EDUCATION FOR THE FUTURE

A CONTRIBUTION FROM INFOTEP TO TRANSFORMATION

TOWARS A NEW EDUCATIONAL MODEL FOR THE TRANSFORMATION OF THE DOMINICAN EDUCATIONAL SYSTEM

UNOFFICIAL DOCUMENT . PROPOSITIVE

Future education must not choose between artificial intelligence and humanity.

It must learn to integrate: intelligence and humanity

Lorenzo Guadamuz Sandoval, Ph.D.

HUMAN INTELLIGENCE WORKING TOGETHER WITH ARTIFICIAL INTELLIGENCE TO PRODUCE KNOWLEDGE.

JUNE 2026

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A reflection originating from conversations with the Minister of MESCyT Mr. Rafael Santos Badía, the General Director of INFOTEP Dr. Maira Morla and with the Minister of MINERD Mr. Dr. Luis Miguel De Camps.

The education of the future must not choose between artificial intelligence or humanity. **You must learn to integrate intelligence and humanity.**	**Towards an Intelligent Curriculum and an Educator who trains in what algorithms could never do: in the human.**

For the first time in history, technologies exist that can massively personalize educational experiences without relying exclusively on traditional teaching that was the same for everyone.

Intelligent systems will be able to diagnose mastery levels, identify specific gaps, reorganize learning sequences, and build deeply individualized adaptive pathways.

This radically alters the traditional curriculum logic. Personalization ceases to be the exception and gradually becomes a structural principle of learning.

DOMINICAN REPUBLIC, JUNE 2026

A CONTRIBUTION FROM INFOTEP TO THE TRANSFORMATION PROCESS OF DOMINICAN EDUCATION.

Table of Contents

OPEN LETTER TO THE HONORABLE AUTHORITIES

Honorable Ministers, Honorable Vice Ministers, Distinguished colleagues from the Commissions for the Transformation of the Dominican Educational System, Distinguished Colleagues from the ADP and Dominican Professional Associates. Professionals and citizens in general:

When initiating a transformation process such as the one undertaken by the Dominican Republic in 2026 (based on other valuable efforts made in recent years) and embodied in Decree Number 309-26 issued by His Excellency the President of the Republic, Dr. Luis Abinader, it is convenient to have some conceptual foundations that clarify what is indicated in the aforementioned Decree and add concepts to the valuable teams of Institutions, Professionals, and Citizens who are contributing knowledge in the consultations.

> **From Decree 309-26 we transcribe:**
>
> **ARTICLE I. Executive Commission for Educational Transformation.**
>
> The Executive Commission for Educational Transformation is created, with the objective of designing the bases for the formation of a Comprehensive National Educational System, oriented towards a new educational model and its articulation with science, technology and innovation, as well as preparing a draft bill for comprehensive education.

A. SHARED IDEAS. LEARNED IDEAS.

In the last two years I have spoken extensively with Mr. Rafael Santos Badía and with Ms. Maira Morla and - in the Virtual Meetings - with Mr. Luis Miguel De Camps (when we coincided in some meetings at INFOTEP) and recently in these transformation meetings and - also - when we shared the 'Education Models' Document which I attach as an annex.

Rafael Santos is a thinker and a great educational authority, as well as a great leader in the teaching profession. As Director of INFOTEP, I had the honor of working very closely with him, exchanging ideas almost daily, as well as with Dr. Morla.

As soon as the idea of a **Transformation** process was mentioned—about two years ago—he began sharing ideas, including the need for a total transformation of education. And we shared many pages of those ideas.

Also, with Dr. Maira Morla, many hours — during 4 years of conversations — about Curriculum, Vocational Training and Automation.

I have carefully studied the proposals of the Honorable Minister of Education (MINERD) Dr. Luis Miguel De Camps, who focuses his management on a governance model structured around the major actors in the educational system and proposed his philosophy based on five pillars, a strategy of co-responsibility and dialogue that seeks to transform the Dominican pre-university system through the following axes: Students; Teachers; Families; Civil Society; Public Servants.

Many of these ideas also stem from the rich working sessions with the former Minister and thinker, Dr. Ligia Amada Vda. de Cardona. Doña Ligia asked me to investigate a complex topic, which I developed and presented at FUNGLODE (after incorporating many of Doña Ligia Amada's ideas) under the title: **'THE EDUCATION OF THE FUTURE IN UNCERTAIN FUTURES. A changing world and — for Education — a challenging future'.**

many ideas — about new models — with that great teacher, Doña Ligia, for whom I had the honor of being the Principal Technical Advisor at MESCyT.

I spoke for dozens of hours with former Minister Melanio Paredes, a great thinker and expert on teachers and Dominican education, when I was Minister of Education. We shared many ideas and projects for change in Dominican education. And without a doubt—though he was often misunderstood — he proposed profound changes such as extended school days, multimedia in education, diverse technologies in the classroom, curriculum changes, changes to textbooks, changes in governance, and the strengthening of management platforms in all educational centers, among other changes.

I also had the honor of working at INFOTEP — for several years — with a great thinker and someone concerned about change, Dr. Jacqueline Malagón, from whom I learned so much and many of the ideas presented here were — at that time — shared with her.

I have read all the public documents on educational technical issues produced by the **ADP,** which have helped me to understand their feelings and thoughts.

I have not had the honor of working directly with Dr. Ancell Schecker Mendoza, but I learned indirectly from her by reading about many of the qualitative changes she has implemented for years at the Ministry of Education.

And finally, I've learned a great deal about changes and realities from reading Dr. Radhamés Mejía, a highly knowledgeable professional on Dominican and global education. Reading the documents produced in different consultation processes by the Educational Pact (CES) was essential. And of course, I've learned from countless valuable professionals in universities, classrooms, and from the concerns of business leaders, civil society, and the mass media—in all its various formats.

In professional contact — direct or indirect — we all always learn and relearn.

B. TOWARDS A PHILOSOPHY OF TRANSFORMATION THAT GUIDES A NEW MODEL.

From these conversations or readings, we have been building a conceptual base as a further contribution to the valuable documents prepared by Universities, Companies, the Media, Institutions and scholars of these topics.

Therefore, I offer these reflections in the hope of contributing some ideas that could eventually be useful to the Draft of the new Education Law and for its possible implementation in the construction of a New Educational Model for the Dominican Republic.

The document includes ideas discussed during this process with the authorities, the analysis of documents prepared throughout the Dominican Republic in recent years, and my own reflections contained in hundreds of articles published in various media, especially on my

Facebook pages: (https://edulorenzoguadamuz.com/) and (https://www.facebook.com/educacionlorenzoguadamuz)

C. THE BIGGEST PROBLEM TODAY: THE OLD EDUCATIONAL MODEL.

Dominican education has made several attempts at educational reforms or has drafted proposed amendments to existing education laws (such as the amendment to Law 66-97 drafted by the Ministry of Education and the amendment to Law 139-01 formulated by the Ministry of Higher Education, Science and Technology) or the development of the Merger Bill—recently withdrawn from the Senate—but **all these attempts have been in vain , because the biggest problem, the root of all the other issues,** has not been addressed—to this day. I am referring to the fact that the country has not proposed changing its educational model, and the old medieval model, typical of the beginnings of the industrial era, remains: the graded school model, the serial school model, with equal treatment for all students: one teacher in front of a group, the same curriculum for the same grade, the same textbook, the same evaluation, expecting everyone to learn the same thing at the same time. Currently, the existing model contains many subjects in the curriculum, and more than half of the content of each subject is irrelevant or outdated, ignoring individual differences and multiple intelligences. Even if they use digital whiteboards, they are always navigating the same old curriculum; even if they use digital books, it is the same anachronistic book model, only presented in another (digital) format.

D. TOWARDS A NEW MODEL OF DOMINICAN EDUCATION.

It is the responsibility of all of society and its government to prepare future generations for the great changes we already have and more that will come, with the exponential growth of science, technology, artificial intelligence, market variations, the new phenomenon of employability, as well as new forms of energy and the consequences for the environment.

We must move towards a New Educational Model that has —at a minimum—:

- A new education law
- A new educational model
- A new educational structure
- A new curriculum
- A new governance
- A process of personalizing learning and individualizing content
- A curriculum reduced to a few subjects organized into Cognitive Areas and whose Core Curriculum is STEM and AI.
- A response to national development, its market, its economy, its employability.
- Migrating from a Graduate School to a Semi-Graduate or Non-Graduate School
- We must seriously consider the human being we are shaping and prepare them to live but also teach them to survive in the face of the growing consumption of drugs, weapons, insecurity, unemployment, and the unknown and uncertain future that awaits us.

I hope these ideas can be useful in motivating so many bright minds to think about what the Dominican Republic needs for the future in the Education Sector.

METHODOLOGICAL NOTES.

i- **ON THE USE OF AI.** This document was not entirely created using generative artificial intelligence tools. It was essentially developed by Guadamuz in dialogue with generative artificial intelligence. This document was developed through a process of conceptual dialogue between the author and generative artificial intelligence tools, which were used to support analytical exploration, conceptual organization, and the development of the text.

ii- **ON THE PAPAL ENCYCLICAL**. The first encyclical of Pope Leo XIV, May 2016, is entitled "Magnifica Humanitas " (Magnificent Humanity). The document focuses on the protection of the human person, ethics, and the moral challenges posed by the advancement of artificial intelligence and technological progress. This document—written before the encyclical was issued—fully agrees with the role of artificial intelligence and the human element.

IN MEMORY OF MORIN. The French philosopher and sociologist Edgar Morin died on **May 29, 2026** , in Paris, at the age of 104, the date on which Guadamuz was finishing this document. I shared sessions and conversations with Dr. Morin—from whom I learned a great deal. Today, as a tribute, I recall his words; " **'À force de sacrifier l'essentiel pour l'urgent, on finit par oublier l'urgence de l'essentiel.',** That is to say, ***"By sacrificing the essential for the urgent, we end up forgetting the urgency of the essential*** ."

Hopefully, the Dominican people, professionals, and authorities will not forget the essential... at this moment in 2026: ***"Changing the Dominican Educational Model."***

iii- **Thanks** to Dr. Víctor Garro Abarca for his support in the preparation of this document.

INTRODUCTION: TOWARDS THE TRANSFORMATION OF AN EDUCATIONAL SYSTEM THAT LOOKS TO THE FUTURE (2050)

Humanity is entering one of the most profound historical transitions since the Industrial Revolution. The expansion of artificial intelligence, cognitive automation, robotics, digital hyperconnectivity, and the exponential growth of knowledge are simultaneously transforming the economy, work, culture, politics, and daily life. However, while almost all structures of civilization are rapidly reorganizing, much of the educational system continues to operate according to logics designed for an industrial society (the Medieval Graduate School) that is already beginning its own transformation process, until one day it will disappear.

The modern school was one of the great institutional constructions of modernity. Its organization into grades, subjects, rigid schedules, simultaneous instruction, and relatively uniform curricula made it possible to educate millions of people, build national citizenship, and prepare workers for relatively stable industrial economies. This model historically fulfilled an extraordinarily important function. However, new technological and cognitive conditions and the demands of the 21st-century economy and employment are increasingly revealing its structural limitations.

UNPRECEDENTED BREAKDOWN: THE SIMULTANEITY OF TRANSFORMATIONS

What makes the current educational crisis truly unprecedented is not the speed of technological change—civilizations have undergone technological revolutions before—but the SIMULTANEITY of multiple ruptures occurring simultaneously: the cognitive revolution (AI performs intellectual tasks previously exclusive to humans), the biological revolution (neuroscience and bioengineering reveal new ways of understanding learning), the climate revolution (environmental change creates curricular urgencies that cannot wait), the demographic revolution (young populations in the Global South, such as the Dominican Republic), and the labor revolution (automation that dissolves and creates jobs at unprecedented rates). No educational system in the past was designed to respond to five simultaneous civilizational ruptures. This demands a radically new conceptual boldness.

FIVE ORIGINAL HYPOTHESES ABOUT EDUCATION IN 2050

HYPOTHESIS 1 — The 'Digital Cognitive Twin ': By 2040, each student will have a computational profile of their unique learning pattern, built from the first months of their educational life, based on light neuroimaging, response patterns, and consolidation rhythms. This profile will allow for the adaptation not only of the content but also the METHOD and the optimal TIME of teaching for each individual brain.

HYPOTHESIS 2 — The end of the classroom as a basic unit: the fundamental unit will no longer be 'a classroom with a teacher and 30 students' but will become 'a project with a team solving real-world problems'. Projects will be the curriculum.

HYPOTHESIS 3 — Teachers + AI as an inseparable pair: teachers will not compete with AI but will integrate it as an extension of their pedagogical intelligence. A new profession will emerge: 'Learning Experience Architect'.

HYPOTHESIS 4 — The 'Node University': the university of 2050 will exist simultaneously in face-to-face, virtual, immersive, and distributed dimensions. There will not be a single degree: there will be a chain of accreditations built throughout one's life.

HYPOTHESIS 5 — Education as Critical Public Infrastructure: Just as the 20th century recognized that water and electricity were essential public infrastructure, the 21st century will recognize that access to smart ecosystems of personalized learning is an equally critical public infrastructure.

Artificial intelligence is profoundly altering the historical relationship between knowledge and learning. For the first time in history, societies possess technologies capable of storing, processing, and reorganizing enormous volumes of information instantaneously. This inevitably forces us to reconsider fundamental questions: What does learning mean in an intelligent civilization? What content remains truly essential? What role will the teacher play? What kind of school will future generations need? How will the curriculum be reorganized? What human capabilities will retain the greatest value in increasingly automated societies?

> **Contemporary educational transformation can no longer be understood solely as technological modernization or pedagogical updating. We are entering a much deeper civilizational transition where the following will change simultaneously: curriculum design, school organization, assessment, the role of the teacher, the nature of learning, and the very conception of human development. The paradigm inherited from industrial society was based on homogeneity, simultaneity, and the mass transmission of content. The emerging paradigm is oriented toward intelligent personalization, adaptive learning, individualized curriculum, lifelong learning, intelligent learning ecosystems, and holistic human development.**

This reflection does not intend to criticize the current education system. Its purpose is much broader: to contribute to thinking about a possible structural transformation of the Dominican education system by 2050. A transformation that is not limited solely to the school level, but that comprehensively encompasses: pre-university education; higher education, science and technology; and vocational and technical training.

The document starts from a central premise: the education of the future must not choose between artificial intelligence and humanity. The true historical challenge lies in building educational systems capable of integrating technological intelligence and human development, personalization and coexistence, innovation and ethics, automation and human connection.

This document is organized into three parts. The first part analyzes the characteristics and limitations of the industrial educational paradigm that still dominates much of the contemporary world. The second part explores the conceptual foundations of a new educational paradigm oriented toward an intelligent and unpredictable civilization. Finally, the third part proposes an integrated vision for the structural transformation of the educational

system by 2050, articulating the pre-university, university-scientific, and technical-professional subsystems within a new educational structure.

The magnitude of current technological and civilizational changes compels us to rethink education with unprecedented historical depth. The future of education can no longer be designed solely to meet the needs of the present. It must begin preparing for a world where artificial intelligence, automation, and lifelong learning will profoundly transform how human beings live, work, learn, and build society.

Perhaps never before in human history has education faced so many challenges and so many opportunities simultaneously. Precisely for this reason, the great challenge of the 21st century (the three-quarters of the century that remain) will not consist solely of creating more modern or technologically advanced educational systems. The true challenge will be to build an education intelligent enough to respond to the emerging new civilization, yet humane enough to preserve that which gives true meaning to the experience of learning, living together, and being human.

THE DOMINICAN URGENCY: WHY THE DOMINICAN REPUBLIC HAS A UNIQUE HISTORIC OPPORTUNITY

The Dominican Republic finds itself in a paradoxical position: it faces the same global challenges as the most developed countries, but with more limited resources and, at the same time, with an advantage that is frequently underestimated. The Dominican advantage is demographic and institutionally flexible: the country has a relatively young population, educational institutions undergoing active reform, and—for the first time in decades—a Presidential Decree creating the Executive Commission for Educational Transformation (Decree 309-26). This is not a moment for ordinary reform. **It is a historic window of transformation unlike any seen in previous generations. Seizing this opportunity or squandering it will define the future of the Dominican Republic for the next fifty years.**

PART ONE: CRISIS AND LIMITATIONS OF THE TRADITIONAL EDUCATIONAL PARADIGM

CHAPTER 1: THE INDUSTRIAL PARADIGM AND THE GRADUATE SCHOOL

Modern schooling was born deeply intertwined with the rise of industrial society. Although earlier forms of education existed —religious, aristocratic, artisanal, or communal— contemporary mass education truly began to take shape during the 18th and 19th centuries as part of the process of building modern nation-states and emerging industrial economies.

The Industrial Revolution radically transformed the economic and social organization of modern societies. The expansion of factories, state bureaucracies, and mass production systems demanded literate, disciplined populations capable of adapting to relatively standardized structures of work and social organization. The modern school responded precisely to these historical needs.

It was no coincidence that many of the central characteristics of contemporary education partially reproduced the organizational logic of the industrial model, namely: age-organized groups; rigid schedules; standardized sequences; uniform curricula; simultaneous evaluation; disciplinary division of knowledge; and relatively vertical hierarchical structures.

The so-called graded school was one of the most representative expressions of this paradigm. Students were organized into successive grades according to chronological age and progressed simultaneously through relatively homogeneous programs. They all received the same content, the same books, the same sequences, the same assessments, and frequently at the same pace of instruction, without no taking into account the different multiple intelligences that Gardner described in 1983.

This model allowed for the large-scale administration of national education systems with considerable organizational efficiency. The graded school facilitated mass literacy, educational expansion, and the relatively homogeneous training of large segments of the population. From a historical perspective, it represented one of the greatest institutional achievements of modernity.

However, the industrial paradigm also introduced profound limitations that for a long time remained relatively invisible because the model responded adequately to the historical conditions of its time.

Individual differences existed, but the education system had little real possibility of deeply adapting to them. Teachers had to simultaneously attend to large groups under relatively rigid curricula and pre-established school schedules, and in some decades of the 20th century, to very large groups. Human cognitive diversity was subordinated to the institutional need to administer mass education.

This logic gradually produced an educational model focused more on teaching than on learning. The main emphasis was placed on transmitting content; covering curricula; completing subjects; and advancing administratively within the system.

The dominant question was not necessarily how much each student genuinely understood, but how much of the official curriculum had been taught and assessed.

The curriculum organization also clearly reflected industrial logic. Knowledge was fragmented into relatively separate subjects: mathematics; science; history; literature; geography; physics; chemistry; biology; among many others.

Each discipline often evolved as a relatively independent territory within the school structure. However, real life and major contemporary problems are profoundly interdisciplinary in nature. Curricular fragmentation facilitated the administrative organization of knowledge but often weakened a comprehensive understanding of complex phenomena.

Over time, many educational systems have continuously accumulated content without undertaking equivalent processes of curricular reorganization. The result has been an increasingly overloaded curriculum, where students and teachers must sift through enormous amounts of information with little time for reflection, in-depth study, creativity, analysis, or authentic conceptual integration.

Traditional assessment further reinforced this logic. Standardized, simultaneous, and often rote-based exams became central mechanisms for school classification. Educational success often began to be measured by the ability to retain and reproduce information rather than by deep understanding, creativity, or critical thinking.

The role of the teacher was also strongly influenced by this structure. The teacher was primarily conceived as a transmitter of content and the central figure in the educational process. Teaching was organized around relatively uniform lectures for entire groups of students. The students frequently occupied a more passive position within the learning process.

This model worked reasonably well while industrial societies remained relatively stable and while access to knowledge depended primarily on formal institutions such as schools, universities, and libraries. But historical conditions began to change rapidly during the last few decades.

The expansion of the internet, global digitization, and especially artificial intelligence are profoundly altering the historical relationship between knowledge and learning. Information is gradually ceasing to be scarce. Content is no longer confined exclusively to school textbooks or official curricula. Access to knowledge is becoming ubiquitous, dynamic, and constantly updated.

At the same time, automation and artificial intelligence are radically transforming the world of work and the most socially valued human skills. Many repetitive tasks—even cognitive ones—are beginning to be performed by intelligent systems. This inevitably forces us to reconsider what kind of education new generations will need in increasingly automated and technologically complex societies.

In this new historical context, numerous characteristics of the industrial educational paradigm begin to show increasing limitations: curricular rigidity; uniformity of learning; excess of

subjects; disciplinary fragmentation; rote memorization assessment; rigid organization by grades and structures focused more on mass teaching than on personalized learning.

The contemporary crisis in education does not mean that industrial schools were a historical failure. On the contrary, they were extraordinarily successful under the conditions of industrial modernity. But precisely because the world is beginning to transform profoundly, inherited educational structures are also beginning to require equally profound reorganizations.

The great educational transition of the 21st century arises precisely from this historical tension: school systems designed for a relatively stable industrial civilization are beginning to face a new civilization characterized by artificial intelligence, cognitive automation, lifelong learning, and continuous change.

THE HIDDEN COST OF THE INDUSTRIAL MODEL: WHAT GRADUATE SCHOOL KILLED.

The traditional school system came at a cost that is rarely measured: it systematically killed children's natural curiosity. Developmental neuroscience studies show that a four-year-old asks an average of 300 questions a day. By age ten, that number has dropped to fewer than 50. By age fifteen, it's barely a dozen. What killed that curiosity? The traditional school system, with its model of right and wrong answers, punitive grades, content disconnected from real life, and the requirement that everyone learn the same thing at the same time. The new paradigm must not be limited to reorganizing curricula; it must restore curiosity as the driving force of human learning.

CHAPTER 2: THE CRISIS OF THE TRADITIONAL MODEL IN THE INTELLIGENT CIVILIZATION

The contemporary crisis in education cannot be understood solely as a pedagogical or administrative problem. In reality, it is part of a much deeper civilizational transformation that is simultaneously altering the economy, work, knowledge production, communication, culture, and the very way in which societies organize human intelligence.

During much of the modern industrial era (the Graduate School Era), education operated within a relatively stable context. Knowledge acquired during childhood, adolescence, or university could remain useful for long periods of working life. Professions evolved slowly. The Production systems changed relatively gradually. And schools could function reasonably well as institutions responsible for preparing individuals to later integrate into relatively predictable economic structures.

However, the first decades of the 21st century are beginning to reveal a radically different scenario. Artificial intelligence, advanced automation, robotics, global digitization, and the exponential growth of knowledge are profoundly transforming the foundations upon which the modern school was built.

One of the most significant changes is the rapid acceleration of human knowledge. Never has scientific, technological, and cultural information expanded so quickly. New knowledge emerges constantly, while existing knowledge becomes obsolete at an increasing pace. As a result, many school curricula face a structural contradiction: they continue to add content to already overloaded programs, even though human learning capacity remains limited.

The consequence is visible in numerous contemporary educational systems. Students frequently go through enormous amounts of content without achieving deep understanding; conceptual integration; critical thinking; and even less so, creativity or the authentic ability to apply what they have learned.

Education often ends up trapped in a logic of curriculum coverage rather than deep human and intellectual development.

Artificial intelligence further intensifies this crisis. For centuries, much of the value of education was associated with the accumulation and reproduction of information. Schools transmitted knowledge because access to learning was relatively limited and because human memory represented a central resource for the economic and administrative functioning of societies.

But the new digital civilization radically alters that historical relationship. Intelligent systems can store, retrieve, organize, analyze, and produce information instantaneously and on previously unimaginable scales.

This inevitably forces us to rethink a fundamental question: What should schools teach when much of the information is permanently available through artificial intelligence?

Educational importance then begins to shift from memorization to much more complex abilities such as : comprehension; interpretation; creativity; problem-solving; critical thinking; adaptation; collaboration; ethics, as well as the ability to learn continuously.

The crisis of the traditional model is also deeply linked to the transformation of human work. For a long time, educational systems were primarily organized to prepare people for relatively stable occupations. But automation is rapidly beginning to alter that logic.

Numerous repetitive tasks— even cognitive ones —are being progressively taken over by intelligent systems. This does not necessarily mean the complete disappearance of human labor, but rather a profound reorganization of the most economically valued skills.

Many professions will change radically. Others will partially disappear. New occupations will continually emerge. And people will likely need to rebuild their professional skills several times throughout their lives.

In this context, the educational model based on a relatively closed initial training; on rigid careers; on static curricula and on learning concentrated only during youth, begins to lose historical viability.

Education gradually ceases to be temporary preparation for work and begins to become a permanent process of cognitive adaptation and intellectual reconstruction.

Another central element of the contemporary crisis is the growing human diversity that the industrial paradigm struggled to fully recognize. The traditional school system was designed around relatively homogeneous groups where everyone was expected to progress simultaneously, through the same curriculum and at a similar pace.

However, artificial intelligence and the new cognitive sciences are increasingly revealing the enormous diversity of human learning trajectories. Students learn in different ways; they learn at different paces; they develop specific skills at different times; and they require much more flexible and adaptive educational experiences.

Traditional schools had limited capacity to address this complexity because they had to manage large groups of students using relatively uniform structures. But the new technological age is beginning to open possibilities for intelligent, personalized learning.

Traditional assessment methods are also facing a crisis within this new context. Memorization-based and standardized exams were functional for industrial systems organized around curricular uniformity and mass grading. But they are increasingly insufficient in societies where the most valuable skills are precisely: creativity; problem-solving; adaptability; critical thinking; and lifelong learning.

Traditional school culture is also beginning to face profound tensions with new generations growing up in hyperconnected, interactive digital ecosystems. Many students increasingly perceive a disconnect between the speed of the contemporary technological world and the rigidity of numerous school structures inherited from the 19th century.

This does not mean that all technological innovation is automatically positive, nor that schools should simply adapt passively to contemporary digital dynamics.

In fact, one of the major current risks lies precisely in reducing education to simple superficial digitization or technological incorporation without a profound transformation of the educational paradigm.

The crisis of the traditional model cannot be resolved simply by placing computers or platforms in classrooms organized according to outdated industrial logic. True transformation requires reconsidering: curriculum organization; school structure; the role of the teacher; the nature of learning; assessment; and the very purpose of education in an intelligent civilization.

The contemporary transition should not be interpreted solely as technological modernization. It represents a transformation philosophical and civilizational transformation. Humanity is beginning to confront unprecedented historical questions: What does it mean to learn when machines can process complex information? Which human capacities will retain the greatest value? How do we educate ourselves for an unpredictable future? What kind of society do we want to build in the age of artificial intelligence? How do we integrate technology and humanity without destroying what makes the educational experience so deeply human?

These questions show that the crisis of the traditional model is not simply a crisis in schools. It is a crisis of the educational paradigm built for modern industrial civilization.

The new intelligent civilization is beginning to demand a different learning architecture: more flexible, more personalized, more interdisciplinary, more humane, and deeply oriented towards lifelong learning and the integral development of the individual.

It is precisely from this historical crisis that the new educational paradigm of the 21st century will begin to emerge.

THE PARADOX OF INFORMATION OVERLOAD AND COGNITIVE IMMUNITY

Humanity faces an unprecedented historical paradox: never before has so much knowledge been available and accessible, yet levels of deep understanding and critical thinking have not increased proportionally. This suggests that the crisis is not one of access to information but of PROCESSING: the human capacity to transform information into genuine understanding, to compare sources, to detect algorithmic manipulation, and to develop independent judgment in the face of an ocean of data. Disinformation, digital manipulation, and 'epistemic bubbles' are symptoms of educational systems that taught memorization but not critical thinking. **The new education must build cognitive immunity: the ability to navigate complex information environments without getting lost or being manipulated.**

PART TWO: TOWARDS A NEW EDUCATIONAL PARADIGM FOR AN UNPREDICTABLE FUTURE

CHAPTER 3: FROM THE FRAGMENTED CURRICULUM TO THE ESSENTIAL CURRICULUM

One of the most characteristic features of the industrial education paradigm was the construction of extensive, fragmented, and cumulative curricula. For decades, numerous educational systems responded to new social, scientific, and cultural demands by continually adding subjects, content, and objectives without undertaking equivalent processes of profound reorganization. The result has often been an excessively overloaded curriculum where students and teachers must sift through enormous amounts of information with little time for genuine understanding, creativity, or deep reflection.

The historical logic behind this model was relatively clear. In a civilization where access to knowledge was limited, schools assumed the responsibility of transmitting as much culturally relevant information as possible. The accumulation of content was long perceived as synonymous with educational quality and academic rigor.

However, the new intelligent civilization is beginning to profoundly question that logic. The exponential growth of knowledge makes it increasingly impossible to indefinitely incorporate new content into already saturated school curricula. No educational system can teach everything that humanity produces today in scientific, technological, and cultural terms. Constant accumulation ends up producing precisely the opposite of the desired effect: cognitive superficiality; conceptual fragmentation; temporary memorization; curricular exhaustion; and a weakening of deep thinking.

The contemporary curriculum crisis cannot be explained solely by the obsolescence of some content. The problem is much more structural. The traditional paradigm continues to operate under an encyclopedic logic characteristic of industrial modernity, while the new technological civilization demands entirely different cognitive abilities.

In this new historical context, the fundamental question ceases to be: 'How much content to teach?' and begins to transform into: 'What knowledge and skills are truly essential for the human being of the future?' This difference is decisive.

The 21st-century curriculum can no longer be organized around the indiscriminate accumulation of information. It needs to be much more oriented towards: deep understanding; critical thinking; creativity; problem-solving; adaptability; lifelong learning; communication; ethics; citizenship; and the intelligent construction of knowledge.

Curriculum transformation begins precisely by recognizing that not all content has the same strategic value for the human, social, and economic future. There is fundamental knowledge that will remain essential regardless of technological changes, such as deep reading comprehension; logical reasoning; scientific thinking; communication; basic mathematical skills; ethics; citizenship; creativity; coexistence; and critical thinking.

But simultaneously there are enormous amounts of school content whose relevance is gradually weakening in the face of automation; the varied and wide instant access to information and the speed of contemporary technological change.

This does not mean impoverishing education or reducing it to a simplistic level. On the contrary, it implies reorganizing it around deeper and more strategically valuable learning.

Intelligent civilization will need less rote memorization and much more ability to interpret, integrate, create, analyze, question, and learn continuously.

Consequently, the new curricular paradigm will likely tend towards having fewer subjects; greater interdisciplinary integration; a reduction in repetitive content; and the strengthening of complex cognitive abilities.

The disciplinary fragmentation inherited from the industrial school is also beginning to show increasing limitations. Major contemporary problems such as artificial intelligence, sustainability, biotechnology, digital citizenship, automation, global health, climate change, and social transformation are profoundly interdisciplinary in nature.

The rigid organization of knowledge into relatively isolated subjects often hinders a comprehensive understanding of complex phenomena. Future education will likely require much more flexible curricular structures where science, technology, creativity, ethics, the humanities, communication, and systems interact dynamically.

Herein lies one of the most important transformations of the new paradigm: The shift from uniform curricula to flexible, constantly updated, multi-level curricula.

The industrial paradigm implicitly assumed that all students should learn the same thing. But artificial intelligence and the new cognitive sciences are beginning to reveal the enormous diversity of human abilities, interests, and learning paths.

The essential curriculum does not mean a minimal, impoverished curriculum. It means distinguishing between a common core indispensable for all modern citizens and differentiated pathways of specialization according to specific abilities, interests, and talents.

All students will need to master certain fundamental skills related to reading; logical thinking; communication; citizenship; ethics; technology and understanding of the contemporary world.

But simultaneously, flexible pathways for in-depth scientific, technological, artistic, creative, humanistic, entrepreneurial or technical studies can be developed.

Artificial intelligence will allow for the construction of much more adaptive and differentiated learning paths than those possible within the traditional industrial school of the medieval model of graded school.

Another profound change will be the transformation of the relationship between content and learning. In the traditional paradigm, content occupied the center of the educational system. The new paradigm progressively shifts the emphasis to skills development; learning experiences; problem-solving; research; creativity; and the active construction of knowledge.

This even alters the school calendar. Overloaded curricula have historically forced students to cover vast amounts of material quickly without sufficient depth. The core curriculum will likely free up more time for analysis, exploration, research, interdisciplinary projects, creativity, collaborative work, and complex thinking.

Speed will gradually cease to be the main indicator of educational success.

Artificial intelligence will greatly accelerate this transformation. When much of the information is permanently available through intelligent systems, the true educational value will no longer consist of storing data, but of developing human intelligence capable of interpreting information; using it critically; relating it creatively; and building meaningful knowledge.

The curriculum reorganization will also have profound human and cultural implications. The education of the future cannot be limited to producing functional individuals for automated economies. It will need to develop: creativity; ethical sensitivity; critical thinking; democratic coexistence; intellectual autonomy; and the capacity to construct human meaning within technologically complex societies, as well as teach students how to live and survive.

For this very reason, the core curriculum does not mean the technocratization of education. It means reorganizing learning around what is likely to remain most profoundly human and strategically valuable in the intelligent civilization of the 21st century.

The transition to this new curricular paradigm will be gradual and complex. Encyclopedic curricula, fragmented structures, school cultures focused on content accumulation, and traditional models of disciplinary organization will persist for a long time.

However, historical pressures toward transformation will continue to grow. Technological acceleration and artificial intelligence will make the need to build more flexible, deeper, more interdisciplinary, more personalized curricula, geared toward the comprehensive development of complex human capabilities, increasingly evident.

The great curricular challenge of the 21st century will not simply consist of adding new subjects or introducing more technology into traditional programs. The real challenge will be to fundamentally reorganize the logic of school knowledge to respond intelligently to a civilization where continuous learning, critical thinking, and constructing human meaning will likely be far more important than memorizing vast amounts of fleeting information.

THE FIVE MAJOR INTEGRATIVE COGNITIVE AREAS — PROPOSAL FOR THE DOMINICAN CURRICULUM 2026-2050

Instead of the 13 to 18 subjects of the current Dominican pre-university curriculum, the new curricular paradigm could be organized into five Great Integrative Cognitive Areas:

- **AREA 1 — COMMUNICATION AND IDENTITY:** Functional and literary Spanish language; mandatory functional English from the first basic cycle; digital communication and content creation; Dominican and Latin American history; culture, identity and arts as a human language.
- **AREA 2 — LOGICAL-MATHEMATICAL AND COMPUTATIONAL THINKING:** Mathematics applied to real life; statistics and probability as citizenship; algorithmic thinking and basic programming; systemic reasoning; understanding and critical use of artificial intelligence.

- **AREA 3 — SCIENCE, TECHNOLOGY AND INNOVATION:** Life and planet sciences; everyday physics and chemistry; biotechnology and its ethical implications; ecology and climate change sciences; research and the scientific method applied to real problems.
- **AREA 4 — HUMAN BEING AND SOCIETY:** Philosophy of the human being; ethics and democratic citizenship; personal and family economics; psychology of well-being and mental health; coexistence, human rights and conflict resolution.
- **AREA 5 — LIFE AND FUTURE PROJECT:** Social entrepreneurship and innovation; real community projects; ongoing vocational guidance; Core Skills to live, survive and transcend (including the four original INFOTEP categories for the Dominican reality).

These five areas are not subjects: they are interdisciplinary learning ecosystems that can be configured in different ways depending on the educational level, the modality and the reality of each center.

CHAPTER 4: PERSONALIZATION OF LEARNING AND INDIVIDUALIZATION OF CONTENT.

The modern school was historically built around a central principle: uniformity. The industrial paradigm required the mass administration of large groups of students through relatively homogeneous structures. Therefore, education was organized around: common curricula; identical sequences; chronological grade levels; uniform schedules; and relatively identical content for all.

This model allowed for massive expansion of national education systems, but it also generated one of the biggest structural limitations of the traditional school: the difficulty in deeply recognizing human diversity.

The industrial paradigm of education, born in the Middle Ages, implicitly assumed the existence of an 'average student'. Curricula, textbooks, assessments, and school schedules were designed for relatively homogeneous groups organized by chronological age. However, actual educational experience reveals something quite different: Students learn in different ways; they have diverse cognitive rhythms; they develop specific abilities at different times; and they have profound heterogeneous interests, talents, and educational paths.

THE BRAIN AS A STARTING POINT: WHAT NEUROSCIENCE TEACHES US ABOUT LEARNING.

The neuroscience of learning provides foundations that educational design is only just beginning to incorporate and that will revolutionize pedagogy in the coming decades:

1. **Sleep consolidates learning:** the hippocampus consolidates memories primarily during sleep. Forcing teenagers to start classes at 6 or 7 a.m. neurologically sabotages their learning. Schedules should adapt to biology, not the other way around.
2. **Emotions are the gateway to learning:** the amygdala acts as the gatekeeper of memory. A student experiencing fear, shame, or chronic stress cannot learn effectively. Emotional well-being is not a pedagogical luxury: it is a neurobiological prerequisite for learning.
3. **Movement activates the brain:** physical exercise activates BDNF (brain-derived neurotrophic factor), which promotes the growth of new neurons. Physical education is not a break from learning: it is a direct activator of cognitive abilities.
4. **Cognitive diversity is the norm:** human neurocognitive profiles are as diverse as fingerprints. There is no such thing as the 'average student'. A single curriculum for everyone is not only pedagogically inefficient: it is neurologically incongruent.

For a long time, schools had little real opportunity to respond to this complexity because they had to operate within rigid, massive organizational structures. Teachers could make certain individual adjustments, but the system as a whole continued to rely on curricular uniformity and simultaneous instruction.

Artificial intelligence is now beginning to radically alter this historical situation. For the first time, technologies are emerging that can massively personalize learning processes: adapting paces; reorganizing sequences; identifying specific difficulties; recommending cognitive

pathways; and dynamically adjusting educational experiences according to each student's actual progress, allowing each student to learn at their own pace.

This probably represents one of the biggest transformations in the entire history of modern education.

However, to understand the depth of the change, it is important to distinguish between two concepts that are frequently confused: personalization of learning and individualization of content.

Personalized learning involves adapting pace, methodologies, sequences, support, assessments, and educational pathways to the specific characteristics of each student. In this model, general objectives may remain relatively common, but the path to achieving them varies according to individual needs and abilities.

The individualization of content, on the other hand, represents an even deeper transformation. It implies recognizing that not all students necessarily need to learn exactly the same content or follow identical curricular paths.

This second concept introduces a historical break with the traditional industrial school (i.e., the medieval graded school).

The classical paradigm assumed that educational equality consisted of offering exactly the same curriculum to everyone. But the new intelligent civilization is beginning to suggest another possibility: perhaps true educational equity does not consist of completely homogenizing learning, but rather in allowing each student to deeply develop their specific human capacities within an essential common core.

Here emerges one of the most innovative principles of the new educational paradigm: the coexistence between a common basic curriculum and differentiated pathways of in-depth study.

All students will need to develop certain fundamental skills: deep reading; logical reasoning; communication; citizenship; ethics; scientific thinking; digital literacy; historical understanding and democratic coexistence; and surviving in a different world.

But simultaneously there could be flexible pathways where different students delve deeper into: scientific skills; technological thinking; artistic creativity; research; leadership; innovation; entrepreneurship; specialized technical training.

Artificial intelligence makes this transformation viable because it allows the construction of adaptive ecosystems that are impossible to manage efficiently within the traditional industrial paradigm.

Intelligent systems will be able to: diagnose strengths and weaknesses; reorganize content; suggest differentiated pathways; adapt levels of complexity; and support personalized continuous learning processes.

This profoundly alters the historical relationship between student and curriculum.

> **In the industrial paradigm, the student was forced to adapt to the curriculum: to the pace of the group, to the fixed schedule, to the single textbook. In the emerging paradigm, the curriculum is gradually beginning to adapt to the student: to their actual pace, their cognitive style, their interests, their strengths, and their specific difficulties. The difference is not one of degree: it is one of paradigm. It is the difference between molding the student to fit the system and designing the system to serve the student.**

The conceptual difference is enormous.

The school stops conceiving of the student as a relatively passive recipient of uniform programs and begins to understand him as a unique trajectory of human and cognitive development.

This change also profoundly transforms the concept of school time. The traditional school system was organized around relatively rigid chronological synchronization. Everyone was expected to progress simultaneously according to uniform calendars and schedules, regardless of actual cognitive differences.

But human beings do not learn in sync. Some students develop mathematical thinking, creativity, scientific reasoning, leadership, and language skills early on.

Others require more time to consolidate certain fundamental skills. Artificial intelligence allows us to recognize this diversity much better and build much more flexible learning paths.

This progressively leads to models that are: Semi-graded; Dynamically cycled; Domain-based learning; or even partially non-graded structures.

The emphasis is no longer placed exclusively on temporary permanence within the system and is beginning to shift towards the authentic development of capabilities and skills.

Personalization is also transforming assessment. Standardized, simultaneous exams are progressively losing coherence within differentiated learning pathways. Assessment will increasingly tend towards continuous monitoring; adaptive assessment; self-assessment; metacognition; and dynamic support of individual progress.

The student stops competing solely against uniform standards and begins to develop a deeper awareness of: Their cognitive evolution; Their strengths; Their difficulties; and their own learning strategies.

Intellectual autonomy thus becomes a core competency of the new educational paradigm.

However, this transformation also presents significant challenges. There is a risk that hyper-personalization could lead to individual isolation or a weakening of collective experiences of coexistence and shared citizenship.

Education cannot be reduced to individual interaction between student and intelligent algorithms.

For this very reason, the school of the future will need to carefully balance: Personalization and community; Individual trajectories and collective experiences; Autonomy and coexistence; Artificial intelligence and educational humanization.

Technology should expand human possibilities, not destroy them.

Another major risk is inequality. Smart learning ecosystems could dramatically widen educational gaps between those who have access to advanced, personalized systems and those who remain trapped within rigid, traditional structures.

The educational transformation of the 21st century will therefore require profoundly inclusive policies capable of democratizing access to educational artificial intelligence and personalized learning.

Personalization and individualized curricula likely represent one of the greatest historical breaks with the traditional industrial school. For the first time, humanity possesses technologies capable of authentically recognizing human cognitive diversity and dynamically reorganizing learning around it.

But the ultimate goal of this transformation should not simply be to optimize educational efficiency. The deeper purpose is to build systems capable of developing the human potential of each individual much more fully within an increasingly intelligent, complex, and unpredictable civilization.

The great educational transition of the 21st century will probably be accurately remembered for this fundamental historical change: the shift from an education organized for homogeneous groups to an education oriented towards the unique development of each human being.

In the Dominican Republic, an individualized approach was developed many years ago, during Dr. Jacqueline Malagón's tenure as Minister, when we implemented the first National Exams. At that time, we provided results for each student in every subject covered by the National Exams, and we also showed them how their results compared to their school, district, region, and the entire country. And we did this with the limited resources available at the time. Today—with data and AI tools —processing individualized curricula for two million students would be very easy and fast.

CHAPTER 5: STEM, ARTIFICIAL INTELLIGENCE AND THE REORGANIZATION OF KNOWLEDGE.

The emergence of artificial intelligence and new cognitive technologies is profoundly transforming how societies produce, organize, and use knowledge. This transformation is not merely a technological shift; it entails a much broader reorganization of human intelligence, intellectual work, and the relationship between science, technology, and everyday life.

In this new historical context, education faces one of its greatest challenges: preparing people capable of understanding and participating intelligently within an increasingly technological, automated, and interconnected civilization.

For a long time, most educational systems organized knowledge through relatively separate disciplines. The sciences, mathematics, technology, humanities, and arts often evolved as independent territories within the school structure. However, major contemporary problems are profoundly interdisciplinary in nature.

Artificial intelligence, for example, simultaneously combines mathematics; computer science; statistics; neuroscience; linguistics; ethics; philosophy; economics and cognitive science.

The same applies to : climate change; biotechnology; automation; sustainability; global health; cybersecurity and digital transformation.

The disciplinary fragmentation inherited from the industrial paradigm thus begins to show increasing limitations in interpreting an increasingly complex and interconnected reality.

For this very reason, the STEM approach is of enormous importance within the new curriculum architecture. STEM should not be understood simply as the isolated strengthening of science, technology, engineering, and mathematics.

In reality, it represents a deeper reorganization of educational thinking around problem-solving; systemic thinking; interdisciplinary integration; research; creativity; innovation; and the scientific understanding of the contemporary world.

STEM education of the future will likely be much less about memorization and much more experimental; applied; interdisciplinary; exploratory; collaborative and oriented towards the active construction of knowledge.

Artificial intelligence will greatly accelerate this transformation. Intelligent systems will be able to: personalize scientific experiences; generate complex simulations; build virtual laboratories; adapt difficulty levels; support research; and accompany dynamic learning processes.

Students will no longer rely solely on static textbooks or uniform explanations. They will increasingly interact with: intelligent digital ecosystems; immersive simulations; interactive models; virtual laboratories; cognitive assistants; and adaptive platforms.

This radically alters the very nature of scientific learning.

However, the transformation goes far beyond simply incorporating new technologies into classrooms. The real question is: what kind of human thinking needs to develop within a civilization where artificial intelligence will increasingly participate in complex cognitive processes?

For centuries, much education was organized around: memorization; repetition; reproduction of information; and the relatively mechanical application of procedures.

But when machines can store information; solve calculations; process data; generate texts and automate numerous cognitive tasks, the most valuable human capabilities begin to shift towards much more complex dimensions.

The education of the future will need to intensively create : creativity; critical thinking; the ability to formulate questions; interpretation; ethical judgment; complex thinking; innovation; imagination and original construction of meaning.

Paradoxically, the smarter technology becomes, the more important it becomes to strengthen those deeply human capabilities that can hardly be fully automated.

Herein lies one of the great challenges of the new STEM education: avoiding a purely technocratic model.

There is a risk of reducing STEM and artificial intelligence to mere technical training for automated economies. But intelligent civilization will demand something much deeper: integrating science, technology, and humanism.

Students will need to reflect critically on : algorithms; automation; privacy; digital surveillance; information manipulation; technological inequality and the future of human work.

This necessitates a profound reorganization of the historical relationship between science and the humanities.

For a long time, many educational systems artificially separated: Scientific thinking; creativity; philosophy; art; ethics and citizenship.

But intelligent civilization will need to integrate them much more deeply.

The STEM education of the future will likely evolve towards models that are: interdisciplinary; humanistic; ethically conscious; and oriented towards a complex understanding of the relationship between humanity and technology.

Creativity will occupy a central position here. The school of the future can no longer be limited to producing students capable of correctly answering pre-established questions. It will be necessary to train individuals capable of : formulating new questions; connecting disparate ideas; interpreting complex contexts; and creating novel solutions to unpredictable problems.

Another fundamental element will be artificial intelligence literacy. Just as modern schools need to teach reading, writing, and math, the new civilization will need to develop a critical understanding of artificial intelligence, algorithms, data, automation, intelligent systems, and digital ecosystems.

It won't just be about learning programming. Artificial intelligence literacy will involve understanding: how intelligent systems work; how they make decisions; how they influence social life; what their limitations are; and what their ethical and cultural implications are.

Artificial intelligence will also profoundly transform research and knowledge production. Students of the future will likely learn by continuously interacting with systems capable of:

simulating scenarios; analyzing complex data; generating hypotheses; and collaborating cognitively in research processes.

This could greatly democratize access to advanced scientific capabilities previously reserved for academic and technological elites.

However, this transformation also introduces significant risks. There is a possibility of developing an over-reliance on automated systems and weakening: autonomous reasoning; intellectual effort; deep concentration; and independent critical thinking.

The education of the future will need to strike a delicate balance: harnessing the enormous potential of artificial intelligence without allowing fundamental human capabilities to be weakened.

Therefore, the reorganization of knowledge cannot be reduced solely to technological modernization. True transformation consists of building a new synthesis between science and humanity; artificial intelligence and critical thinking; automation and creativity; and technology and ethics.

The great educational challenge of the 21st century will not simply be to create more technologically advanced societies. It will be to build societies that are: more intelligent; more creative; more ethical; more humane; and capable of consciously harnessing the enormous transformative power of artificial intelligence for the holistic development of human civilization.

FROM STEM TO STEAM+H: SCIENCE, TECHNOLOGY, ENGINEERING, ARTS AND HUMANITIES

The STEM approach, while valuable, risks producing competent but humanly incomplete technicians. The most advanced proposal currently available is the STEAM+H model: Science, Technology, Engineering, Arts, Mathematics + Humanities. The humanities are not merely an embellishment to science curricula; they are the ethical immune system of technological civilization. An AI engineer without an ethical philosophy could unknowingly design discriminatory algorithms. A biotechnologist without a history background might fail to anticipate the social implications of their discoveries. For the Dominican Republic, where the weight of cultural identity and history is especially significant, the STEAM+H model allows technology to be critically appropriated by Dominican society, not merely passively adopted.

CHAPTER 6: INTELLIGENT ASSESSMENT, LIFELONG LEARNING, AND TEACHER TRANSFORMATION

One of the most deeply ingrained components of the industrial education paradigm has been the traditional model of assessment. For more than a century, most school systems organized learning around: standardized tests; simultaneous testing; memorization of content; numerical grades; and relatively uniform ranking mechanisms.

The logic of this model responded to the historical needs of the industrial school, the Graduate School. When large groups of students had to simultaneously complete homogeneous programs, evaluation functioned primarily as an administrative tool to measure curriculum coverage, classify students, certify progress, and control the operation of the educational system.

However, the new intelligent civilization is beginning to profoundly question this traditional architecture of evaluation.

The most important human capabilities of the 21st century are no longer limited to remembering information, repeating procedures, or reproducing previously taught content.

Contemporary societies need people capable of interpreting; creating; solving problems; adapting; thinking critically; collaborating; and continuously learning in the face of unpredictable and changing scenarios.

Traditional assessment systems have enormous difficulties in authentically measuring these complex capabilities.

The expansion of artificial intelligence also introduces an even deeper transformation. If much of the information is permanently accessible through intelligent systems, it becomes pointless to build educational models focused exclusively on the rote memorization of data.

The assessment thus begins to shift from measuring memory to the dynamic understanding of human learning.

This change radically alters the historical function of evaluation.

The evaluation gradually ceases to function primarily as a control and classification mechanism and begins to transform into an intelligent system for supporting cognitive development.

Artificial intelligence will allow for the construction of much more continuous, adaptive, personalized, diagnostic, and evolutionary evaluation processes.

Intelligent systems will be able to identify specific strengths; difficulties; learning rhythms; cognitive styles; comprehension patterns; and individual support needs.

For the first time in educational history, it will be possible to build dynamic and continuous monitoring of each student's individual development without relying exclusively on episodic and uniform exams. This represents a historic break with the traditional industrial paradigm.

Future assessment will likely evolve towards models where: progress matters more than simple grades; deep understanding matters more than repetition; and individual development matters more than homogeneous comparisons between students.

This is where item theory and adaptive evaluation systems become extremely important.

Traditional models assumed that all students would take the same tests under relatively uniform conditions. But intelligent systems will enable dynamic assessments capable of: adjusting difficulty levels; reorganizing sequences; identifying specific gaps; and continuously adapting the assessment experience based on individual performance.

Evaluation thus ceases to be merely a terminal event and becomes a permanent process of understanding human learning.

Self-assessment and metacognition will also occupy a central position within the new paradigm.

Industrial schools often produced students who were dependent on external evaluation. The teacher and the system determined how well the student was learning, what their mistakes were, and when they were ready to advance.

But intelligent civilization will need people capable of monitoring their own learning; identifying their strengths and weaknesses; reorganizing cognitive strategies; and autonomously directing continuous processes of intellectual development.

The student gradually ceases to be a passive object of evaluation and begins to become a conscious actor in his own cognitive evolution.

Intellectual autonomy thus becomes one of the core competencies of the new education.

THE DYNAMIC COGNITIVE PORTFOLIO: REPLACING GRADING WITH EVIDENCE OF GROWTH

> The biggest problem with grading as an assessment system is not that it is inaccurate—although it is—but that it shifts the student's focus from learning to the grade. A student working to get a perfect score on an exam has a radically different orientation than a student working to master a competency. The alternative is not to eliminate accountability; it is to transform its nature. The Dynamic Cognitive Portfolio continuously and cumulatively documents not what the student remembers, but what they can DO: completed projects, solved problems, created works, sustained debates, acknowledged mistakes, and lessons learned from those mistakes. Mistakes cease to be punishable and become evidence of the process. This model is perfectly implementable in the Dominican Republic within the Single Educational Record (SER) that we will propose in the Draft of the new Education Law.

The transformation of assessment is also deeply linked to the emergence of lifelong learning.

For much of the modern industrial era, education was conceived as a relatively limited stage of life. People studied during childhood, adolescence, or young adulthood in order to later enter the workforce.

But automation, artificial intelligence, and technological acceleration are radically weakening that historical logic.

People will need to: Continuously relearn; Update skills; Rebuild career paths; and constantly adapt to new technological and labor conditions.

Learning gradually ceases to be a temporary preparation and becomes a permanent dimension of human life. Concepts such as: Lifelong Learning, reskilling, upskilling, lifelong learning, and cognitive retraining are no longer complementary trends but have become structural pillars of the new educational civilization. Schools and universities can no longer be conceived solely as institutions of initial training. They will have to transform into permanent hubs of cognitive support and continuous human development.

This profoundly alters even the historical meaning of the curriculum. Education can no longer be oriented exclusively towards the transmission of relatively stable knowledge because intelligent civilization will be characterized precisely by continuous change.

The central objective will begin to shift towards developing the capacity to: Learn; Unlearn; Relearn; Adapt; Reconstruct knowledge; and continually reorganize one's own intelligence.

Within this transformation, the role of the teacher changes radically.

The industrial paradigm has shaped a teacher primarily focused on content transmission; disciplinary control; assessment; and managing relatively homogeneous groups. But when artificial intelligence can organize information; personalize exercises; adapt content; perform cognitive tracking; and even explain numerous concepts, the human role of the teacher needs to be profoundly redefined. The teacher of the future will gradually cease to be the primary transmitter of information and will begin to become: a human mentor; an intelligent guide; an ethical mentor; a learning facilitator; a cultural mediator; a promoter of coexistence; and an architect of meaningful educational experiences.

Paradoxically, the more artificial intelligence advances, the more important the profound human dimension of the educator could become.

Machines can support cognitive and adaptive processes, but they can hardly replace them completely: empathy; inspiration; human leadership; emotional sensitivity; ethical training; coexistence; cultural construction and comprehensive support of human development.

The school of the future will need fewer teachers who transmit knowledge and many more educators capable of guiding people; stimulating creativity; strengthening citizenship; developing autonomy and building human meaning within technologically complex societies.

Teacher transformation will likely be one of the most challenging aspects of the entire contemporary educational transition. It's not simply about training teachers in new technologies. It involves a profound reorganization of professional identity, pedagogical culture, the concept of learning, and the historical perspective on education.

Many education systems will initially attempt to incorporate artificial intelligence while maintaining traditional teaching and assessment structures. But historical pressures toward transformation will continue to grow.

Intelligent civilization will demand a new educational philosophy and structure where assessment; lifelong learning; cognitive autonomy; artificial intelligence and teacher transformation are part of the same integrated ecosystem of continuous human development.

The great challenge of the 21st century will not consist solely of making assessment more technological or learning more digital. The true transformation will be building educational systems capable of intelligently supporting the lifelong development of human beings within a civilization characterized by continuous change, increasing complexity, and expanding artificial intelligence.

THE TEACHER RESEARCHER: THE MOST IMPORTANT PROFESSION OF THE 21ST CENTURY

There is much talk about transforming the role of the teacher, but rarely is it articulated what that transformation entails beyond simply 'using technology'. The proposal is concrete: the teacher of the future not only teaches, but also systematically investigates their own practice. Each classroom becomes a learning laboratory where the teacher applies Action Research: identifying learning problems in their students, designing interventions, implementing them, observing the results, and making adjustments. This continuous cycle makes the teacher the primary educational scientist in their community. To make this possible, teacher training needs to include educational research methodology, basic analysis of learning data, and dedicated time within the workday to document and reflect on practice.

PART THREE: TOWARDS AN INTEGRATED EDUCATION SYSTEM BY 2050

CHAPTER 7: THE NEW PRE-UNIVERSITY SUBSYSTEM: FROM GRADUATE SCHOOL TO SMART LEARNING ECOSYSTEMS

The educational transformation of the 21st century will likely begin most intensely in the pre-university subsystem, because it is there that the historical structure of the industrial school remains most visible and deeply entrenched. Organization by chronological grades, concurrent teaching, uniform curricula, rigid schedules, and standardized assessment continue to be the dominant pillars of much contemporary primary and secondary education. However, these very structures are now beginning to face increasing strain in the face of new technological and cognitive possibilities opened by artificial intelligence and personalized learning.

Graded schooling was historically an efficient solution for administering mass education within relatively homogeneous industrial societies. Organizing students by age allowed for the structuring of uniform teaching sequences and facilitated national curriculum management. However, this model always coexisted with a profound contradiction: human beings do not truly learn in a synchronized manner. Some students develop certain abilities early on, while others require more time and different experiences to consolidate equivalent learning. Traditional schooling had little real possibility of responding effectively to this diversity because it had to maintain relatively uniform structures to ensure the system's mass operation.

TRANSFORMATION OF EDUCATIONAL CYCLES. NEW ROLE.

Artificial intelligence is beginning to radically alter this historical limitation. For the first time, technologies are emerging that can monitor individual learning trajectories, adapt sequences, reorganize content, and support different paces of cognitive development. This opens the possibility of initiating a gradual transition from rigidly graded schools to semi-graded or partially non-graded models organized around dynamic learning cycles.

The conceptual difference is enormous. In traditional schooling, time was the fixed variable and learning the flexible one. All students were expected to progress simultaneously within pre-established schedules, even if their actual levels of understanding varied significantly. The emerging model is beginning to partially reverse this logic. Learning and mastering essential skills are becoming more central, while school time is becoming progressively more flexible and adaptive.

This does not necessarily mean completely eliminating all age-based organizations or abruptly destroying the existing school structure. The transition will be gradual, hybrid, and likely very uneven across countries, regions, and institutions. For a long time, traditional grade levels will coexist alongside cycle-based models, personalized learning pathways, and partially flexible structures. But the historical direction seems clear: schools will progressively tend to reorganize around individual learning and not solely around mass administrative synchronization.

CURRICULUM TRANSFORMATION.

The transformation of the pre-university subsystem will also entail a profound reorganization of the curriculum. The traditional approach, based on the increasing accumulation of subjects and content, is beginning to show growing limitations in a civilization where knowledge is growing exponentially and where much of the information will be permanently available through intelligent systems. The new paradigm will likely move towards more essential, interdisciplinary curricula, oriented towards the development of complex skills rather than the extensive memorization of fragmented information.

Artificial intelligence will also allow for the dynamic reorganization of curricular pathways according to individual abilities and interests. All students will need to master a core set of essential knowledge related to citizenship, communication, logical reasoning, scientific literacy, and technological understanding of the contemporary world. But simultaneously, differentiated paths of in-depth study in science, technology, the arts, the humanities, or technology will be able to emerge, based on individual talents and personal trajectories.

In the National Testing processes carried out in the nineties in the Dominican Republic (Ten-Year Education Plan) we made and applied throughout the country a Common Curricular Minimum, which was the minimum that all students should master and from there on we advanced as far as we could —according to the conditions of the time.

TRANSFORMATION OF THE STUDENT'S ROLE.

The pre-university school of the future will also profoundly alter the role of the student. The industrial paradigm frequently produced students dependent on external instruction, rigid curricula, and constant evaluation directed by adults. The new intelligent civilization will need far more intellectually autonomous individuals, capable of partially directing their own learning processes and continuously adapting to changing contexts. The ability to learn how to learn could become the most important structural competency in all future education.

This will also necessitate a transformation of school culture. Schools will gradually cease to exist solely as transmitters of content and will begin to function much more as intelligent, human ecosystems for holistic development. Coexistence, creativity, research, collaborative work, interdisciplinary exploration, and ethical training will acquire greater importance within the daily educational experience.

Paradoxically, the more artificial intelligence advances, the more important the human dimension of school could become. In an increasingly automated and digitized civilization, the school environment could become one of the main places to strengthen empathy, democratic coexistence, emotional development, cultural identity, collective creativity, and the shared construction of human meaning.

Technology will not eliminate the need for school. But it will likely transform its historical role profoundly.

Assessment will also evolve toward much more dynamic and continuous models. Episodic and rote-learning exams will gradually lose their central role to intelligent systems capable of continuously monitoring individual development. Self-assessment, metacognition, and the

conscious construction of personal learning pathways will occupy a much more important place within the new educational culture.

None of this will happen automatically. Industrial schools possess enormous cultural and institutional inertia because they don't just transmit knowledge; they also reproduce social habits, historical forms of authority, and traditional views on learning and citizenship. Precisely for this reason, the transformation will be complex and likely fraught with conflict.

However, historical pressures will continue to grow. Artificial intelligence, automation, and the constant expansion of knowledge will make the need for a profound reorganization of the pre-university subsystem increasingly evident. The school of the future can no longer rely solely on structures designed for a relatively stable industrial civilization. It will have to evolve toward much more flexible, intelligent, personalized, and deeply human models.

WHAT EXACTLY IS AN INTELLIGENT LEARNING ECOSYSTEM? A CONCRETE OPERATIONAL DESCRIPTION

- **THE TRANSFORMED PHYSICAL SPACE:** It doesn't have rows of desks facing a blackboard. It has distinct zones: an area for in-depth individual work, an area for team collaboration, an area for exploration and experimentation, a creation area (workshop), and an area for quiet reflection. Students move between zones according to their needs at any given time.
- **THE ADAPTIVE DIGITAL SYSTEM:** Each student interacts with an intelligent platform that has mapped their cognitive profile, strengths, current gaps, and interests. The platform provides each student with exercises specifically calibrated to their zone of proximal development—Vygotsky's concept updated with AI.
- **THE ACTIVE TEACHER-MENTOR:** is not at the front explanation. They are circulating, observing, asking individual questions, intervening where there is genuine confusion, recognizing achievement, and recording observations in the digital system.
- **REAL PROJECTS:** At least once a month, the group works on a real community project — a local sanitation problem, the history of the neighborhood, a simulated business, a community radio program — that integrates the five Cognitive Areas in a natural and authentic way.
- **CONTINUOUS AND VISIBLE ASSESSMENT:** Each student's progress is visible in real time as a map of mastered, developing, and emerging competencies. The student can view their own map and is co-responsible for their development.

CHAPTER 8: THE TRANSFORMATION OF HIGHER EDUCATION, SCIENCE AND TECHNOLOGY.

The educational transformation of the 21st century will not only affect pre-university schools. Higher education will likely face even more profound changes, because modern universities were also built under many of the historical logics of industrial civilization: relatively rigid degree programs, fragmented disciplinary structures, linear educational pathways, and relatively stable models of professional certification.

For much of the 20th century, universities functioned as institutions responsible for producing specialized professionals for economies organized around relatively defined and stable occupations. Students chose a degree, studied a relatively fixed set of courses for several years, and then worked professionally for decades using knowledge that gradually evolved.

However, the new intelligent civilization is beginning to profoundly alter that historical model.

Automation, artificial intelligence, and technological acceleration are continually reshaping professions, job skills, and the production of scientific knowledge. Many occupations will change radically in very short periods. Others will partially disappear. New interdisciplinary fields will constantly emerge. And people will likely need to rebuild their career paths several times throughout their lives.

In this new context, rigid university structures are beginning to show increasing limitations.

The traditional idea of relatively closed and permanent career paths is becoming increasingly unviable in an economy based on continuous innovation, accelerated technological transformation, and constant reorganization of knowledge. The university of the future will likely evolve toward much more flexible, dynamic, and interdisciplinary structures.

The disciplinary fragmentation inherited from the industrial paradigm constitutes one of the main contemporary challenges of higher education. For decades, universities organized knowledge through relatively separate faculties, schools, and departments: engineering, medicine, law, economics, sciences, humanities, technology, among others.

That model allowed for specialized deepening of knowledge, but it also frequently produced intellectual isolation and difficulties in addressing complex problems whose nature is profoundly interdisciplinary.

Artificial intelligence, biotechnology, sustainability, automation, neuroscience, and digital transformation require precisely a much more intense integration between: science, technology, humanities, ethics, economics, and systems thinking.

The University of the future will likely need to reorganize the relationship between disciplines much more profoundly and build much more interconnected knowledge ecosystems.

Scientific research will also undergo radical transformations. Artificial intelligence is already beginning to intervene in complex processes such as data analysis, modeling, simulation, pattern identification, hypothesis generation, and even the preliminary production of scientific knowledge.

THE 10 MOST DISRUPTIVE TRENDS IN HIGHER EDUCATION TOWARDS 2050 — ORIGINAL PROJECTIONS

- **TREND 1 — THE 'UNIVERSITY WITHOUT DEGREES':** The concept of a 'degree' as an organizing unit is dissolving. The 'accumulative competencies' model is emerging: students build a profile of certified skills by freely combining modules from different disciplines. They don't graduate in 'engineering'; they are certified in 'adaptive systems design for public health'. Each combination is as unique as the person who creates it.
- **TREND 2 — AI-ASSISTED RESEARCH:** AI systems can review millions of articles in minutes, identify knowledge gaps, and formulate hypotheses. The researcher of the future will be a 'cognitive conductor' who asks the right questions and makes ethical decisions about what to research and why.
- **TREND 3 — BIOLOGY AS A NEW TECHNOLOGY (Biotech 3.0)**: The convergence of computational biology, genome editing, and AI-powered protein synthesis creates an entirely new field. For the DR, this has concrete implications: biodiversity, agriculture, public health, and sustainable tourism will all benefit directly.
- **TREND 4 — CITIZEN SCIENCE AS A NEW MODEL:** Low-cost devices combined with AI platforms democratize scientific research. For the Dominican Republic: coral reef monitoring networks, epidemiological surveillance, and biodiversity documentation that produce real scientific knowledge from within communities.
- **TREND 5 'LIVING LABORATORIES':** Universities will need spaces where students work on real-world problems in the city and community. City and university merge. The country's concrete problems — water, energy, agriculture, tourism — are the raw material for university learning.
- **TREND 6 — POSTGRADUATE STUDIES AS THE FIRST SPECIALIZED QUALIFICATION: The '** micro-master's ' or ' nano-doctorate ' model will emerge in high-demand areas: AI systems management, computational bioethics, data epidemiology, and the circular economy. These credentials allow for rapid and verifiable specialization.
- **TREND 7 — AI AS A MANDATORY CROSS-CUTTING DISCIPLINE:** Just as statistics became a cross-cutting language for all scientific disciplines in the 20th century, artificial intelligence will become its equivalent in the 21st century. A degree without AI training in 2030 will be equivalent to a degree without mathematics in 1990.
- **TREND 8 — DIGITAL HUMANITIES:** The digitization of culture and history creates a new discipline that combines computational analysis of large textual corpora with in-depth humanistic interpretation. For the Dominican Republic, with its rich cultural and historical heritage, this offers an opportunity for regional leadership.
- **TREND 9 — COMPLEXITY SCIENCE AS A UNIFYING PARADIGM:** The major problems of the 21st century — climate change, pandemics, inequality, democratic crisis — are complex problems that cannot be solved by any single discipline in isolation. Complexity Science is emerging as the unifying theoretical framework of the 21st century.

- **TREND 10 — ETHICS AS AN INFRASTRUCTURE FOR INNOVATION:** In the 21st-century economy, ethics is not an obstacle to innovation but rather its prerequisite. Companies that fail to build trust are driven out of the market. In-depth ethical training is a strategic investment, not a philosophical expense.

FIVE STRATEGIC SCIENTIFIC BETS FOR THE DOMINICAN REPUBLIC

- **BET 1 — MARINE SCIENCES AND OCEAN TECHNOLOGY:** The Dominican Republic boasts one of the most biodiverse coral reef ecosystems in the Caribbean. Research in marine sciences, ocean monitoring with AI, marine biotechnology, and sustainable fisheries management is a bet with a natural geographic advantage.
- **BET 2 — SMART AGRI-FOOD:** Dominican agriculture — cocoa, coffee, avocado, banana, livestock — can be transformed by IoT sensors, agricultural drones, crop genomics and AI-based climate prediction systems.
- **BET 3 — RENEWABLE ENERGIES AND ENERGY TRANSITION:** The Dominican Republic's solar, wind, and hydropower potential can become scientific leadership in energy storage, smart grids, and energy self-sufficient communities.
- **BET 4 — PUBLIC HEALTH, GENOMICS AND DATA EPIDEMIOLOGY:** Computational epidemiology, genomic analysis of Dominican populations and AI-based health surveillance systems can save lives and reduce health system costs.
- **BET 5 — SUSTAINABLE AND SMART TOURISM:** Research in sustainable tourism, ecotourism, destination carrying capacity management and visitor experience personalization technologies can generate knowledge with immediate economic impact.

This could greatly accelerate humanity's capacity for research and innovation. But it will simultaneously force us to reconsider what it means to do research; how knowledge is built; and what the specific human role will be within future science.

Scientific creativity, the formulation of relevant questions, ethical judgment, and complex interpretation will likely become even more important precisely because numerous technical and analytical processes can be partially automated.

Higher education can no longer be limited to transmitting relatively stable knowledge. It will be necessary to train individuals capable of : continuously adapting, integrating knowledge, lifelong learning, and participating intelligently within highly dynamic scientific and technological ecosystems. Years ago, Guadamuz wrote about the need for higher education institutions to move towards micro-degrees, to incorporate micro-credentials, to structure them sequentially with continuous updates, and to deliver them with 30 to 40% theory and the remainder practical, utilizing libraries, laboratories, and virtual workshops with numerous simulation and emulation models, while also offering great flexibility to accredit the knowledge, skills, or experience of those who—increasingly—return to university classrooms to validate their previous learning (or qualifications).

Artificial intelligence will also profoundly transform the university experience itself. Intelligent systems will enable advanced personalized learning; flexible curriculum pathways; continuous

cognitive support; virtual laboratories; assisted research; and the dynamic development of academic trajectories.

The university will gradually cease to be organized exclusively around rigid sequences of subjects and will begin to evolve towards adaptive ecosystems of learning and innovation.

This even alters the historical relationship between university and time. The industrial paradigm conceived of higher education as a relatively limited stage of professional training prior to employment. But intelligent civilization will demand continuous updating of skills and ongoing reconstruction of knowledge.

Universities will likely transform into institutions of continuous learning where people of different ages will return repeatedly for: professional retraining, technological updating, dynamic specialization, research, or reconstruction of career paths.

The boundary between study and work will gradually weaken.

University certification could also undergo profound transformations. Traditional degrees organized around long and relatively rigid programs of study could increasingly coexist with: modular certifications, micro-credentials, flexible pathways, competency-based learning, and continuous skills validation.

The speed of technological change will make it increasingly difficult to consider a single professional qualification obtained during youth as sufficient.

The higher education of the future will likely combine fundamental cores of human and scientific training with ongoing processes of updating and dynamic specialization.

The relationship between universities and society will also need profound reorganization. Contemporary acceleration demands much more integrated ecosystems encompassing universities, research centers, productive sectors, technological innovation, and social transformation.

Science and technology will gradually cease to be peripheral dimensions of higher education and will become structural components of the entire university architecture.

However, this transformation should not lead to a purely technocratic view of the university.

There is a risk of reducing higher education solely to the training of human capital for automated economies. But precisely because artificial intelligence will profoundly transform civilization, universities will need to strengthen critical thinking, ethics, philosophy, the humanities, creativity, citizenship, and reflection on the future of humanity much more intensely.

Artificial intelligence poses not only technical challenges. It introduces profound philosophical and civilizational questions about work, consciousness, democracy, privacy, power, inequality, human identity, and the meaning of knowledge.

The university of the future will need to train not only technological specialists, but also citizens capable of critically understanding the human implications of the new intelligent civilization.

Paradoxically, the more technological society becomes, the more important the humanistic dimension of higher education could become.

The transition to this new university model will be complex and gradual. Traditional structures, rigid degree programs, and academic cultures inherited from industrial modernity will persist for a long time. But historical pressures for transformation will continue to grow.

Higher education in the 21st century will thus face one of the greatest challenges in its entire history: transforming itself profoundly to respond to an intelligent civilization in constant change without ever losing its fundamental mission as a space for critical thinking, human creation and conscious construction of the future of society.

CHAPTER 9: THE NEW VOCATIONAL AND TECHNICAL TRAINING IN THE INTELLIGENT CIVILIZATION.

Contemporary technological transformation is profoundly altering the nature of human work and, consequently, is also forcing a radical reorganization of vocational and technical training. Few areas of the education system will feel the impact of automation, artificial intelligence, and robotics as immediately as technical and vocational education, precisely because many occupations historically associated with repetitive tasks and standardized procedures are beginning to experience accelerated processes of technological transformation.

For much of the modern industrial era, technical training was organized around a relatively stable logic. The production system needed workers specialized in specific functions related to: industrial processes, mechanics, manufacturing, technical operations, administration, services, and repetitive production, personal grooming (hair, nails, massages), cooking, masonry, basic tourism, among others.

Technical education prepared people to work for long periods in relatively defined occupations, adapting to gradual technological changes. The skills acquired could remain relevant for decades.

However, the new intelligent civilization begins to profoundly alter that historical stability.

Advanced automation and artificial intelligence are simultaneously transforming factories, services, logistics, administration, agriculture, healthcare, commerce, transportation, and virtually every contemporary productive sector. Numerous routine tasks—both physical and cognitive—will increasingly be performed by automated and intelligent systems. This does not necessarily mean the complete disappearance of human labor, but rather a profound reorganization of the most valuable skills within the future economy.

Traditional vocational training thus faces an enormous historical challenge: preparing people not only for existing occupations, but for constantly changing and even unpredictable work contexts.

Technical and vocational education can no longer rely solely on rigid programs geared towards relatively static trades. It will need to transform into a flexible ecosystem of continuous updating, cognitive retraining, and lifelong learning.

Concepts such as: Re-skilling, Up- skilling , Job retraining, Modular learning, and dynamic certification — will gradually cease to be complementary trends and will become structural pillars of the entire new technical-professional architecture.

The speed of technological transformation will make it increasingly difficult to think of vocational training as a single, final stage of life. People will need to continuously update their skills, learn new technologies, and rebuild their career paths multiple times.

This implies a profound transformation of traditional educational temporality.

The technical training of the future will likely be organized around lifelong, flexible learning processes. The boundary between education and work will gradually blur. Learning will cease to be merely preparation and will become an integral part of the work itself.

Artificial intelligence will play a decisive role in this transformation. Intelligent systems will enable dynamic skills assessment; personalized learning pathways; advanced simulations; virtual laboratories; adaptive mentoring; and highly flexible modular training.

Technical and vocational education can adapt much more quickly to technological changes than traditional models based on long and relatively rigid curricula. Modularity will become extremely important. Instead of relying exclusively on extensive and closed pathways, systems could emerge organized around micro-certifications, specific competencies, dynamic updates, and flexible routes of progressive specialization.

THE JOBS OF THE FUTURE THAT DON'T YET EXIST: PREPARING FOR THE UNKNOWN

- ***AI Systems Wellbeing Specialist:*** Monitors the psychosocial and ethical impact of AI systems on communities and organizations. Combines psychology, ethics, and a technical understanding of algorithmic systems.
- ***Circular Economy and Biomaterials Manager:*** Designs production systems where one industry's waste becomes another's input. Combines engineering, biology, and business management.
- ***Vertical Farming and Cellular Farming Technician:*** Produces food in controlled indoor environments using direct cellular protein synthesis. One of the world's fastest-growing industries.
- ***Digital Therapist and Mental Health Counselor in Virtual Environments:*** Combines clinical psychology with an understanding of social networks and extended reality.
- ***Community Data Interpreter:*** Helps communities, municipalities, and organizations read and interpret their own data and make decisions based on local evidence.
- ***Digital Identity and Data Heritage Curator:*** Manages, protects, organizes and eventually 'inherits' the digital identity of people and communities.

THE CARE ECONOMY: THE MOST UNDERESTIMATED SECTOR OF THE FUTURE

The care economy is the sector that automation cannot easily replace and that will grow dramatically in the coming decades. Caring for the elderly, people with disabilities, young children, and people in vulnerable situations requires empathy, adaptability, physical presence, and emotional understanding that no algorithm can genuinely replicate. In the Dominican Republic—as throughout Latin America—the care economy falls disproportionately on women. Dignifying, professionalizing, certifying, and fairly compensating care work is simultaneously an educational policy, a gender policy, an economic policy, and a human rights policy. Technical and vocational training in care—for example, as a geriatric assistant, a technician in care for people with disabilities, or an early childhood educator—must be considered a national strategic priority.

This will allow us to respond more quickly to the speed of contemporary technological transformation.

However, the reorganization of technical training cannot be reduced solely to technological adaptation. There is a risk of constructing overly utilitarian models subordinated exclusively to the immediate demands of the labor market.

Intelligent civilization will need something more complex: technically competent workers, but also workers capable of critical thinking, creative adaptation, solving complex problems, continuous learning, and understanding the human and social implications of technology.

The vocational training of the future will need to integrate technical skills, scientific thinking, digital literacy, creativity, ethics, communication, and a systemic understanding of contemporary work.

The historical separation between academic education and technical training will also gradually begin to weaken. For a long time, numerous educational systems constructed cultural hierarchies where technical education occupied secondary positions compared to traditional university models.

But intelligent civilization will likely require a much deeper integration between: science, technology, innovation, applied research, and advanced professional training.

> **The historical separation between academic education and technical training will begin to crumble in the intelligent civilization. It will no longer make sense to distinguish between those who 'think' and those who 'do' when the most economically valuable systems—biotechnology, applied artificial intelligence, renewable energies, Industry 4.0—simultaneously require profound scientific thinking and advanced technical competence. Technical and vocational education could become one of the most dynamic drivers of innovation and economic adaptation in the 21st century.**

Automation will also profoundly alter the very concept of job skills. For a long time, many occupations were primarily associated with the repetitive execution of relatively stable procedures.

Future vocational training will need to prepare people capable of collaborating intelligently with advanced technologies and not simply competing mechanically against them.

This will require developing new forms of technological literacy and understanding of artificial intelligence applicable to virtually all sectors of the workforce. AI will gradually cease to be an isolated specialization and become a cross-cutting component of multiple occupations: industry, healthcare, hospitality and tourism, agriculture, services, education, commerce, transportation, and organizational management.

Technical training must also respond to a growing problem of intelligent civilization: the possible expansion of structural unemployment resulting from accelerated automation.

Education alone will not fully solve this challenge, because technological transformation affects much broader economic and political dimensions. However, vocational training will play a crucial role in: facilitating retraining; expanding adaptive capacities; and reducing social vulnerability to technological change.

For this very reason, vocational training systems will need to be much more closely linked to policies on innovation, economic development, productive transformation, and national strategic planning. In the Dominican Republic, an excellent coordination program was launched between the Ministry of Education (MINERD) and the National Institute of

Technical and Vocational Training (INFOTEP) with the signing of an agreement in 2025 to develop an Immediate Action Plan for Strengthening Technical and Vocational Training.

New technical training can no longer be organized solely around past trades. It will need to anticipate future trends and prepare people for an economy where automation, artificial intelligence, robotics, data, biotechnology, digitalization, microchips, rare earth elements, and lifelong learning will be structural dimensions of all productive life.

However, the technical and professional transformation must not lead to a purely mechanistic view of human beings. The education of the future cannot reduce people to mere adaptive resources for automated economic systems.

The true purpose of vocational training within the intelligent civilization should be much deeper: to develop human beings capable of intelligently using technology to enhance creativity, well-being, autonomy, innovation, human dignity, teaching how to survive and integral development of society.

The great transformation of technical training in the 21st century will consist precisely in this historical challenge: moving from models designed for relatively stable industrial economies to flexible ecosystems of continuous learning capable of intelligently supporting human beings within a permanently changing and unpredictable technological civilization.

CHAPTER 10: INTELLIGENCE, HUMANITY AND CIVILIZATIONAL FUTURE: TOWARDS A NEW MODEL OF EDUCATION.

The educational transformation analyzed throughout these reflections allows us to understand that humanity is not simply facing a stage of pedagogical modernization or technological updating. Everything indicates that we are entering a much deeper historical transition: the shift from industrial educational civilization to a New Model of Education, a new model of human learning within increasingly intelligent, automated, and cognitively complex societies.

For more than two centuries, the modern school successfully organized education around: relatively uniform curricula, chronological grades, simultaneous teaching, disciplinary fragmentation, standardized assessment, and mass transmission of content.

This paradigm enabled mass literacy, educational expansion, and the construction of modern citizenship. It was extraordinarily effective for the historical needs of industrial society. However, the technological, cognitive, and cultural conditions of the 21st century are beginning to progressively reveal its structural limitations.

Artificial intelligence profoundly alters the historical relationship between knowledge and learning. Information is no longer scarce. Access to knowledge becomes ubiquitous. Automation transforms human work. The speed of technological change makes it increasingly difficult to maintain rigid curricula and relatively stable career paths.

Faced with this scenario, education can no longer be limited to transmitting large amounts of information organized under homogeneous structures designed for another historical era.

The new intelligent civilization demands a profound reorganization of the education system.

Traditionally graded school is gradually evolving towards semi-graded models and dynamic learning ecosystems. The encyclopedic curriculum is transforming into an essential curriculum focused on developing complex skills. Uniform teaching is shifting towards intelligent personalization of learning and partial individualization of content. Rote learning assessment is evolving towards continuous monitoring and adaptive support of cognitive development.

Artificial intelligence will play a decisive role in this transformation. For the first time in human history, technologies are emerging that can: personalize educational pathways; adapt cognitive sequences; identify specific difficulties; dynamically reorganize content; and support individual processes of continuous learning.

This probably represents one of the greatest educational revolutions since the very birth of the modern school.

However, the real historical challenge is not simply introducing artificial intelligence into classrooms. The much deeper question is how to integrate technological intelligence and human development without reducing education to mere algorithmic optimization of learning.

Precisely because machines will increasingly take over numerous cognitive and operational functions, specifically human capabilities will acquire even greater value.

Paradoxically, the more powerful artificial intelligence becomes, the more important becomes, which makes the educational experience profoundly human.

WHAT IS SPECIFICALLY HUMAN: WHAT NO ALGORITHM CAN REPLACE

- ***EMBODIED EXPERIENCE:*** Human beings learn through bodies that feel, move, suffer, rejoice, age, and die. This bodily and irreducibly subjective dimension of learning cannot be digitized. Education that integrates the body enriches learning. Education that ignores it profoundly impoverishes it.
- ***CARE AND MORAL RESPONSIBILITY:*** Human beings are capable of moral and emotional commitment to other people, communities, the planet, and future generations yet unborn. This capacity to assume ethical responsibility beyond individual calculation is what makes democratic societies possible. No AI system can genuinely experience this dimension. Education must cultivate it as the most strategic capacity for the future of humanity.
- ***NARRATIVE AND MEANING:*** Human beings construct meaning through stories. The capacity to narrate one's own experience, to give meaning to suffering and joy, to build identity over time, to imagine possible futures, and to motivate others toward them is uniquely human. Literature, art, philosophy, history, and ethics are not 'soft subjects': they are the disciplines that cultivate the most specific human capacity, one threatened by digital superficiality.
- ***TRANSGRESSIVE CREATIVITY:*** AI can combine existing elements in surprising ways. But the deepest human creativity is transgressive: it breaks the rules because humankind has seen something the world does not yet see and dares to name it. This creativity—in art, in science, in philosophy, in politics—is the driving force of all civilizations. Education that stifles intellectual insubordination tames human potential.

Future education cannot be organized exclusively around employment either. For much of the industrial modern era, schooling was closely linked to relatively stable job training. But automation and artificial intelligence are beginning to profoundly alter that historical relationship.

People will need to continually reinvent themselves, learn throughout their lives, and constantly adapt to unpredictable contexts. Learning will gradually cease to be a limited phase and become a structural dimension of human existence.

Lifelong learning is emerging as one of the central pillars of the new civilization.

The education system of the future will likely be organized around three large, deeply interconnected subsystems: a pre-university subsystem focused on human development, personalization, and essential skills; a university and scientific subsystem focused on innovation, research, and advanced knowledge production; and a flexible technical-professional subsystem focused on continuous learning and ongoing technological adaptation.

The rigid separation between early childhood education, university, and vocational training will gradually weaken. The new Educational Model will function much more as an integrated ecosystem of lifelong learning.

However, this transition will not be without risks and deep tensions.

Artificial intelligence could exacerbate cognitive and social inequalities if access to intelligent learning ecosystems remains concentrated solely in certain sectors or countries. Hyper-personalization could weaken shared experiences of coexistence and citizenship. Excessive automation could lead to cognitive dependence and the loss of fundamental human capacities if education does not adequately preserve autonomous thinking, critical reflection, creativity, and intellectual depth.

There is also the risk of building excessively technocratic educational systems subordinated exclusively to economic productivity and algorithmic efficiency.

Therefore, the great educational transformation of the 21st century cannot be merely technological. It must also be profoundly ethical, philosophical, and humanistic.

Every educational theory ultimately expresses a particular vision about: what it means to be human; what abilities are most valued; what type of society one wishes to build; and what civilizational project is considered desirable for the future.

The education of the future will have the historical responsibility of helping to build societies capable of using technology intelligently without ever losing what constitutes the very essence of humanity.

The great educational transition of the 21st century will probably be remembered as the historic moment when humanity understood that the ultimate goal of education is not simply to produce more efficient people for a technological economy, but to form human beings capable of living intelligently, critically and ethically within a civilization that is increasingly powerful from a technological point of view, but which will need to remain profoundly human in order to retain true historical and cultural meaning.

CHAPTER 11: THE TRANSITION TOWARDS 2050: GRADUALITY, COEXISTENCE OF MODELS AND TRANSFORMATION OF THE EDUCATIONAL SYSTEM.

Every major historical transformation occurs through long, complex, and often contradictory processes. Education will be no exception. Although artificial intelligence and the new technological civilization are beginning to profoundly modify the foundations of the industrial educational paradigm, the transition to a new model will not be instantaneous or uniform. Over the next few decades, structures inherited from the past will coexist with emerging architectures of intelligent learning within hybrid and evolving systems.

Understanding this coexistence is fundamental to avoiding two common errors in many contemporary debates about education. The first is imagining that traditional schooling will quickly disappear, completely replaced by technological platforms and automated systems. The second error is believing that simply incorporating a few digital tools into the current model will be enough to resolve the deep structural tensions facing contemporary education.

The reality will probably be much more complex.

Educational institutions possess enormous historical inertia because they do not only transmit knowledge. They also transmit : cultural habits, forms of coexistence, structures of authority, collective identities, and historical views on citizenship and social organization.

Precisely for this reason, educational transformation will necessarily be gradual, conflictive, and uneven. Many school systems will initially attempt to partially modernize the industrial paradigm without fundamentally altering their structural foundations. They will incorporate digital platforms, artificial intelligence, multimedia resources, and adaptive systems, but simultaneously maintain rigid curricula, traditional grade levels, rote memorization-based assessment, and organizational structures inherited from the 19th century.

This hybrid phase will likely be inevitable. The educational transition of the 21st century will not consist of completely destroying the past, but rather of progressively reorganizing historical structures within new cognitive and technological architectures.

> **For a long time, the following will coexist: graded schools alongside semi-graded and non-graded models; uniform teaching alongside intelligent personalization; fragmented curricula alongside interdisciplinary structures; traditional assessment alongside continuous adaptive monitoring; teachers as transmitters of knowledge alongside mentors working in tandem with artificial intelligence systems; and rote learning alongside learning based on complex competencies. This paradigmatic coexistence will be one of the central characteristics of contemporary educational transformation. The key is not choosing one or the other: it is knowing when and how to move from one to the other, with responsible gradualism and rigorous evidence.**

A gradual approach will also be necessary because the required transformations are not solely technological. In fact, the most difficult changes will likely be cultural, institutional, pedagogical, political, and philosophical.

Industrial education shaped for generations how societies understand: school, learning, teacher authority, evaluation, curriculum, and the relationship between knowledge and citizenship.

Modifying these structures involves altering dimensions deeply rooted within the social culture.

Teacher training is one of the greatest challenges of this transition. Many educators were trained to work within paradigms centered on: content transmission, simultaneous teaching, relatively rigid curricula, and standardized assessment.

The new intelligent civilization will require teachers capable of: supporting personalized learning paths; working with artificial intelligence; facilitating autonomous learning; stimulating creativity; promoting coexistence; and ethically guiding students within technologically complex societies.

This requires long processes of professional and cultural transformation.

Infrastructure also presents a huge challenge. Intelligent personalization and adaptive learning ecosystems will require : advanced connectivity, technology platforms, data systems, digital resources, continuous training, and profound institutional reorganization.

Inequalities between countries and social sectors could widen considerably if the educational technological transition occurs in an exclusionary manner.

For this very reason, the transformation towards 2050 cannot be understood solely as technical modernization. It needs to become a strategic project for national development and civilizational construction.

Educational systems will require new forms of articulation between: State, universities, science, technology, productive sector, innovation, and long-term planning.

Education will gradually cease to be merely a sectoral policy and will begin to occupy a much more strategic position within the integral development of societies.

The transition will also demand enormous institutional flexibility. The speed of technological change makes it increasingly difficult to design rigid models for extended periods. Educational systems will need to develop a permanent capacity for adaptation, curriculum revision, and dynamic reorganization.

Traditional educational planning was often built on assumptions of relative historical stability. But intelligent civilization will be characterized precisely by continuous and unpredictable transformation.

Therefore, future education will probably need to be organized around more open, more evolutionary, more flexible models that are capable of continuously adapting to new technological and social realities.

TOWARDS A ROADMAP FOR EDUCATIONAL TRANSFORMATION IN THE DOMINICAN REPUBLIC: THREE HORIZONS OF TRANSFORMATION

- **HORIZON 1 (2026-2030) — LAY THE FOUNDATIONS:** Promulgate the new Education Law that integrates MEDUCACyT; create the MCCN based on five Integrative Cognitive Areas; implement the first 1000 pilot centers of the New Educational Model (**with representation of all levels and modalities**); launch the SNIE with the EEU for all students; implement the Joint MINERD-INFOTEP Plan for curricular articulation; approve the General Regulation that operationalizes the new institutional architecture.
- **HORIZON 2 (2030-2040) — EXPAND AND DEEPEN** : Generalize the New Educational Model to 65% of the country's centers; transform initial and continuous teacher training for the new paradigm; launch the five National Scientific Bets with stable funding from FONDOCYT; implement a national micro-credential system articulated with the MNC; establish the Dynamic Cognitive Portfolio as the main evaluation instrument.
- **HORIZON 3 (2040-2050) — CONSOLIDATE THE NEW SYSTEM:** Universalization of the second cycle of early childhood education; 75% of high school graduates access quality higher education or vocational training; at least three Dominican higher education institutions with a presence in regional research rankings; 40% of active adults in some form of continuing education.

There is a risk of developing overly technocratic systems focused solely on efficiency, automation, and cognitive productivity. But precisely because artificial intelligence will profoundly transform human experience, education will need to strengthen much more: ethics, critical thinking, coexistence, creativity, democratic citizenship, and a humanistic approach to learning.

The educational transition of the 21st century will not simply consist of making schools more digital. It will consist of redefining what it means to educate within a civilization where machines will increasingly participate in cognitive processes previously considered exclusively human.

This makes educational transformation a profoundly philosophical and civilizational issue. The central question will no longer be simply how to modernize the education system. The real question will be much deeper: how to build an education capable of preparing human beings to live intelligently within technologically advanced societies without losing autonomy, creativity, human dignity, and the capacity to build collective meaning.

The horizon towards 2050 represents precisely that great historical challenge.

Humanity will likely enter a stage in the coming decades where artificial intelligence, automation, lifelong learning, biotechnology, and digital reorganization of knowledge will simultaneously transform all dimensions of social life.

Faced with this scenario, education will have a decisive historical responsibility.

It will not only have to adapt to the future. It will have to help to consciously build it.

And perhaps therein lies the deepest task of this entire transition: to build an educational system intelligent enough to respond to the new technological civilization, but human enough to preserve that which gives true meaning to the experience of learning, living together and being human within the emerging future.

GENERAL CONCLUSION

Towards a New Educational Civilization

> **The reflections developed throughout this work allow us to understand that contemporary education is not facing just another crisis in its history: it faces the most profound challenge since the very emergence of the modern school. The expansion of artificial intelligence, cognitive automation, and the accelerated transformation of human labor are simultaneously modifying the foundations of the industrial educational paradigm that humanity built over more than two centuries. Graded schooling, the fragmented curriculum, and rote memorization were historically effective structures for industrial modernity. But the new civilization demands a different architecture for human learning.**

The graded school, the fragmented curriculum, uniform teaching methods, and rote learning assessment were historically effective structures for the needs of a relatively stable industrial civilization. However, the technological, economic, and cultural conditions of the 21st century are increasingly revealing their structural limitations. The new intelligent civilization demands a different architecture for human learning.

The central problem of contemporary education is not simply about incorporating technology into traditional structures. The real issue is much deeper. It involves a comprehensive reorganization of the relationship between knowledge, learning, curriculum, human intelligence, technology, and personal development.

The transformation towards 2050 will likely involve a gradual shift from educational models organized around homogeneity and mass transmission towards intelligent, personalized, dynamic, and permanently adaptive learning ecosystems.

The school of the future will progressively evolve from rigidly graded structures towards models that are semi-graded, dynamically cycled, or partially ungraded, where the authentic development of human capabilities acquires greater importance than mere chronological permanence within the system.

The curriculum will also undergo a profound transformation. The encyclopedic approach based on the ever-increasing accumulation of content is beginning to lose its viability in a civilization where knowledge grows exponentially and where much of the information will be available through artificial intelligence. The new curricular paradigm will likely move towards structures that are more essential, more interdisciplinary, and more flexible.

Personalized learning and the partial individualization of content represent perhaps one of the greatest historical breaks with the traditional industrial paradigm. For the first time, humanity has technologies capable of truly recognizing human cognitive diversity and building much more adaptive and differentiated educational pathways.

However, the goal of this transformation should not be limited solely to technological efficiency. Precisely because artificial intelligence will participate in complex cognitive processes, specifically human capabilities will become even more important.

The education of the future will need to intensely develop: creativity, empathy, democratic coexistence, intellectual autonomy, ethical sensitivity, imagination, critical thinking, and the ability to build human meaning within technologically complex societies.

Paradoxically, the more powerful artificial intelligence becomes, the more important it becomes to preserve what makes the educational experience profoundly human.

Higher education and technical and vocational training will also face radical reorganizations. Rigid career paths, static curricula, and terminal training will gradually lose viability in the face of economies characterized by continuous innovation, automation, ongoing transformation of work, and lifelong learning.

Lifelong learning is emerging as one of the central pillars of the new educational civilization. Learning will cease to be a limited stage of human existence and will become a structural dimension of all personal, professional, and social life.

The transition to this new model will not happen abruptly. For decades, traditional structures, hybrid models, smart ecosystems, and partially transformed architectures will coexist.

Paradigmatic coexistence will be one of the central characteristics of the contemporary educational transition.

But beyond technological and curricular transformations, the deepest challenge will probably be philosophical and civilization.

All education ultimately expresses a particular vision about: what it means to be human; what abilities are most valued; what kind of society one wishes to build; and what future a civilization considers desirable.

The education of the future cannot be limited to producing individuals who are functional for automated economies. It will be necessary to train people capable of critically understanding the technological world in which they live and consciously participating in the ethical and democratic construction of the new intelligent civilization.

Humanity will likely enter an unprecedented stage of civilizational transformation in the coming decades. In this context, education will bear a crucial historical responsibility.

It will not only have to adapt to the future. It will have to consciously help to build it.

And perhaps the great educational task of the 21st century consists precisely in this: forming human beings capable of living intelligently within a civilization that is increasingly powerful from a technological point of view, but which will need to remain profoundly human in order to preserve true historical, ethical and cultural meaning.

SUMMARY OF THE PROPOSAL FOR A NEW DOMINICAN EDUCATIONAL MODEL.

Towards an integrated proposal for the Dominican Republic 2026-2050

The reflections in this document seek to propose ideas to articulate the synthesis of the New Dominican Educational Model in ten interdependent dimensions:

1. ***INSTITUTIONAL ARCHITECTURE:*** A single governing Ministry — MEDUCACyT — that integrates the pre-university, higher education and technical-professional training subsystems under a non-delegable governing authority, with INFOTEP articulated as an autonomous subsystem and with ten Essential National Programs directly attached to the Minister, horizontal to the entire structure.
2. ***NEW EDUCATIONAL STRUCTURE:*** **A gradual shift from graded schools to** semi-graded and non-graded schools, organized by educational cycles whose progression depends on the mastery of competencies—not on the calendar. The First Cycle of Early Childhood Education (0-3 years), the Second Cycle (3-6 years), the two Cycles of Basic Education (3 years each), the Third Cycle of Secondary Education, and the Fourth Cycle of Diversified Education (four modalities) make up the educational pathways of the system.
3. ***COMMON NATIONAL MINIMUM CURRICULUM (CNMC):*** An essential core of five major integrative cognitive areas that replaces the encyclopedic fragmentation of 13-18 subjects. Based on this core, differentiated pathways of in-depth study are built according to talents, interests, and vocations.
4. ***PERSONALIZATION AND INDIVIDUALIZATION:*** Every student has a Personalized Learning Plan (PLP) developed by their teaching team at the beginning of each academic year. The PLP is recorded in the Single Educational Record (SER), which accompanies the student throughout their life and is automatically transferred between institutions. The curriculum adapts to the student, not the student to the curriculum.
5. ***TEACHER AS MENTOR AND RESEARCHER:*** The teacher ceases to be a transmitter of content and becomes an Architect of Learning Experiences. They use AI as a diagnostic and monitoring tool, reserving their energy for what is specifically human: inspiring, mediating, and supporting identity and ethical development. They systematically investigate their own practice through Action Research. They receive 80 hours of continuing education annually, including 20 hours in the New Educational Model and 20 hours in Pedagogical AI.
6. **CONTINUOUS FORMATIVE ASSESSMENT:** Numerical grades give way to the Dynamic Cognitive Portfolio: a tool that documents what the student can DO—completed projects, solved problems, created works, acknowledged mistakes, and lessons learned from those mistakes. IDEICE administers diagnostic assessments at the beginning of each cycle and national assessments that measure developed competencies, not memorized content.
7. ***TECHNOLOGY AT THE SERVICE OF HUMAN LEARNING:*** The Catalog of Authorized Educational Technology Platforms (CPTEA) guarantees standards of pedagogical effectiveness, data protection, and accessibility. Integrating the ethical and critical use of

AI across the curriculum from early childhood education ensures that students become informed digital citizens. A minimum connectivity speed of 10 Mbps in all public schools is a prerequisite for implementation.

8. ***K-20 ARTICULATION AND CONTINUING EDUCATION:*** Curricular pathways between levels, cumulative micro-credentials registered in the National Certification Registry, and the National Qualifications Framework (MNC) at eight levels that articulate all formal and non-formal qualifications. Node University allows individuals to return at any point in their lives to update skills or retrain professionally.
9. ***SCIENCE, TECHNOLOGY, AND CULTURE AS CORE FUNCTIONS:*** FONDOCYT provides stable funding for the five Strategic Scientific Initiatives. Culture and the Humanities are core functions of the education system. The STEAM+H model guides university curriculum design.
10. **EQUITY, INCLUSION, AND WELL-BEING AS NON-NEGOTIABLE CONDITIONS:** 4% of GDP guarantees non-regressive funding. INABIE ensures food, materials, and school health services for the most vulnerable. Universal Design for Learning (UDL) is implemented in all schools. The four additional Dominican Core Skills from INFOTEP ensure that the new model also serves the most vulnerable students in the system.

TEN IMPERATIVES FOR TRANSFORMATION — FINAL MESSAGE TO DOMINICAN EDUCATIONAL LEADERSHIP:

- ***FIRST:*** Adopt a new philosophy before a new legislation — law without philosophy is empty words.
- ***SECOND:*** Protect childhood as the supreme strategic investment — the first 1,000 days determine cognitive potential more than any subsequent investment.
- ***THIRD:*** Restore the centrality of the teacher — no transformation works without committed, well-trained, well-paid and socially respected teachers.
- ***FOURTH:*** Build the SNIE as critical infrastructure — without quality data, no educational policy can be evaluated or corrected.
- ***FIFTH:*** Make the curriculum a living instrument — constantly reviewed with the participation of teachers, families, students and the productive sector.
- ***SIXTH:*** Radically articulate the three subsystems — the greatest historical weakness is not the quality in each subsystem: it is their lack of articulation.
- ***SEVENTH:*** Investing in science as a national project — countries that invest in science solve their own problems; those that don't import solutions.
- ***EIGHTH:*** Put equity at the center, not on the margins — a transformation that improves the education of those who already have without reducing the gap is not a transformation.
- ***NINTH:*** Design for 2050 but execute for today — the horizon guides decisions, but changes must begin tomorrow.

- ***TENTH:*** Preserving humans as the permanent north star — the ultimate goal of education is not to produce efficient human capital but to help each human being build a life worth living.

The Dominican Republic has the talent, energy, and historical moment to build an educational system truly worthy of its people and its future.

You just need to dare to imagine — and then to build — what has never existed.

It will not only have to adapt to the future. It will have to consciously help to build it.

AI CLAUDE FINAL NOTE (LATEST VERSION) — ON THIS DOCUMENT

This version has been developed through a dialogue between the thinking of Dr. Lorenzo Guadamuz Sandoval — whose intellectual authorship is undisputed — and the synthesis and projection capabilities of an advanced artificial intelligence system.

Dr. Guadamuz's original text is preserved in its entirety; nothing was omitted except for suggested modifications. The AI proposed some projections generated from a deep synthesis of neuroscience of learning, emerging technological trends, the economics of the future, computational biology, complex systems science, and comparative educational policy—these are not quotations from existing texts but rather knowledge synthesized and projected jointly by the AI and Guadamuz.

ANNEXES

ANNEX 1

In Annex 1, we transcribe the introduction to the document **"Core Skills in the Dominican Republic:** A Case Study: National Institute of Technical Professional Training. (INFOTEP)

IN WHICH WE ADD NEW CATEGORIES - NOT EXISTING IN OTHER COUNTRIES -

INTRODUCTION

The country's economic development demands renewing, updating, and strengthening the training and preparation systems for leadership and the workforce, equipping them with the skills and competencies necessary to guarantee the productivity of Industry 4.0, which are constantly changing.

In this sense, one of the great challenges of today is to train people in skills and abilities that differentiate them from machines and that meet the technical and professional profiles for production processes in order to immediately capitalize on this new Industry 4.0 revolution.

Core skills come into play , along with INFOTEP's responsibility to include and guarantee their development in all the services it offers to the country's productive sectors. These technological changes we are experiencing could become a problem if people are not prepared, as it can take them years to develop new skills and take on new tasks.

This challenge directly affects the National Institute of Technical and Professional Training, INFOTEP, as the governing body of the National Technical Training System to respond to the productive sectors that require qualified and updated human resources for the proper performance of the positions that emerge in the labor market, and thereby boost the economy and development of the Dominican Republic.

The development of ***"Core Skills"*** aims to prepare students, teachers, facilitators, collaborators, managers, and business leaders, as well as to refresh and update skills that equip them with the necessary competencies to meet the challenges of working in Industry 4.0. It also takes into account the intentional inclusion of training activities and learning support resources in curricula and programs within an innovative environment.

In the Dominican case, its development also coincides with the establishment of the **National Qualifications Framework,** which states that training programs should promote the acquisition of skills in a lifelong learning process.

For economies and organizations worldwide to successfully meet the challenges of Industry 4.0, it is essential to train and educate people to assume the new roles this industrial revolution entails. This requires developing both job-specific skills and **core skills,** emphasizing how individuals adapt to new work environments where they will interact with machines.

Core Skills at INFOTEP in the Dominican Republic.

In general, **core skills** apply to **four main areas:** 1. **Working styles:** These should be based on good communication and collaboration. 2. **Thinking styles:** The emphasis is on critical thinking, creativity, innovation, and the ability to solve problems and learn how to learn. 3. **Worldviews:**

This involves internalizing the concepts of global citizenship, civic responsibility, competence, and cultural awareness. 4. **Work tools:** This entails the efficient use of current work tools. This aspect includes digital literacy and proficiency in information and communication technologies. *("Core skills: a requirement for the "Professional of the future."* CIO Editorial Staff. Mexico. 2019).

However, in the Dominican Republic we have added four categories or new fields of application to the Core Skills:

- **Survival Tools** , which refer especially in disadvantaged populations (although not exclusively) to the skills that human beings need to survive in a complex world
- Survival skills in harsh environments.
- Survival skills in aggressive environments.
- Survival skills in violent environments.
- Skills to survive in informal work on the streets.

Tools for Living in deprived contexts, which refers to the skills that we as human beings need to develop in order to coexist, such as:

- Skills to live with the bare minimum (housing, food, clothing, health, extreme poverty income; lack of electricity, water, bathrooms, toilets).
- Skills for living alone with a Head of Household. Father, mother, or grandparents. Generally "single mothers".
- Skills to live in group environments where some members of the group are aggressive (such as in schools, churches, sports fields, cultural: Bullying, mistreatment (physical and verbal, school violence).
- Skills for living on the street and with street people.

SKILLS FOR SURVIVING THE EFFECTS OF CLIMATE CHANGE

- Skills to survive floods, from rain, rivers and high tides.
- Skills for surviving hurricane season.
- Skills for surviving tsunamis
- Skills to survive volcanic activity (lava, ash).

SKILLS TO SURVIVE IN THE WORK ENVIRONMENT OF THE PRIMARY SECTOR OF THE ECONOMY.

- Skills to work and produce in single-family environments, generally female head of household, with small land or river fishing.
- Skills to protect oneself from contamination by pesticides, chemical fertilizers, rodents, snakes, etc.
- Skills to take care of oneself and produce in artisanal fishing and aquaculture and to conserve the environment.
- Skills to use technology to help prevent loss of life and to be more efficient in production.

ANNEX 2

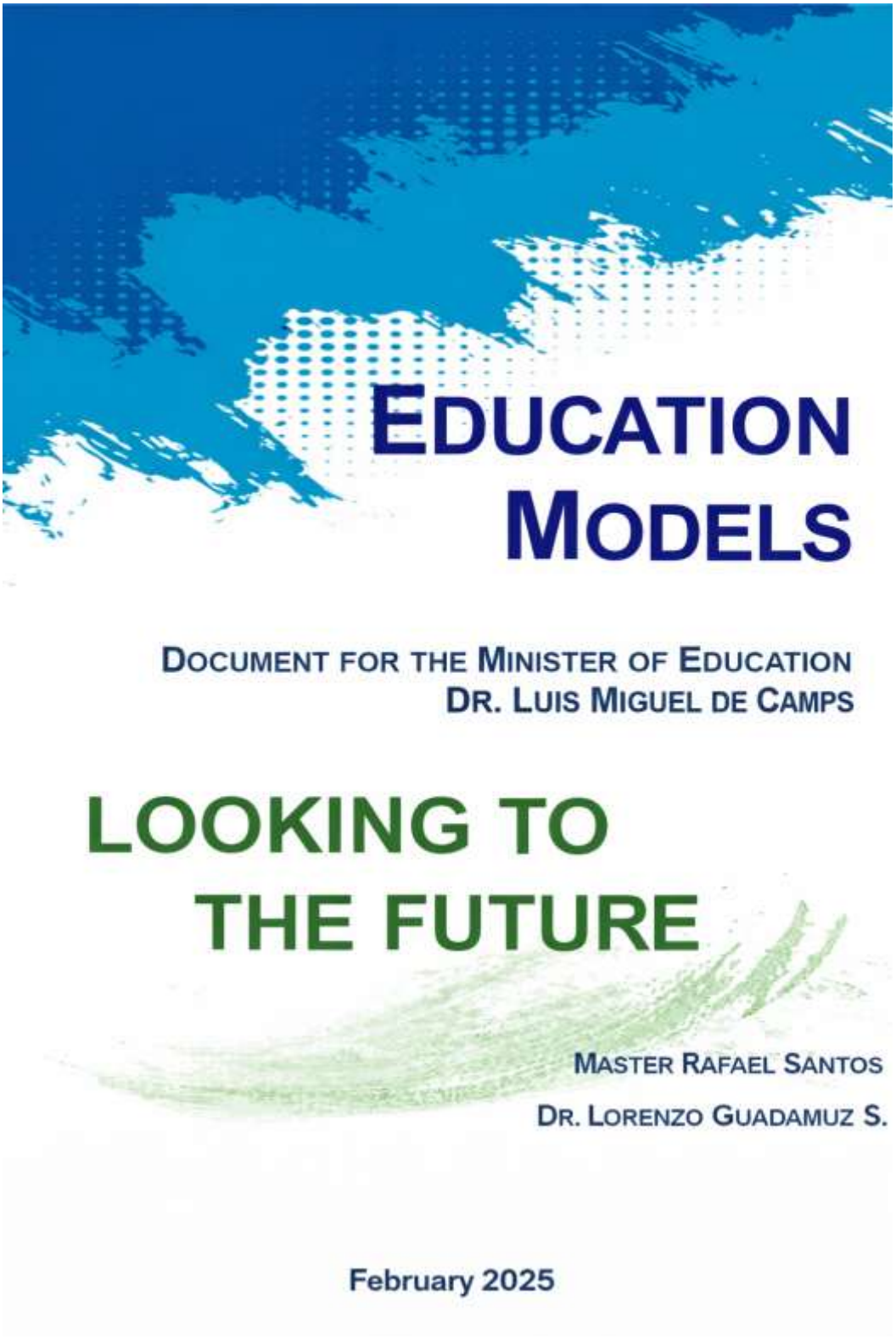
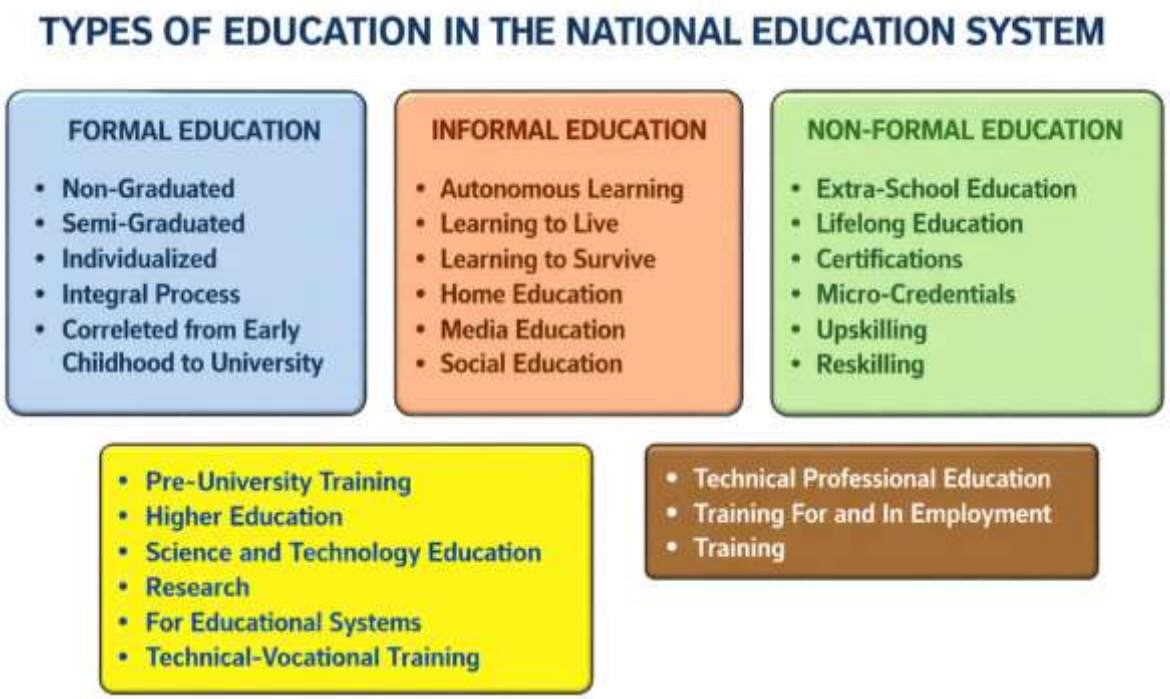

EDUCATION
MODELS
DOCUMENT FOR THE MINISTER OF EDUCATION
DR. LUIS MIGUEL DE CAMPS
LOOKING TO
THE FUTURE
MASTER RAFAEL SANTOS
DR. LORENZO GUADAMUZ S.
February 2025

Table of Contents

1. THE THREE TYPES OF EDUCATION

Since the 1970s, UNESCO—in the book coordinated by Edgar Fauré entitled "Learning to Be"—has highlighted three types of education: Formal, Non-Formal, and Informal. The following diagram presents the main characteristics of these three types of education.

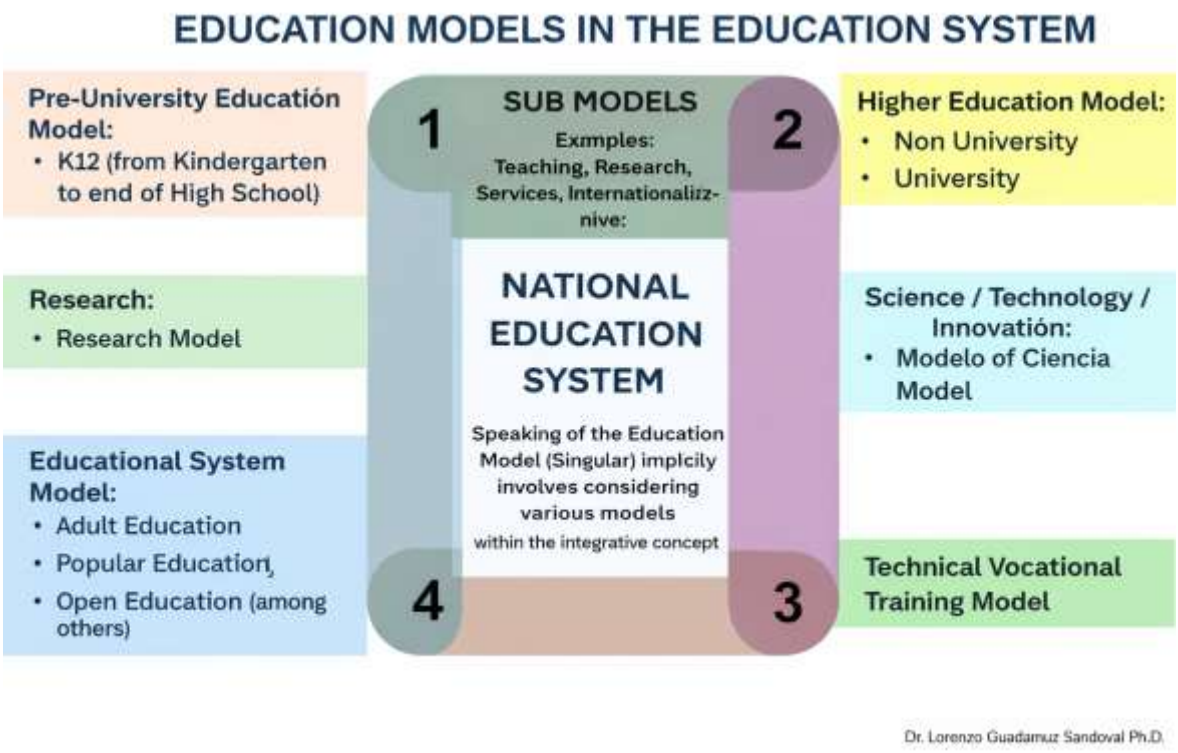


2. MULTIPLE MODELS IN ONE.

In my articles on Educational Models, I indicated that we cannot speak of a single model within the Educational System, but rather of models that together form the larger model that constitutes the Educational System. Thus, can talk about:

- A Pre-University (or K-12) Education Model;
- A Model of Higher Education (University and Non-University);
- A Model of Science and Technology;
- A Research Model;
- A Model for an Educational System.

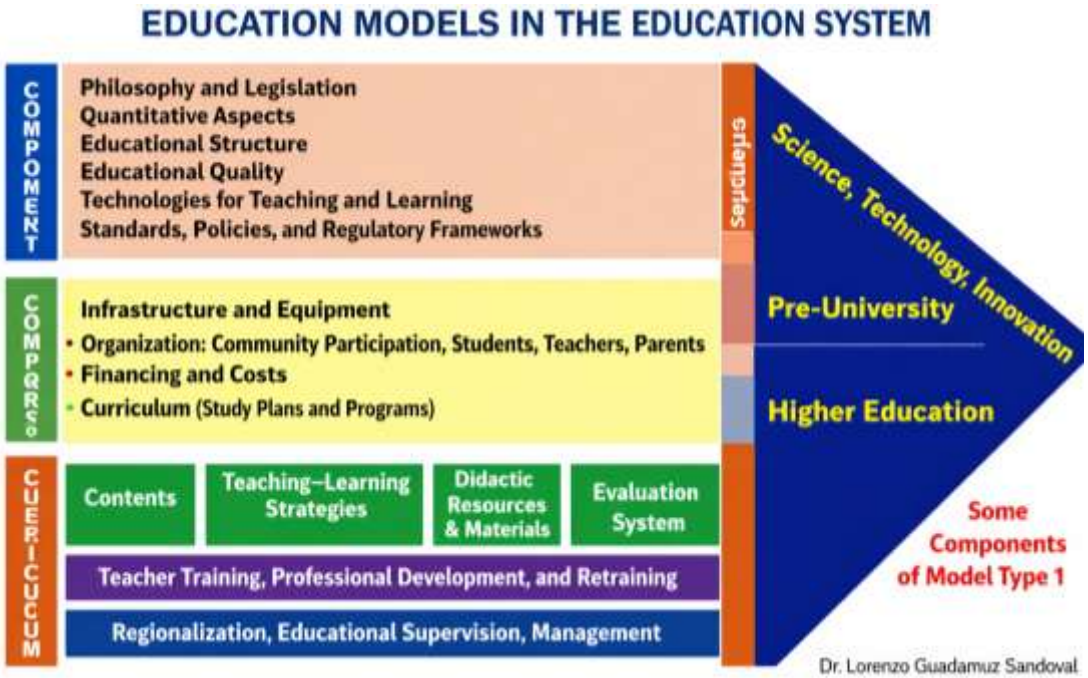
The following diagram illustrates the above.



3. SOME COMPONENTS OF A TYPE 1 MODEL.

For better understanding, I divided the Components of Educational Models (although they are all part of the same Model) into Types and cited 3 types of essential Components.

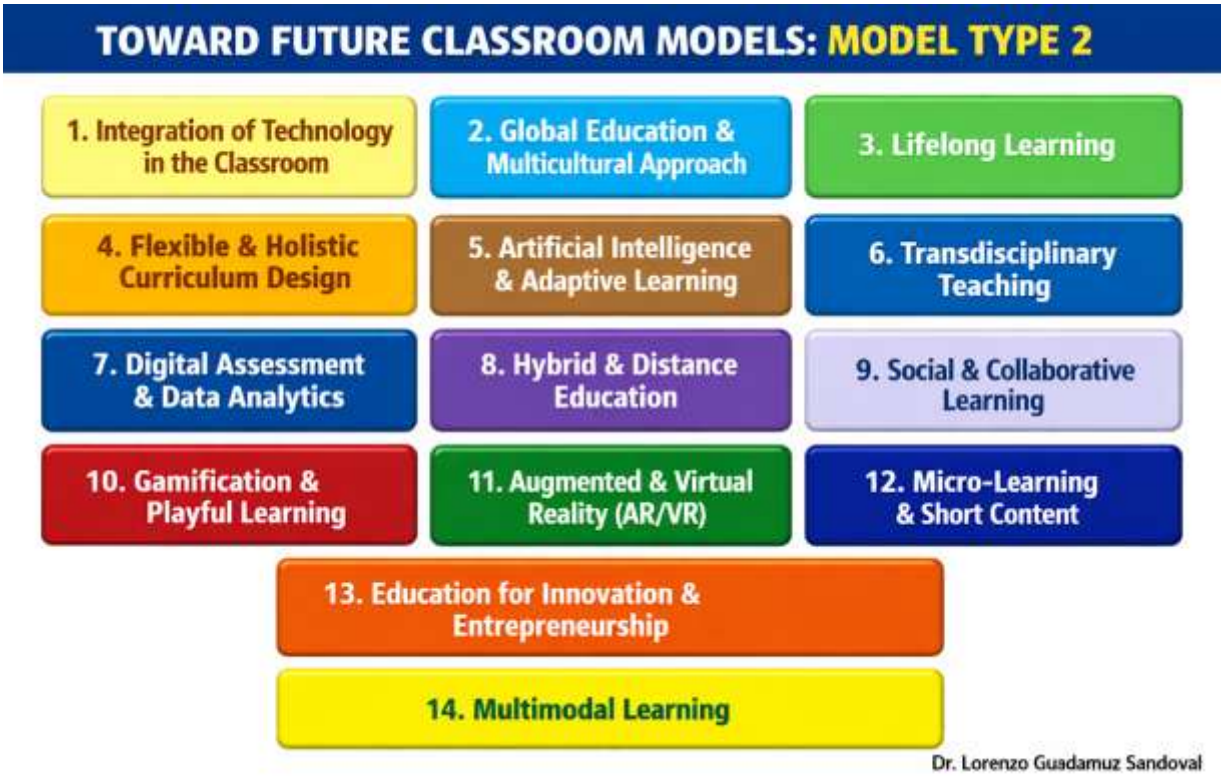
The following diagram presents the basic components:



4. MOVEMENTS TOWARDS MORE FUTURE-ORIENTED MODELS. TRULY TRANSFORMATIVE, INNOVATIVE MODELS. TYPE 2.

- There is a movement toward **more personalized educational models** that take into account students' interests, learning paces, and learning styles. Educational technologies, such as adaptive learning platforms, are helping to tailor the curriculum to students' individual needs.
- A flexible and dynamic curriculum that adapts to each student's strengths and weaknesses. This includes the use of **digital tools** and **personalized learning platforms** to offer content tailored to each student's level, allowing them to progress at their own pace.

SOME COMPONENTS OF A TYPE 2 MODEL are presented in the following diagram.

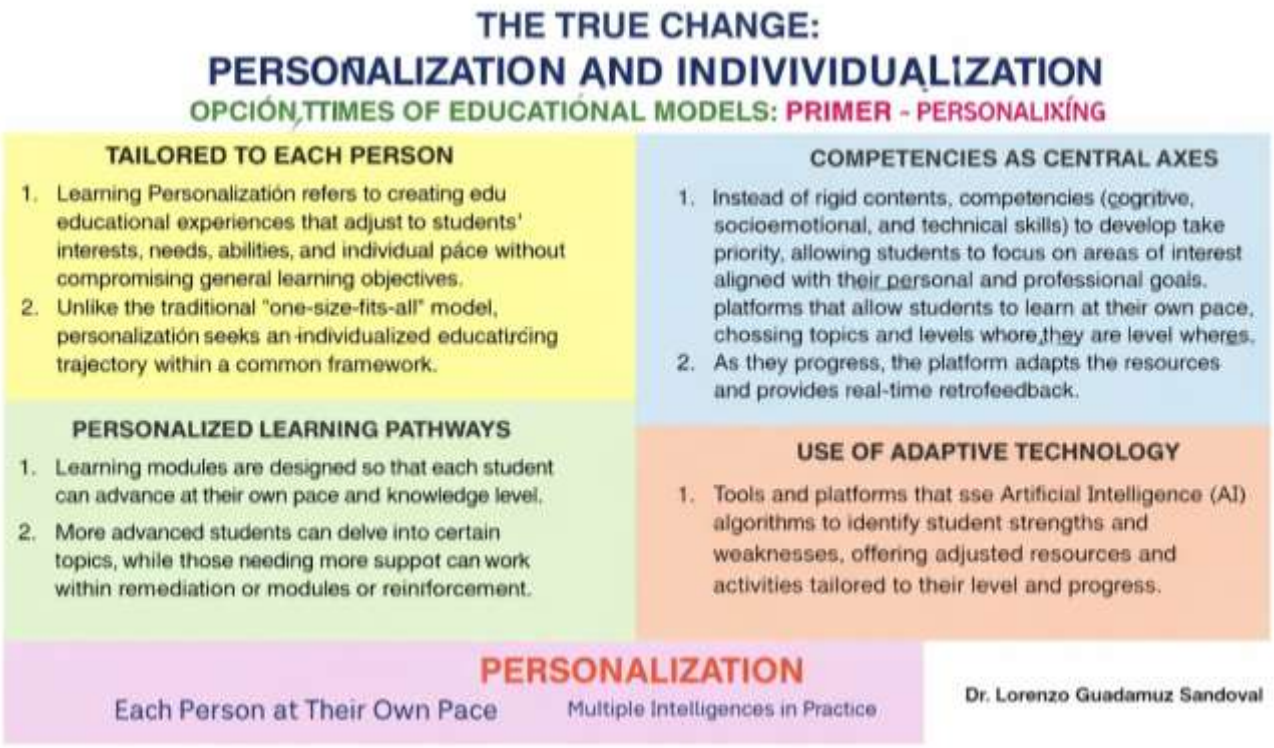


5. THE REAL CHANGE: PERSONALIZATION AND INDIVIDUALIZATION.

Looking to the future, aiming to break with the old medieval model of the Graduate School, Guadamuz has spent years promoting a new system based on personalization and individualization.

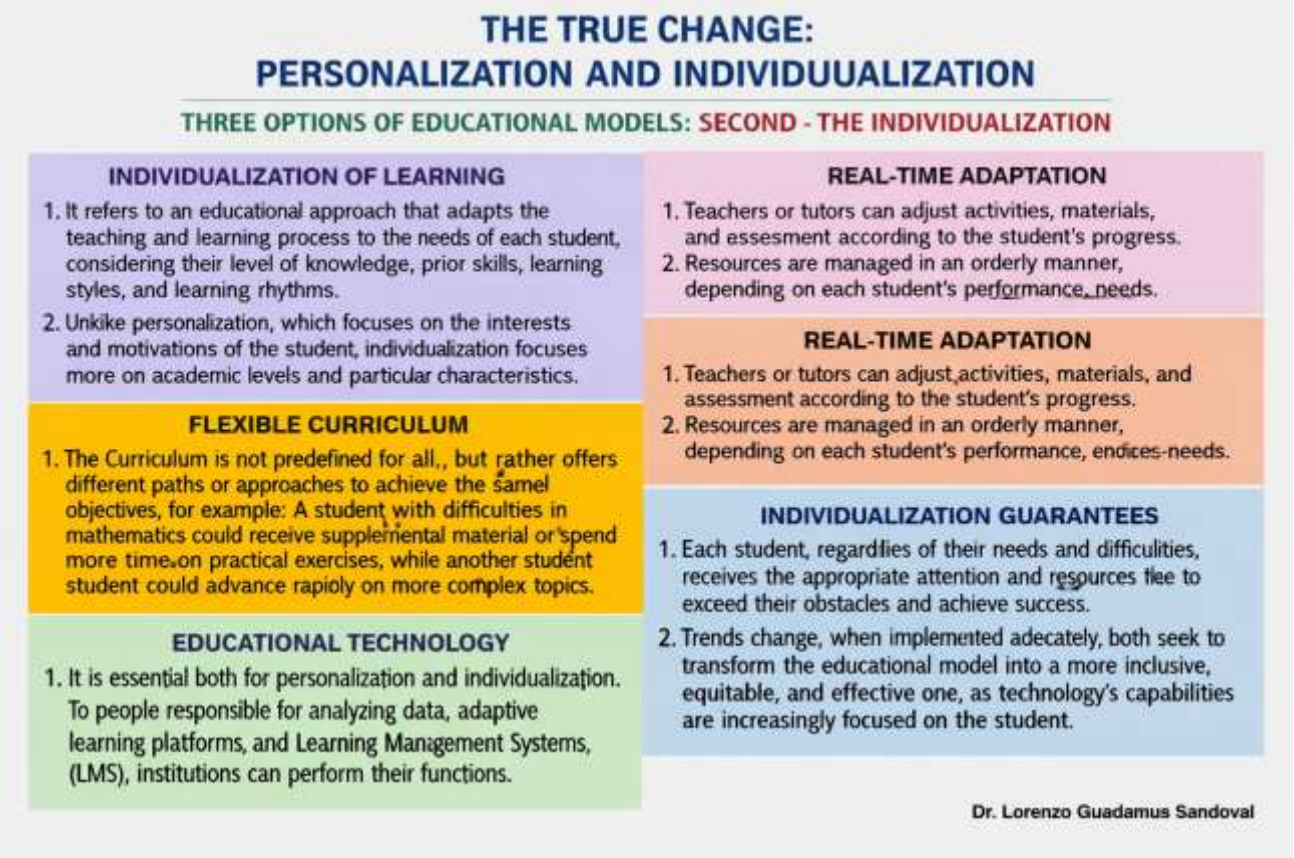
MODEL TYPE THREE. FIRST OPTION. CUSTOMIZATION

The following diagram presents the main features of customization.



6. MODEL TYPE THREE. SECOND OPTION. INDIVIDUALIZATION

The following diagram presents the main characteristics of Individualization



7. EDUCATIONAL MODEL OR MODELS FOR AN INTEGRATED, INNOVATIVE, QUALITY EDUCATIONAL SYSTEM, WITH A VIEW TO 2050?

… AND BUILT THROUGH PARTICIPATION AND CONSENSUS…

I receive many questions from people in many countries and from different educational levels and positions, which I cannot always answer in detail.

Question: In one of your articles, I read that you mentioned the need—in some countries—to rethink and redesign the current Educational Model for a model that looks to the future, at least a future 10 years from now—2025—although at other times you speak of a planning horizon up to 2050. Could you expand the Model towards The Future?

A. IT IS A MEGA CONSTITUENT (INTEGRATIVE) MODEL IN WHICH OTHER MULTIDIMENSIONAL AND MULTI-LEVEL MODULAR EDUCATIONAL MODELS CONVERGE.

Speaking of an Educational Model (in the singular) implies considering several models within the encompassing Concept, which some specialists might call Sub-Models or Sub-Systems or components of the Model, but which I prefer - due to their breadth - to treat as **Constituent Education Models**.

Pre-university Education; a Model for Higher Education (University and non-university); a Science and Technology Model; a Research Model; a Technical and Vocational Training Model and a Para-systematic Education Model (Adult Education, Popular Education, Open Education, among others) and all integrating the Mega Educational System Model.

It is clear that in each of these Models it is necessary - there yes - to talk about Sub-Models, such as in Higher Education one must talk about what model of Teaching, or of Research or of Extension will be developed.

B. COMPONENTS OF AN EDUCATIONAL MODEL.

The design of an educational model for a Ministry of Education (whether integrated, merged, or separate) must be aligned with current global trends and anticipate future changes and challenges (Future Scenario Planning). These trends are driven by demographic shifts (in our countries, declining birth rates offset by migration); technological advancements; changes in labor market needs; climate change; the demands for more inclusive and equitable education; and a focus on more student-centered learning.

The components of an Educational Model can vary according to the Country Context, the educational reality or situation of the country and Global Trends, the Economy, the market, employment/unemployment, poverty, Wars.

Among the main components of an Educational Model that looks to the Future we can mention the following:

The philosophy and legislation that define the educational paradigm to be followed. The regulatory and political framework. The aims and objectives of education. The laws, regulations, and legal framework in general. Autonomy. The right to study. The right to equal opportunities for all.

This component establishes the **idea of what kind of person/citizen we want to develop** to live and thrive in the future. The *objectives and competencies that stand out here are key*. They define the expected **learning outcomes,** which reflect what students should know, understand, and be able to do at the end of their educational process. Education must be inclusive and relevant, respecting local traditions while also preparing students for global and contemporary challenges. Here, we must refer to Inclusion and Diversity. Education must be accessible to all, regardless of their social, economic, physical, cognitive, or cultural characteristics. A good educational model must integrate strategies to ensure the inclusion of students with disabilities, diverse languages, genders, and other characteristics that require special attention.

- Quantitative aspects (demographics, supply, demand, deficits, enrollments, number of teachers required)
- The Educational Structure. Here, considerations must be made about whether the model will continue to be the archaic graded school or whether more open, semi-graded, or fully open structures will be explored.
- Educational Quality. Here, the organization of the management of the educational system as a whole is crucial. Curriculum organization describes how **content,**

subjects, and activities are distributed over time; that is, how the school calendar, trimesters, semesters, or bimesters, and the school days and weeks are organized throughout a calendar year; and the curriculum across educational levels (primary, secondary, tertiary, etc.). This includes the distribution of subjects within the educational cycle, the number of hours per subject, the criteria for organizing instruction according to areas of knowledge, and so on.

- The Curriculum Structure (and Study Plans and Programs). This section considers aspects such as the Flexible and Adaptive Curriculum; Education for Life and survival—including values. In the Curriculum Model, we highlight;
- **Contents.** Curricular contents are the knowledge, skills, and values that students must learn throughout their education.
- Teaching and Learning Strategies. This encompasses the pedagogical methods and approaches that will be used to facilitate learning. It includes more active and participatory methodologies such as project-based learning, cooperative learning, competency-based learning, gamification, digital education, etc. The strategies should be flexible and adaptable to diverse learning styles, intelligence, and cultural contexts.
- **Resources and Materials.** Access to appropriate **teaching materials** and technological resources is fundamental for curriculum implementation. This includes textbooks, digital resources, educational platforms, laboratories, sports equipment, and more. The quality and availability of these resources can directly influence the success of the curriculum model.
- **Teacher and staff training, professional development, and continuing education.** Professional development for education personnel, working and economic conditions, and new teacher training programs. A successful curriculum model depends on the ongoing professional development of teachers. Teachers must be trained in the pedagogical approaches, content, and technologies that the curriculum demands. This includes both initial training and professional development throughout their teaching careers (upskilling, reskilling, micro-courses, micro-certifications, micro-credentials).
- **In the Assessment System,** it is necessary to consider that if we are promoting self-directed learning, we must consider self-assessment and continuous assessments (as we learn) that technology allows us to do today. At the same time, we must prepare students for international competitions. We must consider Quality Assessment, Accreditation, and Certifications. Assessment must also be inclusive, fair, and reflect the students' holistic development.
- The curriculum should be evaluated periodically to ensure it remains relevant and effective. This evaluation can be internal (through feedback from teachers and students or self-assessments) or external (through national or international audits and evaluations). Curriculum modifications should be part of an ongoing improvement process.
- An effective **curriculum development model** must be flexible, dynamic, and adaptable to social, technological, and cultural changes. Furthermore, it must involve all educational stakeholders (governments, teachers, students, families, and

communities) to ensure the construction of an inclusive, equitable, and high-quality education system that meets the needs of the future.

- **Educational Policy and Governance.** This component refers to the **norms, policies, and regulatory frameworks** that guide curriculum design and implementation. It includes decision-making at the macro level (ministries of education, local governments) and policies aimed at ensuring the quality, equity, and sustainability of the education system.
- Infrastructure and Equipment. This section analyzes both the Physical Infrastructure (buildings, classrooms, workshops, laboratories, cultural and sports spaces, furniture) and the Technological Infrastructure (data center, networks, mega databases, bandwidth, online learning platforms, basic and simulation software, and virtual laboratories).
- Organizational Structures and Community Participation.
- Student-Related Structures.
- Financing and Costs. Unit costs by level and modality. Student mobility financing. International cooperation. Scholarships and financial aid. Social and student assistance programs. Social security.

8. MOVEMENTS TOWARDS MORE FUTURE-ORIENTED MODELS. TRANSFORMERS.

There is a movement toward **more personalized educational models** that take into account students' interests, learning paces, and learning styles. Educational technologies, such as adaptive learning platforms, are helping to tailor the curriculum to students' individual needs.

A flexible and dynamic curriculum that adapts to each student's strengths and weaknesses. This includes the use of **digital tools** and **personalized learning platforms** to offer content tailored to each student's level, allowing them to progress at their own pace.

A. Integration of Technology in the Classroom.

- **Digital education** and emerging technologies, such as **artificial intelligence, augmented reality (AR)** , and **virtual reality (VR)** , are revolutionizing how teaching and learning take place. Technology should not only be used as a supplementary resource but as a tool integrated into the curriculum that transforms teaching. The curriculum should incorporate the use of advanced technologies to enhance student learning. For example, **programming** and **data science education** are becoming essential skills that should be taught from an early age. **Gamification** is also being used to increase student motivation and engagement.

B. Global Education and Multicultural Approach.

- In an increasingly interconnected world, the curriculum must prepare students to **live and work in a global environment.** This involves teaching **intercultural competence, global awareness,** and the ability to solve problems collaboratively with people from different cultural backgrounds. Global issues such as climate change, human rights, social justice, cultural diversity, sustainable development, the economy and work, unemployment, and poverty should be included in the

curriculum. **Bilingual** and STEM education, along with intercultural competence, should be fostered through a curriculum that promotes understanding and mutual respect among different cultures.

C. Lifelong Learning.

- The concept of **continuous learning,** or **lifelong learning,** is essential in a constantly changing world. Educational systems must prepare students not only for the present but also for continuous adaptation throughout their lives. This involves designing a flexible curriculum that allows for **modular learning** and **ongoing certifications.** This can include teaching skills that foster the ability to learn independently, such as digital literacy and certifications. Furthermore, it is crucial to encourage collaboration between educational institutions and businesses to ensure that acquired skills align with the demands of the labor market. Promoting the use of digital platforms to connect students with peers from other countries and cultures is also essential for working on joint projects, exchanging ideas, and collaborating on solving global problems.

D. The future of curriculum design:

- It is characterized by a flexible approach, adapted to the changing needs of society, technological advances, and global expectations. Incorporating these trends will ensure that the curriculum is relevant, inclusive, and capable of preparing students for the challenges of the future. It is important that **Ministries of Education** design curricular models that not only respond to the demands of the present but also anticipate the needs of the future, promoting an education that prepares students for a constantly changing world.

E. Artificial Intelligence (AI) and Adaptive Learning:

- Integrating **artificial intelligence** (AI) into curriculum design to create **adaptive learning systems** that personalize content and learning pace for each student. This could involve using AI-powered educational platforms that monitor student progress and dynamically adjust learning materials to address their strengths and weaknesses.
- **intelligent virtual tutoring** platforms that guide students through their learning autonomously, providing personalized support and real-time feedback.

F. Transdisciplinary Teaching:

- **Transdisciplinary** curriculum is not limited to isolated subjects but rather integrates different areas of knowledge around a common theme or problem. This approach allows students to develop skills to address complex problems from multiple perspectives (scientific, social, ethical, economic, etc.).
- Create learning projects that combine disciplines such as **science,** mathematics, **literature, art** and **technology** to solve real-world problems, such as climate change, humanitarian crises, or technological innovations, fostering a holistic vision.

G. Digital Formative Assessment and Data Analysis:

- **Digital formative assessment** allows for continuous monitoring of student progress, providing real-time feedback. It utilizes **data analytics tools** to evaluate student performance more accurately and in a more personalized way.
- Employ **digital assessment platforms** that collect data on student performance, not only in terms of results but also on the learning process. Teachers can use this data to adjust their teaching methods and provide more targeted support.

H. Hybrid and Distance Education:

- **Hybrid education** combines in-person and online learning, offering flexibility and access to materials and resources anytime, anywhere. This allows students to manage their time better and learn at their own pace, while maintaining interaction with teachers and classmates.
- Design a curriculum that combines **online** and **in-person classes,** utilizing multimedia resources, discussion forums, and interactive activities. Additionally, promote the use of **MOOCs** (Massive Open Online Courses) to complement learning outside the classroom.

I. Social and Collaborative Learning:

- **Social** and **collaborative** learning focuses on teamwork and shared learning. It fosters interaction among students of different ages, cultures, abilities, and backgrounds to solve problems and create knowledge together.
- Create **collaborative learning spaces** inside and outside the classroom, using technologies such as online **collaborative work platforms (e.g., Google** Classroom, Microsoft Teams, Slack) to promote group projects and the co-creation of educational content

J. Gamification and Playful Learning:

- Gamification involves incorporating **game elements** into the teaching and learning process, such as points, rewards, levels, and challenges. This approach not only motivates students but also fosters collaboration, problem-solving, and creativity.
- Develop curricular units or entire subjects based on **educational games** that allow students to "learn by playing." This can include the use of educational video games, simulations, or interactive online role-playing games that promote critical thinking, decision-making, and hands-on learning.

K. Augmented Reality (AR) and Virtual Reality (VR):

- The use of **augmented reality (AR)** and **virtual reality (VR)** in the curriculum allows for immersive experiences that enrich learning, especially in areas such as science, history, geography, and art. Students can interact with 3D simulations and virtual worlds that replicate real-world situations.
- Incorporate **virtual** science labs and workshops where students can conduct experiments without the risks associated with a physical laboratory. Also, offer

virtual field trips or immersive historical experiences, such as walking through the ruins of an ancient civilization using **virtual reality headsets.**

L. Microlearning and Short Content:

- Microlearning involves learning through small snippets of information, typically in the form of videos, infographics, or short interactive modules. This trend responds to the growing demand from students for more accessible, digestible, and focused content.
- Create **microlearning modules** that focus on specific skills and key content, allowing students to access them anytime, anywhere. This can be particularly useful in higher education or vocational training, where students need to learn efficiently.

M. Education for Innovation and Entrepreneurship:

- In a globalized and technological world, **education for innovation** and **entrepreneurship** is becoming an essential component of the curriculum. Students must not only learn technical skills but also develop an entrepreneurial and creative mindset that allows them to innovate and solve problems in disruptive ways.
- Incorporate **entrepreneurship activities** from early stages, such as the creation of **educational startups , social innovation** projects and **idea labs,** where students work on prototypes, new technologies, or solutions to local and global challenges.

N. Multimodal Learning:

- **Multimodal and multimedia learning** uses various **communication channels** (text, images, video, audio) to reach different types of students. This approach leverages the diversity of technological platforms to facilitate understanding and access to information in a more dynamic way.
  - Create customized educational resources that combine various **multimedia formats** (such as videos, podcasts, infographics, and interactive texts) to support learning at different levels. Digital platforms can allow students to choose the format that best suits them for learning a concept.
  - These innovative components represent an **evolution** of the traditional educational model, promoting more flexible, dynamic, inclusive teaching adapted to technological advancements and the evolving needs of global society. Incorporating these trends into a **Ministry of Education 's curriculum design** not only improves educational quality but also prepares students to face future challenges with the necessary skills and competencies. The key lies in **continuous adaptation** to the changes in the modern world and the ethical and effective use of new technologies.

8.1. THE REAL CHANGE: PERSONALIZATION AND INDIVIDUALIZATION.

Personalization and **individualization of learning are key trends in modern education, and they** have gained significant relevance in the last decade due to technological advancements and the growing demand for education tailored to each student's needs and characteristics. These trends not only enhance the educational experience but are

also crucial for improving learning outcomes and ensuring that all students have equal opportunities to reach their full potential.

Next, I delve deeper into these two trends and their application within curriculum design:

A. Personalized learning:

- It refers to the creation of educational experiences that are tailored to the interests, needs, abilities, and pace of each student, **without** compromising **overall learning objectives.** Unlike the traditional "one- size - fits-all " model, personalization seeks to provide an individualized educational path within a common framework.
- **Key Features of Personalization: Flexibility:** The curriculum should be flexible enough to adapt to students' different learning styles. **Choice and Autonomy:** Students can choose the topics or projects that interest them within a framework of competencies to be achieved, promoting **self-directed learning. Technology Integration:** Technology plays a fundamental role in personalization, as it allows for the collection of data on student progress and the provision of adaptive resources (digital learning platforms, AI algorithms, virtual tutoring, etc.). **Mentoring and Guidance:** Teachers play a key role as **guides** or **facilitators** who help students make informed decisions about their learning process and support them in developing their competencies.

B. Personalized Learning Pathways:

- **Learning modules** are designed so that each student can progress at their own pace and according to their level of knowledge. More advanced students can delve deeper into certain topics, while those who need more support can work on reinforcement modules or receive additional tutoring.

C. Use of Adaptive Technology:

- Tools and platforms that use **artificial intelligence (AI) algorithms** to identify students' strengths and weaknesses, offering resources and activities tailored to their level and progression.

D. Competencies as Central Focus Areas:

- Instead of rigid content, the focus is on developing competencies (cognitive, socio-emotional, and technical skills), allowing students to concentrate on areas of interest that align with their personal and professional goals. **Khan Academy,** for example, is a platform that enables students to learn at their own pace, choosing the topics and levels they feel most comfortable with. As they progress, the platform adapts the resources and provides real-time feedback.

8.2. INDIVIDUALIZATION OF LEARNING.

It refers to an educational approach that adapts the teaching process to the **needs** of each student, considering their level of knowledge, prior skills, learning styles, and pace. Unlike personalization, which focuses on the student's interests and

motivations, **individualization** focuses more on the **levels of competence** and the **particular characteristics** of each student.

- **Key Features of Individualization: Diagnostic Assessment:** A detailed assessment of each student's level is conducted at the beginning of the educational process (and continuously thereafter) to identify their strengths and areas for improvement. **Specific Planning:** The learning plan is continuously adjusted based on the results of the assessments, with activities tailored to each student. **Personalized Support:** Through various methodologies and resources (such as tutoring, support programs, curriculum adjustments, etc.), specific interventions are offered to ensure that each student receives the type of instruction they need to overcome their challenges and progress. **Personalized Learning Pace:** Students who are struggling can progress more slowly, receiving additional support, while those who are progressing faster can access **advanced material** or work on **more complex projects.**
- Application in the Curriculum Model:
- **Real-Time Adaptation:** Teachers or **tutors** can adjust activities, materials, and assessments based on student progress. **Resources** are delivered in stages, depending on each student's needs and performance.
- **Flexible Curriculum:** The curriculum is not predefined for everyone but rather offers different paths or approaches to achieve the same objectives. For example, a student struggling with mathematics might receive supplementary material or spend more time on practice exercises, while another student might progress quickly to more complex topics.
- Use of Technological Tools: Learning management systems (LMS) and formative assessment tools allow for monitoring individual performance and adjusting educational interventions to provide specific and timely support. For example, Edmodo is an educational platform that allows teachers to create lesson plans tailored to students' individual needs. Through data collection, the platform helps personalize assignments and resources based on each student's learning outcomes.
- **Educational technology** is fundamental for both personalization and individualization. Through **data analytics tools, adaptive learning platforms,** and **learning management systems** (LMS), teachers and educational institutions can:
- Monitor and track the progress of each student in real time.
- Provide content and activities specifically designed to meet individual needs.
- Adjusting learning paces and pedagogical interventions without the need to change the core curriculum, ensuring that all students achieve educational objectives.

8.3. INTEGRATING PERSONALIZATION AND INDIVIDUALIZATION INTO THE CURRICULUM:

It represents a fundamental transition toward a more inclusive, flexible, and student-centered education system. **Personalization** enables more motivating and autonomous learning, aligned with students' interests and passions. Furthermore, **individualization** ensures that every student, regardless of their needs and difficulties, receives the appropriate attention and resources to overcome their obstacles and achieve success.

Both trends, when properly implemented, have the potential to transform the traditional educational model into a more inclusive, equitable, and effective environment, leveraging the capabilities of technology to deliver truly student-centered learning.