, 2014; Campos Arenas, 2017; Pleshcová, G. & McAlpine, L., 2015; Weimer, 2003; Newton, 2000). The prerogative of active learning is at the foundations of various pedagogical theories, such us *Teaching for Understanding* of Harvard School (Blythe, 1998; Perkins, 1985) or *Student Agency* theories (OECD, 2019).

Personalized education, thus conceived, highlights the transcendental importance of "the student taking ownership of his or her learning process through awareness and exploration of the internal, cognitive and affective processes that take part in the development of knowledge. It is hoped that they assimilate into their habitual behavior the values and motivations that inspire the desire and practice of lifelong learning" (Bellomo, 2023: 187).

By doing so, it intends to foster the values, motivations and practices that fulfill the desire to learn for life. From this perspective, an education that enhances the student's lifelong learning skills is more personalized since it makes him or her less dependent on external circumstances and more aware of his metacognition processes. Evidently, theories that emphasize the importance of self-regulation are do not restrict personalization to the mere exercise of choice on the part of the student (Pintrich, 2004: 387).

The development of self-regulation requires the acquisition of concurrent skills in two dimensions: *cognitive* and *affective-motivational* (Daura, 2021). At the first level, it demands the ability to select the most appropriate cognitive strategies to the task involved. Likewise, it is necessary to apply *metacognitive strategies* to ensure adequate planning, monitoring or change in the chosen strategy. The capacity for self-regulation also requires abilities to organize one's own time, control effort or manage resources to reduce distractions, ensure an environment suitable for study or seek external advice.

The *affective-motivational dimension* demands *components of expectations* (positive or negative self-perceptions that the student has about himself and his ability to perform a task), as well as the *components of value*. The latter reflect the importance that the student assigns to the assigned academic task. The progressive maturation of these two components is evident in the student's ability to set goals and achieve them, all of which is possible if there is intrinsic motivation. The existence of intrinsic motivation makes the person less dependent on extrinsic motivation, that is, on the application of rewards or punishments.

By understanding active learning or self-regulation as a concurrent deployment and exercise of these internal capacities at different levels, we can easily recognize the gap that exists between the first or second sense of personalization and this fourth sense. While the first two senses associate personalization with the creation of external contextual conditions for the exercise of individual choice, the fourth refers to the effective ability to exercise autonomy on the part of the student and to sustain learning throughout life. This deep and robust sense of autonomy

implies the development of stable capacities that allow students to design their own life project in accordance with their own way of being and expectations.

Personalized learning in the sense of "comprehensive flourishment"

The recognition of these different cognitive and affective-motivational levels introduces us to a new understanding of the notion of personalization, conceived in a broad sense as "comprehensive human flourishing". The association between comprehensive education and personalized education is evident when recognizing that educational activity is oriented towards the full development of all dimensions of the person; it aims personal fulfilment. Hence, education that integrates more aspects of development is more personalized.

Of course, this aspiration for integrality and comprehensiveness can be expressed in different ways depending on how "full human development" is understood, according to each person's own philosophical and existential commitments. From a Christian perspective, James Arthur (2021), for example, draws on the Aristotelian tradition to highlight the intrinsic relationship between the flourishing and development of virtues in *A Christian Education in the Virtues. Character Formation and Human Flourishing*.

In César Coll's framework, on the other hand, the demand for comprehensiveness is recognized in the need to integrate three types of content in the teaching-learning process: conceptual, attitudinal and procedural content (Coll, 1987), oriented towards expectations of social, labor and citizen insertion.

The Competency Framework is also nourished by this same demand for integration between knowledge, know-how and value judgement. Although it brings together a diverse set of formulations and meanings (Gimeno Sacristán, 2008: 37) there is an agreed understanding of what is meant to develop a competence: "Competencies include both content and process knowledge (knowing what and knowing how), but they also include skills, values, attitudes and motivation" (Mindt & Rieckmann,

2017: 132; Cf. also Kouwenhoven, 2009, Weinert, 2001, Weik et al., 2016).

In opposition to the encyclopedic inertia of nineteenth-century educational systems, all these approaches promote a more comprehensive and integrated conception of learning that converges in the expectation of providing a more harmonious and full display of the different dimensions of the person.

4. Extrinsic and intrinsic personalization

The analysis developed so far helps us identify two main orientations of personalized education: extrinsic and intrinsic. Understanding their differences will allow us to better discern the scope and nature of digital transformations and its contribution to personalization.

The extrinsic orientation of personalization (*extrinsic personalization*, for short) takes place when we create favourable contextual conditions for the experience of a personalized experience. Extrinsic personalization increases when, for example, we propose more options or alternatives to the student. This happens when a higher education institution offers blended environments, giving students the opportunity to choose between face-to-face or on-line learning. It also occurs when it distributes a large group of students into smaller groups to promote closer accompaniment by the teacher or it allows them to choose within different curricular pathways.

Being contextual in nature, the extrinsic orientation creates favourable conditions for the development of a personalized educational experience, but it does not ensure it. In the presence of a small group, a teacher may implement a non-personalized methodology or have a distant and unsympathetic bond with their students. Similarly, given the possibility to choose within face-to-face or on-line learning, a student may prefer the one that least collaborates with their learning process, for example, favouring social affinity.

For personalization to be complete, it is necessary to enter a dimension that is intrinsic to the teaching-learning process and not merely contextual. The intrinsic orientation of personalization (or *intrinsic personalization*) thus refers not so much to the conditions external to the process, but to the way in which the teaching-learning experience itself is developed. From the point of view of learning, intrinsic personalization is related to the student's degree of commitment to his or her own process, the depth with which he or she manages to engage with learning, and the breadth with which he or she deploys his or her intellectual and affective capacities in this process.

The intrinsic dimension and the extrinsic dimension of personalization need to develop simultaneously and in a complementary way. Just as the development of the extrinsic approach does not ensure personalization in the intrinsic sense, it is difficult to develop the latter without a series of enabling extrinsic conditions.

At this point, however both orientations intertwine in every learning experience, it becomes obvious that we can trace a certain predominance of one of these two orientations within each of the five meanings or levels of personalization. The first meaning of personalization tends to be merely extrinsic, given that it refers to the existence of alternatives of choice independently of the act of choosing itself and the aim of the choice itself.

The second meaning involves creating a learning environment or proposal that fits the preferences, expectations and capabilities of each individual person. The identification of these preferences, expectations or capabilities, as well as the creation of this environment and proposals not always depends on the student action or decision. Parents and teachers have a central role in the provision of external contextual framework of development in early stages of education. Therefore, the major orientation of the second meaning of personalization is still extrinsic, although a germinal degree of intrinsic personalization arises every time the given context actually meets individual needs, expectations or capabilities. This adequacy between external context and internal expectation or

capability often drives to motivation and desire to learn. Moreover, this motivation is one of many other ingredients that take place in deeper personalized learning development.

Evidently, there is a certain predominance of extrinsic orientation in the first two senses of personalization, while intrinsic orientation predominates in the last two senses. The third sense related to close accompaniment has such complexity that it deserves a deeper analysis due to its complexity. We will return to this issue later on.

The main contributions of digital transformation for the development of personalization clearly refer to extrinsic orientation. By multiplying the thresholds of choice, facilitating adaptation to one's own pace, and ensuring greater adjustment to one's own interests, technologies create favorable contexts to promote self-regulation and a leading role on the part of the student, which promises better possibilities for human comprehensive flourishing.

Thus, applying the Aristotelian categorization of the four causes (cf. González Álvarez, 1969: 139; Solis Sotomayor, 2014), it can be stated that personalization constitutes the final cause of educational activity when conceived as comprehensive development or human flourishing, that to which all the other senses of personalization are ordered. It can be considered, therefore, the "main analogue" to which the remaining secondary analogues refer. For its part, personalization understood as enhancing the active agency of the students addresses efficient causality, since he or she is the first and main architect of his perfective development.

Within this framework, we can conclude not only that the creation of extrinsic conditions does not necessarily and directly ensure the development of the capacity for autonomous learning. It is also worth highlighting another principle that generally goes more unnoticed: students who have sufficiently developed self-regulation, intrinsic motivation and certain cognitive or metacognitive abilities are better prepared to make decisions that contribute to their true development and learning. In simpler words, the more intrinsic the personalization, the

greater the ability to take advantage of extrinsic personalization, but not the other way around. Hence, since digital transformation fosters extrinsic personalization (creating favourable contextual conditions for learning), we need to assure intrinsic personalization in order to take full profit of digital innovation.

5. Teachers vs machines in the quest of personalization

Every time new technologies become massive, they threaten traditional teaching. What constitutes a novelty nowadays is the range, attractiveness and benefits of new digital resources. By enlarging the number of pedagogical mediations, digital transformation offers undeniable potential for accessing ever-widening thresholds of culture and broadening the horizon of human understanding.

> “New technologies are altering the roots of this educational distribution model. The digitization process is the first great force for the transformation of educational formats. The new educational market is a fundamental engine of this process. What is digitized eliminates the cost of its reproduction. Once the “product” is digitized (a book, a class, an exercise, a course), it becomes ubiquitous immediate, portable. The digital bits create an unlimited currency of information distribution in space and time. (Rivas, 2021: 8).

George Steiner (2016: 207) states: “The screen can teach, examine, demonstrate, interact with precision, clarity and patience greater than that of a human instructor.” In this context, is teaching an endangered species? Renowned specialists have already raised the alarm:

> “As AI develops, teachers may find themselves freed from so many tasks, to the point that the perceived need for teachers dwindles to almost nothing. Although this might have some advantages in contexts where teachers are scarce, the goal of eliminating the need for human teachers reveals a fundamental

> misunderstanding of their essential social role in the learning process (Miao et al., 2021: 22).

In the words of World Bank specialists:

> "It is essential to emphasize that AI should not be seen as a replacement for human expertise, but rather as a way to enhance and scale the impact of human judgment and skills. The role of educators remains critical, and AI tools should be viewed as powerful assistants that can help teachers personalize learning experiences, provide targeted support, and make data-driven decisions (Molina et Al., 2024: 7)

The answer is forceful and reflects a fairly widespread opinion in educational fields. However, it immediately raises a new question: what is the basis of teacher irreplaceability? For almost a decade, certain voices have invited us to conceive teaching as "digital curators" as digital transformation conquers more and more aspects of education (Yakel, 2007; Antonio & Tuffley, 2015). Being specialized curators, teachers must specialize in selecting the content and resources that best respond to the development needs of their students. They are required, in other words, to be able to provide the contextual conditions necessary for personalized learning.

This vision of teachers as facilitators of environments or contexts for learning constitutes a risky reductionism, since it turns the teacher or professor into a promoter of extrinsic personalization. It has already been stated that current digital technologies are those that best promise to solve this provision, that is, they have demonstrated a wonderful capacity to generate contextual conditions for adequate learning and thus promote extrinsic personalization. In some way, entertainment platforms already carry out digital curation through the application of algorithms that are regulated according to adaptive criteria. They offer users a "digital curation" service without the need for human mediation. The application of this same curatorship model is already being explored in a nascent way in certain adaptive platforms and there are many who imagine a future of

education in which numerous teaching tasks are replaced by AI technologies.

Obviously, this replacement of teaching functions by machines could be frustrated by factual and casual reasons (for example, technological delay, lack of human resources, trade union resistance, etc.). For the purposes of this conceptual analysis, it remains important to ask if the possibility of survival of the teaching function should be subject exclusively to such externalities or if there is some essential irreplaceable function in the teaching role we should preserve. For now, it is worth reiterating that the more we conceive teacher´s adding value by creating contextual conditions, the greater the possibility of effectively replacing its role with technology support.

The essential contribution of teaching must be sought in another direction, in its connection with the promotion of intrinsic personalization. Good teachers act not only as selectors of meaningful content and promoters of effective learning activities, but also as exemplar models.

Sometimes, what is taught is much more than a technique or specific set of facts. When the teacher is someone exemplary, the desire for imitation naturally awakens in the hearts and minds of the students. In these cases, the student learns a way of seeing the world and relating to others, recognizing and admiring the knowledge, skills and attitudes that they recognize in their teacher.

The exemplary role of the significant adult, and the propensity for imitation by boys and girls, was already recognized in 1965 by Albert Bandura. Neuroscientific studies on the functioning of mirror neurons (Rizzolati, 2005) have added empirical evidence in order to highlight the importance of imitation in learning pro-social behaviours throughout life and not exclusively during early childhood. Given the philosophical framing of the present work, it is not the intention of these paragraphs to provide empirical evidence on the relevance of imitation and, consequently, of the exemplary role of the teacher. The presumption of irreplaceability proposed here is based on theoretical principles that correspond to a certain anthropological worldview. Although they are

philosophically grounded, they do not lack persuasive force and support of evidence.

We can recognize three complementary levels of modelling/imitation in higher education (Cf. Bellomo, 2023: 217-223). In 2007, Ken Bein published the results of his research on the behaviour and characteristics of the best university professors. One of his first findings was decisive:

> "Without exception, extraordinary teachers know their subject very well. All of them are accomplished scholars, artists or working scientists. Some have an impressive list of publications that are most appreciated by academics. Others present more modest records; or, in some cases, virtually none at all. But whether they are published widely or not, extraordinary teachers stay abreast of important intellectual, scientific, or artistic developments in their fields, reason valuable and original about their topics, and study carefully and extensively what other people do. in their disciplines, they often read a lot from other fields (sometimes very different from their own) and are very interested in the general themes of their disciplines: the histories, the controversies, the epistemological discussions. In short, they can achieve intellectually, physically or emotionally what they expect from their students (Bein, 2007: 27).

The first level of exemplarity occurs when students acquire the "spirit" of that same discipline whose concepts and procedures they are learning. The "spirit" constitutes the disposition to understand and value the world that is implicit in all authentic disciplinary training. Thinking like an engineer, an architect, a paediatrician or a philosopher is not something that happens suddenly due to technical training alone. It occurs in the context of the assimilation of both the "lyrics" and the "music," so to speak, of the discipline. It is achieved through rigorous and deep conceptual learning, but it exceeds mere conceptualization. It demands a much more precious achievement: the incorporation of a *forma mentis* (Zubiri, 1983:153) by the student. *Disciplinary exemplarity* occurs when

the student develops in his intelligence the *forma mentis* of the discipline that he recognizes in his teacher.

A similar phenomenon occurs at the level of *motivational exemplarity*. Machines do not spread enthusiasm or create vocations. Only truly passionate people achieve this extraordinary legacy. Without this motivational ingredient, it is not possible to achieve self-regulation and the acquisition of lifelong learning skills, central components involved in the fourth meaning of personalization. This passion is a powerful "fuel" for intrinsic motivation. Good teaching is irreplaceable for the promotion of this intangible but essential aspect of educational activity, especially in stages in which the passion is germinal and somewhat tentative, as is the case of the initial levels of higher education.

Finally, *moral exemplarity* does not exclusively refer to the formative value of ethical teaching in the context of higher education. Teachers are ethical examples when they express in their daily behaviour a full and sincere commitment to the development of each of their students. This commitment reveals itself in concrete actions: in the preparation of classes, in the quality of feedback or in the effort of cross-examination when faced with inappropriate comments, among many other activities. At the same time, moral exemplarity is not limited to this effective commitment to the development of each student. It also requires, in higher education, fostering the deontology of professional practice. A good lawyer teaches his students while handling his own cases. He teaches by example the ethical practice of his specialty.

"Technology is an excellent amplifier of human exemplarities, but no technology is a carrier of exemplarity by itself" (Bellomo, 2023: 223). Thanks to technology, we can access a broad and very rich legacy of behavioral models at any of the three levels indicated. Watching a documentary about Ghandi can be inspiring. But the inspiration will come from the person of Ghandi, whose legacy is present in a digital mediation. In some way, the digital transformation of education increases the possibility to access to exemplary mediations, but also to non-exemplary

ones, which awakens the pressing need to develop critical thinking and value judging.

What is the philosophical ground of this exemplarity? How can it be explained? Recalling the foundations of Aristotelian theory of the four causes and its application to pedagogy, students are properly the *efficient cause* of education. Teachers can exercise, at most, *efficient dispositive causality* as they help create contextual conditions for active learning (Solís Sotomayor, 2014: 65), but they are not the first and main protagonists of the educational development that occurs in the student.

This efficient dispositive causality constitutes, as has been said, the most replaceable aspect of teacher´s function as the development of new generative digital technologies expands. However, when teachers become role models, when their behavior and way of being become a source of inspiration for students, then a different type of causality is verified. The external image of the teacher is internalized in the student; an expectation of emulation grows in him or her, and is installed as a source of motivation. So, in some way, some attribute of the teacher becomes a final cause for the student. The desire for emulation fuels motivation, triggers the student's executive abilities, guides the development of specific skills and enhances individual flourishing. In a way, the student develops aiming to be in a way like his *exemplary cause*, but preserving his own individuality.

In summary, personal accompaniment (which was identified as the third meaning of personalized education) can be exerted in a merely extrinsic orientation (if the teaching role is limited to curation or creation of learning environments or contexts). Therefore, the teaching function thus considered has a great chance to be replaced by the action of digital technologies. But the teaching function can also be configured as exemplary cause, fostering intrinsic orientation of personalization. When teacher´s practice becomes exemplary in any of the ways considered above and if the student internalizes this exemplarity through the development of internal capacities as a result of emulation, then something of the teaching function becomes irreplaceable by its own

virtue and nature. This not only happens regardless of the impact of digital revolution in education and its undeniable contributions to culture and learning, but also assures that students may take advantage fully of this revolution.

6. Conclusions

The main contributions of digital transformation to the development of personalized education have an extrinsic orientation and refer to the first and second meaning of personalization. Indeed, they encourage personalization through the multiplication of choice thresholds (first sense) and favor the contextual adaptation of teaching strategies to the interests, time, place and pace of the students (second sense).

Regarding the third sense of personalization (close accompaniment), certain pedagogical approaches limit teaching responsibility to the creation of contexts conducive to learning and conceive this accompaniment as an external support, instrumental in nature. Under these assumptions, the appearance of digital adaptive learning tools becomes a potential threat that heralds the replaceability of teaching action. The new digital platforms, despite their germinal state and their incipient degree of development, boast of their ability to select – without any teaching mediation – the best resources and activities for each student based on the information provided in their own learning process.

Given a deeper understanding of what educational personalization entails, the characterization of the teaching role also expands. While extrinsic accompaniment admits being replaced and even surpassed through the action of AI innovations, the exemplary dimension can only be replaced indirectly, as long as technology acts simply as a means to bring closer or enhance present or past, but real, human exemplarities.

In conclusion, the creation of contextual environments is a necessary but not sufficient condition for the development of intrinsic personalization. Teacher´s role not only needs to create an extrinsic context conducive to learning, providing knowledge, tools, activities and guidance (something

that can be solved with the use of technology). Teachers also needs to act as a role model. The exemplary role of teachers triggers a triple imitation by students: disciplinary, motivational and moral.

The exemplary condition of the teacher promotes the development of skills and abilities necessary to achieve personalization in a fourth sense: self-regulation or active learning. This is achieved when the student takes ownership of the process of his or her learning process, when he or she acquires cognitive and metacognitive abilities, and develop affective resources (mainly intrinsic motivation) for the development of intellectual and socio-emotional skills, achieving self-regulation necessary for life-long-learning. Once these intrinsic conditions have been deployed, the student will be able to choose a life project that contributes to his or her comprehensive development or full flourishing, however it is conceived. This integral flourishing constitutes the fifth and deepest aim of personalized education. Digital transformation can foster extrinsic personalization towards this aim, but intrinsic personalization remains a human enterprise that challenges both students and teachers.

7. Bibliography

Antonio, A. B., & Tuffley, D. 2015. "Promoting Information Literacy in Higher Education through Digital Curation". *M/C Journal*, *18* (4). https://doi.org/10.5204/mcj.987.

Arthur, J. 2021. *A Christian Education in the Virtues. Character Formation and Human Flourishing*. London & New York: Routledge.

Bein, K. 2007. *Lo que hacen los mejores profesores en la Universidad*. Barcelona: Universitat de Valencia. 2ª. Ed.

Bandura, A. 1965, "Influence of models' reinforcement contingencies on the acquisition of imitative responses", *Journal of personality and social psychology*, 1(6), 589-595.

Bayley, T. & Belfield, C. R. 2017. *Stackable Credentials: Awards for the Future?* Columbia: Columbia Community College Research Center. Working Paper N°92. Recovered from

https://academiccommons.columbia.edu/doi/10.7916/D82N57KM.

Bellomo, S. 2022. "The role of teachers in the context of new trends of digitized and personalized education". *Proceedings of ICERI2022 Conference. 7th- 9th November 2022*, 7031-7038.

Bellomo, S. 2023. *Educación aumentada: desafíos de la Educación en la era de la inteligencia artificial.* Geneva: Globethics Publications, 265p. DOI: 10.58863/20.500.12424/4293074.

Bernal Guerrero, A. 1999. Análisis del tratado de educación personalizada. Génesis y aportaciones. *Revista española de pedagogía*. año LVII, n.º 212, pp. 15-50.

Blythe, T. et al. 1998. *The Teaching for Understanding Guide*. San Francisco: Jossey-Bass.

Bulger, M. 2016, "Personalized learning: The conversations we're not having", *Data & Society*, Working Paper, 1–29. Recovered form https://datasociety.net/pubs/ecl/PersonalizedLearning_primer_2016.pdf.

Campos Arenas, A. 2017. *Enfoques de enseñanza basados en el aprendizaje*. Ediciones de la U: Bogotá.

Coll, C. 1987. *Psicología y curriculum*. Buenos Aires: Paidós.

Daugherty, L., Bahr, P. R., Nguyen, P., Trifiletti, J. M., Columbus, R., and Kushner, J. 2023. *Stackable Credential Pipelines and Equity for Low- Income Individuals: Evidence from Colorado and Ohio*. Santa Monica, CA: RAND Corporation, 2023. Recovered from https://www.rand.org/pubs/research_reports/RRA2484-1.html

Daura, F. 2021. "El aprendizaje auto-regulado y su orientación por parte del docente universitario". *Actas del Congreso Iberoamericano de Educación*. *Metas 2021*. Recovered from: https://www.adeepra.org.ar/congresos/Congreso%20IBEROAMERICANO/DOCENTES/RLE2992_Daura.pdf

Del Río Sadornil, D. y de Codés Martínez González, M. 2020. *Orientación educativa y tutoría*, Madrid: Sanz y Torres.

Díaz Dorronsoro, R. 2010, "La analogía", en Fernández Labastida, F. and Mercado, J.A. (eds.), *Philosophica: On-line philosophical encyclopedia*. Recovered from: http://www.philosophica.info/archivo/2010/voces/analogia/Analogia.html

García, A. 2012. "La Educación personalizada como herramienta imprescindible para atender la Diversidad en el Aula". *Revista latinoamericana de educación inclusiva.* Vol. 6, Nº 1, 177-189.

García Hoz, V. 1972. *Educación personalizada*. Buenos Aires: Kapeluz.

García Hoz, V. 1981. «La calidad de la educación: una interrogante a las ciencias de la educación, a la política docente y a la actividad escolar», en AAVV, *La calidad de la educación.* Madrid: Consejo Superior de Investigaciones Científicas. Instituto Pedagógico San José de Calasanz, 9-23.

García Hoz, V. 1993. *Introducción general a una pedagogía de la persona*. Madrid: Rialp

García Hoz, V. 1994. "Sobre el concepto de educación personalizada y algunas derivaciones". *Anales.* Madrid: Academia Nacional de Ciencias Morales y Políticas. Tomo 19, 191-206.

Gallego Jimenez, G. y Otero Rodriguez, L.M. 2020. "Hacia una educación inclusiva y personalizada: opiniones e ideario educativo del profesorado". *Polyphōnia. Revista de Educación Inclusiva*. Vol. 4, Núm. 1, 47-70.

Garatte, L. y García Clúa, M. N. 2016. "La «Educación personalizada» en Argentina durante la última dictadura militar". *Ciencia, docencia y tecnología.* Vol. 27. Número 52.

Gates, B. 2016. *Technology's Promise to Education: Personalizing Learning*. Recovered from

https://www.gatesnotes.com/Education/Technologys- Promise-to-Education-Personalizing-Learning

Gattegno, C. 1987. *What We Owe Children. The Subordination of Teaching to Learning.* New York: Educational Solutions.

Gimeno Sacristán, J. (comp) 2008. *Educar por competencias. ¿Qué hay de nuevo?* Madrid: Morata.

González Álvarez. 1969. *Filosofía de la educación.* Buenos Aires: Troquel. 3ª. Ed.

Hartley, D. 2007. "Personalization: the emerging 'revised' code of education?" *Oxford Review of Education*, 33 (5), 629-642.

Holmes, W., Bialik, M. & Fadel, C. 2019. *Artificial Intelligence in Education, The Center for Curriculum Redesign*, Boston, 151-180. Recovered from DOI:10.58863/20.500.12424/4276068

Khan, S. (2024). *Brave New Words: how AI will revolutionize education (and why that's a good thing)* New York: Viking.

Kerssens, N. & Van Dijck, J. 2021. "The platformization of primary education in The Netherlands". *Learning, Media and Technology*, DOI: 10.1080/17439884.2021.1876725.

Kouwenhoven, W. 2009. "Competence-Based Curriculum Development in Higher Education: A Globalised Concept?". In Calafate, C (ed.), *Technology Education and Development*. Netherlands: Intech.

Li, H., Cui, W., Xu, Z., Zhu, Z. and Feng, M. 2019. "Yixue Adaptive Learning System and Its Promise on Improving Student Learning". *Proceedings of the 10th International Conference on Computer Supported Education* (CSEDU 2018), 45-52. DOI: 10.5220/ 0006689800450052.

Miao, F., Holmes, W., Huang, R. y Zhang, H. 2021. *Al and Education, Guidance for Policymakers*. Paris: UNESCO.

Mindt, L. & Rieckmann, M. 2017. "Developing competencies for sustainability- driven entrepreneurship in higher education:

A literature review on teaching and learning methods". *Teoría de la educación*. Vol. 29, No. 1, 129-159. DOI: 10.14201/teoredu 291129159.

Molina, E., Cobo, C., Pineda, J. y Rovner, H. 2024. *La revolución de la IA en Educación: Lo que hay que saber. Innovaciones Digitales de Educación*. Banco Mundial.

Moskal, P., Carter, D., Johnson, D. 2017. "7 Things You Should Know About Adaptive Learning". *Educause Learning Inicitative*. Recovered from https://library.educause.edu/resources/2017/1/7-things-you-should- know- about-adaptive-learning.

Newton, D. 2000. *Teaching for Understanding. What it is and how to do it.* London & New York: Routledge/Falmer.

OECD 2019. "Student Agency 2010". *OECD Future of Education and Skills2030 Concept Note*. Recovered from https://www.oecd.org/ education/2030-project/teaching-and- learning/learning/student-agency/Student_Agency_for_2030_concept_note.pdf

Palacios, L. E., Medina, R., Forment, E., Román, M., Moreno, P., Marín, R. et al. 1989. *El concepto de persona*. Madrid: Rialp.

Pérez Guerrero, J. y Ahedo Ruiz, J. (2020). "La educación personalizada según García Hoz". *Revista complutense de educación*. 31(2) 2020, 153-161.

Perkins, D. 1985. *La escuela inteligente: del adiestramiento de la memoria a la educación de la mente.* Buenos Aires: Gedisa.

Perochena Gonzalez, P. y Coria, G.M. 2017. "La singularidad según la educación personalizada en la era digital". *Educación*, Vol. XXVI, N° 50, marzo 2017, 162-181. https://doi.org/1018800/ educacion.201701.009

Peters, M. A. 2009. "Personalization, Personalized Learning and the Reform of Social policy: the prospect of molecular governance in the digitized society". *Policy Futures in Education*, 7 (6), 615-627.

Pleschová, G. & McAlpine, L. 2016. "Helping teachers to focus on learning and reflect on their teaching: What role does teaching context play?" *Studies in Educational Evaluation*, [s. l.]. Vol. 48, 1–9. DOI 10.1016/j.stueduc.2015.10.002.

Research and Markets. 2024. *Global Smart Education & Learning Management Market by Learning Mode (Adaptive Learning, Blended Learning, Collaborative Learning), Component (Educational Content, Hardware, Services), End-User - Forecast 2024-2030.*
Recovered from: https://www.researchandmarkets.com/reports/4904788/global-smart-education-and-learning-management#cat-pos-20

Pintrich, P. 2004. "A Conceptual Framework for Assessing Motivation and Self-Regulated Learning in College Students". *Educational Psychology Review*,16 (4), 385-407.

Rivas, A. 2019. *¿Quién controla el futuro de la educación?* Buenos Aires: SigloXXI.

Rivas, A. 2021. "The Platformization of Education: A framework to Map the NewDirections of Hybrid Education Systems". *Current and Critical Issues in Curriculum, Learning and Assessment*. IBE/Unesco, No. 46. Recovered from https://unesdoc.unesco.org/ark:/48223/pf0000377733

Rizzolatti, G. 2005. The mirror neuron system and its function in humans. *Anatomy and Embryology*, 210, 419-421.

Rodríguez, L.G. 2016. "La influencia de la pedagogía española en Argentina durante la segunda mitad del siglo XX: el caso de Víctor García Hoz". *Cuadernos del Instituto Antonio de Nebrija de Estudios sobre la Universidad*. Vol. 19, No. 2, 219-242. Recovered from http://www.memoria.fahce.unlp.edu.ar/art_revistas/pr.9751/pr.9751.pdf

Rouhiainen, L. 2019. "How AI and Data Could Personalize Higher Education". *Harvard Business Review*. Recovered from: https://hbsp.harvard.edu/product/H056XO-PDF-ENG

Scott, C. 2014. *Learn to teach. Teach to learn*. Cambridge: Cambridge University Press.

Solís Sotomayor, Luis Xavier. 2014. Causas modales de la educación. *Sophia:* colección de Filosofía de la Educación, 17(2), 61-76.

Steiner, G. 2016. *Lecciones de los maestros*. Madrid: Siruela.

Ubaldi, B. 2020. "La transformación digital de los gobiernos. Lecciones desde distintas partes del mundo". In Bellomo S. y Oszlak, O. 2020. *Desafíos dela administración pública en el contexto de la revolución 4.0.* Buenos Aires:Konrad Adenauer Stiftung, 179-209.

Unesco 2023. *Global Education Monitoring Report 2023: Technology in education – A tool on whose terms?* Paris, UNESCO. Recovered from https://unesdoc.unesco.org/ark:/48223/pf0000385723

Vanbecelaere, S., Cornillie, F., Depaepe, F., Guerrero, R.G., Mavrikis, M., Vasalou, M. and Benton, L. 2021. "Technology-mediated personalised learning for younger learners: concepts, design, methods and practice", *Proceedings of the 2020 ACM Interaction Design and Children Conference: Extended Abstracts*, 126–134. Recovered from https://doi.org/10.1145/33976 17.3398059.

Weimer M. 2003. "Focus on Learning, Transform Teaching". *Change*. 35(5), 48-54. doi:10.1080/00091380309604119

Weinert, F. E. 2001. "Concept of competence: A conceptual clarification". In S. Rychen & L. H. Salganik (Eds.), *Defining and Selecting Key Competencies*, 45–65. Hogrefe & Huber Publishers.

Wiek, A., Bernstein, M.J., Foley, R.W., Cohen, M., Forrest, N., Kuzdas, C., Kay, B., Withycombe Keeler, L. 2016. "Operationalising Competencies in Higher Education for Sustainable Development". In Barth, M., Michelsen, G., Rieckmann, M., Thomas, I. (Eds.)

Routledge Handbook of Higher Education for Sustainable Development, 241-260. London and New York: Routledge.

Wisker, G., Exley, K. y Antoniou, M. 2008. *Working one-to-one with students: Supervising, Coaching, Mentoring and Personal Tutoring.* New York: Routledge.

Woolf University. 2018, *White Paper. Building the First Blockchain University*, Aug. 2018. Recovered from https://woolf.university/ in July 2018. Currently available https://kennison.name/files/ higher- ed/woolf-whitepaper.pdf

Yakel, E. 2007. "Digital curation". *OCLC Systems & Services*, 23(4), 335-340.

Zubiri, X. (1983). *Inteligencia y razón.* Madrid: Alianza.

8. Short biography

Santiago Bellomo is the Dean of the School of Education in Austral University, Buenos Aires, Argentina. He holds a Ph.D. in Philosophy, as well as a degree both in Philosophy and in Education Administration and Management. As an expert in education, he has made assessments to national and international organizations such IBD, World Bank, CONICET and Educ.Ar. He is also member of the *Pool of experts* of Globethics, in the field of *Ethics of digital and emerging technologies.*

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