THIS IS IT: AI WILL CHANGE UNIVERSITY FOR GOOD

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Abstract

Higher education has long been living with the promise, or the threat, that (micro)computing, the internet, or now artificial intelligence, will change everything–whether to reinforce it, turn it upside down, or leave it by the wayside. If we are to learn from the past "to avoid repeating it," the lesson is clear: once again, technology will not deliver what it promises, especially not to this millenium-old institution, which is much older and more stable than the rest of the educational system. But there is something new: each new technological ecosystem that has penetrated education since the advent of writing, including the printing press, has done so by multiplying access to information and the reach of communication, but always at the cost of more uniformity, rigidity, and one-sidedness. The paradigmatic example in this realm is the fiasco of mass media (film, radio, television...), but also, earlier, the enduring textbook and, later, the ephemeral computer-assisted learning. However, the fifth transformation of information and communication, the digital one, in which we are already immersed, brings two more things: the increasingly developed capacity for personalization and the emerging capacity, just beginning with generative AI, for interaction. In an institution that, unlike earlier educational stages, is free from the custodial function, this can and should bring substantial changes in the processes and relationships of learning and teaching, as well as in its organizational and even material architecture.

Since the initial enthusiasm about the abundance of Open Educational Resources (OER), including the hybrid teaching developed during the pandemic, the MOOCs (Massive Open Online Courses) or edupunk (a "do it yourself" recovered or reinvented for education), we have not stopped hearing and repeating that the university would change radically, or even be swept aside by the new forms of teaching and learning driven by the digital transformation. But we have also heard that an institution with almost a millennium of tradition does not need to change in essence, and in fact it has not done so, beyond merely integrating the new models in the offer of proven models, and eventually for improvement, with audiovisual media (audio, film, radio, television) and subsequent generations of information technology. As if that were not enough, now comes Artificial Intelligence (AI), in particular the Generative Artificial Intelligence (GenAI), which questions the usual evaluation mechanisms and the relevance of the knowledge we were used to evaluate, or so many thought when ChatGPT proved capable of passing one academic test after another.

More of the same, over and over again? Yes and no. Unlimited digital resources, ubiquitous and deinstitutionalized learning, courses without limits or prices, smart tutoring for all, hybrid education... Each of these waves of euphoria has been followed by the realization of its limits and its unforeseen consequences: information overload, digital garbage, lurking distractions, the persistence of institutional credentialism, the deflation of MOOCs, the inadequacy and bias of massive and longitudinal data, the awkwardness and boredom of video in the pandemic, and so on. If not more of the same, it is true that we tend to predict the future based on the past. Looking back without anger, we now have more than a century of grandiloquent promises about how each new electronic medium (film, radio, television, video, and, of course, computers) would revolutionize education. However, since Edison announced the replacement of the schoolbook by the motion pictures, one hundred and two classes of students and teachers have gone through school without such a thing happening. Looking a little closer, computer science in particular has been proposing the same thing since the sixties of the last century. Mass media, the broadcasters, failed time and again because, even though their appeal to the (audiovisual) senses and their (mass) scalability were in their favor, it soon became clear that their total one-sidedness, their rigid sequentiality and their strict uniformity were against them. Additionally, the personalization offered first by the *teaching machines,* also a century ago, and then by the *computer-assisted instruction* for the last six decades, never went beyond customizing the timing and branching the itinerary through the same and unique content, with the paradox of being able to lead to discursive boredom to the point of despair. There is every reason to think that we are only facing new iterations of a more than familiar process, something like the *edutech* variant of *Groundhog Day.*

But there are three elements to consider that anticipate something different. The first element is that we are experiencing a transformation of the information ecosystem like no other since the printing press, comparable in scope and depth only to the advent of the printing press or, before that, to the advent of writing or language. In a technical sense, the printing press simply massified literacy, but over time this gave way to a cascade of reforms and religious wars, nation states, the progressive formation of the public sphere and public opinion, mass schooling, the press as the fourth power. The digital transformation is already bringing about broader, faster, and deeper changes whose scope we have yet to grasp. The second is that, in a kind of confirmation of what Engels called *the first law of dialectics,* the transition *from quantity to quality,* changes that are apparently only affecting scale and speed end up transforming processes and structures –the availability of digital resources, for example, begins by facilitating access to formerly limited resources, the same function that the lesson, the textbook, the maps or the typical multicopied readings had before, and ends up rendering this function partly superfluous and calling for a new, essential and difficult task of curation. The third is that specifically Gen AI, the subject of this paper, gives learning resources a quality that was previously exclusive to the teacher: the ability to adapt and interact, something that no previous technology, strictly speaking, offered *per se.*

I. MOOCS: A TSUNAMI, MUCH ADO ABOUT NOTHING

In the year 2000, at the turn of the millennium, having overcome the Y2K scare, which did not materialize, and having just finished a semester as a visiting lecturer at the London School of Economics, I was approached by its director, Anthony Giddens, with a proposal to contribute some of my own material to Fathom, an online learning portal created on the initiative of Columbia University and already joined by the LSE and Cambridge (later Chicago, Michigan and the RAND corporation), the British and New York libraries and the Smithsonian Museum (shortly after followed by the British Natural History Museum, the British Museum of Science, the Victoria and Albert Museum, the Woods Hole Oceanographic Institution and the American Film Institute). Fathom intended to offer not only online courses, as open and distance universities did and, to a lesser extent, in-person universities and business schools were already doing, but rather all kinds of official or open educational and multimedia resources for the academic community, hence the collaboration between universities, libraries, and museums. The future was already there, and it was hard to imagine a more powerful consortium, so without giving it a second thought, I joined enthusiastically with some written work, an interview, and made myself available to participate in any other way. However, Fathom did not do much more than that, it lasted barely two years, and very few people remember or even know of its ephemeral existence.

At the end of the first decade of the century, however, more ambitious proposals began to emerge. On the one hand, there were the formulas that suggested leaving the university institutions behind in favor of self-organizing one's own education, leveraging the abundance of online resources available and the possibility of liaising on internet with kindred spirits and relevant experts. In 2008, Jim Groom took on Blackboard, the first large-scale commercial LMS (learning management system) and coined the term *Edupunk* (Groom, 2008), which was greeted with some enthusiasm (Ebner, 2008; Piscitelli *et al.,* 2012), and which would encourage or make room for somewhat more specific concepts, though never much, such as *heutagogy* (Hase and Kenyon, 2000; Blaschke, 2012) inside and *DIY* education (Kamenetz, 2011) outside, *ubiquitous learning* (Cope and Kalantzis, 2009; Kidd and Chen, 2011) or *invisible learning* (Cobo and Moravec, 2011) galore, etc. On the other hand, there were recursive prophecies about the end of the university as we knew it, to be replaced by totally or essentially online formulas. As early as 1997, business guru Peter Drucker predicted: "Thirty years from now, large university campuses will be relics. Universities will not survive" (Lenzner and Johnson, 1997). Less a guru than an entrepreneur and venture capitalist himself, Peter Thiel launched in 2010 *20 under 20* (20 annual scholarships for people under 20), later renamed the Thiel Fellowships, for young university students, or those about to start, with a business idea and willing to leave the classroom to devote themselves fully to it, which would simply confirm that in the entrepreneurial culture that inhabits the intersection of American universities and the technology sector, a good idea that finds funding may well provoke and justify academic desertion (in various ways, this was or would be the story of Gates, Jobs, Ellison, Dell, Page and Brin, Fanning, Zuckerberg, Musk, Kalanick, Dorsey, Koum and others); while irrelevant against the backdrop of the unstoppable expansion of higher education, they were nonetheless an ostentatious sign of the questioning of their value from the high-tech field and by an active employer and *headhunter,* even though he himself had been a model scholar, LLM from Stanford.

But the university has survived all these calls to flee, just as schools did in the 1970s with the Illichian calls for de-schooling, often applauded but never supported. It is true that the rising costs of college are hardly sustainable, either for the public budget or for private spending. In the first case, the government can always respond by diluting the resources (*i.e.,* increasing the number of places without increasing the endowments at the same rate) or by differentiating the supply (*i.e.,* allowing an increasing stratification of degrees and differentiating the value of the centers), but even if the latter is a general trend, the teaching staff is less elastic downwards than upwards in the face of fluctuations in demand induced by demographic or economic cycles, and the rising costs of supplies and services can hardly be avoided. In the second case, the costs are borne, with determination or resignation, by

families with middle-class aspirations, few children, two sources of income, and a willingness to go into debt if necessary, to the point that there is growing alarm about the rise, or even the bubble (Marr and Hornton, 2009) of student debt in countries with more neoliberal education policies, such as the United States or Chile, where such investment can be individually very profitable. However, given the expansion, it does not seem to be a good idea for everyone, with the corresponding risk of default and, in the rebound, personal ruin, social friction and discrediting of higher education, in addition to increasing inequality. In any case, neither the number of enrollments nor the cost of university education has ever stopped increasing.

More focused on the present and future of large companies, including universities, the late Clay Christensen, the *disruption* guru, predicted in the last decade that between a quarter and half of American colleges (out of an estimated four thousand, of very different nature) would disappear or merge within a decade or a little more (though he always said this in informal contexts such as conferences and interviews, which made it even easier to jump into the headlines) (Hess, 2018; Horn, 2018). Christensen saw it because of online courses, which already had a long tradition, albeit for a minority, but also, more specifically, because of the (then) recent growth of specialized college-level online courses that could be taken in high school (the Advanced Placement courses, a very specific and controversial modality in the United States); the supplemental courses for college students, as well as the already noticeable retail of purely online charter schools (cybercharters, such as Florida Virtual, Pennsylvania Cyber, Aspire, Laureate, and others) and purely or primarily distance universities (such as Western Governors, Southern New Hampshire, Phoenix Online, American Public, Strayer, Grand Canyon, Arizona State, Liberty, etc.). He saw all of them as a perfect, rather than canonical, example of his model of disruptive innovation: a product that starts out as second-rate, for a new audience that cannot afford first-rate, but whose quality gets closer and closer to first-rate until it surpasses it. It should be noted that although MOOCs had their moment of glory during this decade, Christensen does not even mention them in his works on disruption in higher education (Christensen *et al.,* 2011, 2012), as his diagnosis had nothing to do with them. On the contrary, in one of the few texts in which he and one of his collaborators mention MOOCs, they do so in a clearly disdainful way toward their "tremendous fanfare" (Weise and Christensen, 2014: 4). Despite his exaggerated predictions, Clay Christensen and his institute's criticism of the university (as well as the school) was not in the sense of a massive replacement of in-person teaching by a distance or online formula, but with an eye to mixed or blended formulas, years before the COVID-19 pandemic brought the idea of hybrid education into the limelight.

MOOCs (Massive Open Online Open Courses had their moment of glory, which was neither brief nor discreet. The first MOOC officially considered as

such, *Connectivism and Connective Knowledge,* directed by George Siemens and Stephen Downes, took place in 2008. In 2011, Sebastian Thrun and Peter Norvig at Stanford launched their *Introduction to Artificial Intelligence* course as such, which surpassed 160,000 students and was soon emulated by Andrew Ng and other professors at the same university. Seeing the opportunity, Thrun founded Udacity in 2011, and Andrew Ng, along with Daphne Koller, founded Coursera in 2012. That same year, the Massachusetts Institute of Technology joined the race by creating MITx, which, with Harvard's collaboration, would soon become edX, both initiatives were spearheaded by Anant Argawal. Referring to this, and in the same year, John Hennessy, president of Stanford University, proclaimed: "A tsunami is coming" (Auletta, 2012), and the *New York Times* (Pappano, 2012) declared it *the year of the MOOC.* Immediately after, there were impressive enrollment numbers, regularly in the tens of thousands; continuity figures were not that high, though; and completion figures were even lower. While the organizers debated how to foster virtual ("collaborative") contact among enrolled students, how to administer a feasible (and reliable) assessment, and how much to charge for certification (of attendance, of achievement, of passing the bar, of having learned as much as within their ivy-covered walls?), the vast majority of their students did not complete the program, did not go beyond following a couple of units or accessing their open resources, merely took a peek, or simply did not reappear after enrolling. (Rivard, 2013). And, by the way, those who peeked the most and who took the best advantage of them were not the *outcasts of the earth,* but rather those already advantaged in society and in the educational system, yet another case of the *Matthew effect* (Saleh and Sanders, 2014).

Prima facie, therefore, a bluff, a resounding failure in terms of effectiveness, efficiency, and equity. In fact, what seems to have stuck in the minds of everyone in general, and university professors in particular, is simply that the spectacular enrollment figures were followed by no less spectacular dropout figures. But things are never that simple: the 4 or 5% of enrollees who complete MOOCs (those superstar MOOCs, to be exact) certainly pale in comparison to the 84.6% of students who graduate from Harvard at the end of the expected four years, let alone the 96.7% who will have done so at the end of six years, but it should not be ignored that those who managed to enrolled on campus were already only 5.9% of the applicants, so the graduates would be 5% of those who applied for admission after four years and less than 6% after six years, which gives us surprisingly similar percentages in both cases, within the ivy and far from it. MOOCs have been accused of being too easy, but Harvard has long been suspected of inflating grades. Applicants who did not get into Harvard would undoubtedly go elsewhere, but those who dropped out of MOOCs could have dropped out of any course of study, including other MOOCs. In any case, of those who enrolled, it is more than likely that many did so out of curiosity, to

obtain the learning materials, or for more limited purposes than to do the full course, since price was not a barrier to entry.

The objection that MOOCs have their audience in developed countries and among the more educated population, including those with higher education (also among teachers, by the way) is undoubtedly stronger, *i.e.,* that they are part of the Matthew effect, whereby the already rich (in education) become richer (in education and in economic value) and the poor become poorer (at least in relative terms). The problem is, however, that this criticism is applicable to the entire university subsystem, old or new, residential, in-person or online, because of its selectively cumulative character in a society and economy where degree level is increasingly associated with already growing inequalities of wealth and income, status and life opportunities; especially when it is a private expenditure, but also when it is publicly funded (see Hayes, 2013; Frank, 2016; Markovits, 2019; Carnevale *et al.,* 2020; Sandel, 2020). But however much one may say or wish otherwise, this is to be expected of any university offering, all the more so when it targets a new territory or a new community.

Even in the middle of the golden year, it was clear that there was another problem, not so much on the outside as on the inside. Amherst, Duke, and a few other universities refused to join Harvard and MIT in edX when they could have, but the most paradigmatic case was in California, specifically at San Jose State University (SJSU). Michael Sandel is a political philosopher, a lecturer at Harvard, with a very solid body of essential writings in the field. His course *Justice* was the first that this university offered for free online. Although it never came to contest the top of the popularity charts with computer science courses (*Machine Learning* by Ng, from Stanford, *Programming* by Severance, at Michigan, etc.), courses closer to self-help (*Science of Well-Being,* by Santos, at Yale, *Learning to Learn: Powerful Mental Tools...,* by Oakley, at San Diego, etc.), or second language courses with professional horizons (*English for the Workplace...,* from Pennsylvania, or *Chinese for Beginners,* from Beijing, etc.), *Justice* made Sandel a kind of academic rock-superstar not only in and around Boston, but on a global scale. But at the other side of the country, in the heart of Silicon Valley, at SJSU (the only public university in the valley, on the southern shore of the bay), which undoubtedly has a hard time competing with Stanford or Berkeley, among others, someone had an idea: to combine the master classes of the best MOOCs with the personal attention of their own faculty, following the latest pedagogical trend, the so-called *flipped classroom.* There was no problem with some MIT MOOCs and in-house in-person engineering courses, such as the electrical engineering course, in which its students were split into two groups. One group followed the initiative, and the other did not. The initiative offered better results than the traditional format (Ghadiri *et al.,* 2013; Ghadiri, 2014). But the idea upset philosophy lecturers, who are always more sensitive

about their aura and were angry about the proposal to do something like this with Michael Sandel's course and local philosophers. "There is no pedagogical issue in our department that *JusticeX* [Sandel's MOOC with edX] is designed to address, and we have sufficient faculty to teach our equivalent course," Sandel was informed in an open letter. Sandel was forced to issue a sort of apology, explaining that he had merely offered some resources and did not want to take anyone's job, especially not his colleagues' (Carey, 2016).

II. THE PANDEMIC: EVERYONE GOES HOME AND WEARINESS FOR ALL

In the end, the MOOCs did not wipe out anything, but at the end of the decade another *tsunami* was lurking: the COVID-19 pandemic, which forced the evacuation of classrooms, starting with the university. Few spaces are as densely populated as classrooms, so during the period of exponential spread and high incidence of the virus, they were natural candidates for closure, especially where the students were already adults so there was not the relative counterbalance of the care function. There were organizations with powerful digital infrastructures, though more for some things than for others, with operational LMS (Learning Management Systems, then whitewashed as *Virtual Learning Environments*, VLE) in frequent, even daily use by everyone, though often only at the most basic level (uploading presentations or texts in pdf format, communicating exam dates or grades, scheduling tutorials by chat or e-mail...). The participants were presumably well equipped and competent: lecturers who used at least ofimatics and something more in their back office, *i.e.* to prepare their classes, and possibly even more tools for research; students who were *digital natives*, *i.e.* at least regular users; and all of them had one or more personal devices and were predictably better or worse connected. Laboratories, some field work, and cafeterias could not be replaced, but the most common teaching and learning practices could: lectures, readings, tutorials, and assessments, each with its functional and contextual specificities. An experiment of massive innovation and, unfortunately, strongly motivated by circumstances; or at least a generalized novelty.

Not just at university, of course. The stress test was mainly on formal primary and secondary education. Forget about kindergarten no matter how much we insist on its *educational* function (in Spanish it is called "early childhood education", rather than daycare or kindergarten, but not "school", to avoid the pressure for early literacy), its real function is still essentially care, and there is little or nothing to offer at a distance or online. In primary and secondary education, on the other hand, and more so as the years above, the role of the school becomes more and more one to provide information (and

knowledge and even wisdom, of course, but always linked to information: lessons, books, notebooks, exercises...), which is precisely what moves best over cables and waves and between different devices. Every school, every school system, made some effort to maintain a certain amount of de-schooled teaching in a purely spatial sense: In the best cases, a more or less faithful replica of in-person activities, such as classes or lessons, tutorials, assessments, even some teamwork; at the very least, some form of information dissemination, whether massive, broadcast or broadcast-like (radio, television, open resources on the Internet), or more focused on individuals or small groups (e-mail, messaging applications, or even voice calls whether on the new or the old telephone). We have even seen examples of what could be considered heroic care and attention, such as teachers visiting the homes of students with whom they have lost contact, and the occasional residual canteen service and even shelter for students in extreme situations. This forced deployment, in which we understandably looked at the best examples, led many people to say that after this experience of *hybrid education* (or teaching, learning, school, university..., and perhaps mixed, fluid, blended, liquid, hypermedia...), everything had changed and nothing would ever be the same again: the hybrid formula is here to stay. Those statements were repeated over and over again, without dwelling much on specifics.

Perhaps that is the key: *it is here to stay.* If you look up that sentence online, "it is here to stay", you will see the insistence –rivaled perhaps only by the predisposition of teleworking being here to stay too. Enthusiasts for the integration of digital technology felt justified in claiming, or wanted to believe, that the forced move to online teaching and learning would have the effect of demonstrating its effectiveness, efficiency, and excellence for all, as did telework enthusiasts. Or perhaps they were not so convinced of the demonstration and, even if unconsciously, wanted to compensate with their enthusiasm for the lack of evidence of the virtues of hybrid innovations, as in an incantation, or their own perception of the perceptions of others in this regard, as in an exorcism. The diagnosis was more than suspicious for an institution and a profession that had so little regard for any major technological innovation. At first, any argument was a good one for evacuating the classrooms, intuitively feared as the worst source of infection, hardly comparable to public transport or mass events, but less dispensable than these, so it was no bad thing that such a harsh measure seemed less so thanks to an alleged success of the hybrid experience. But there was no such success: without failing to appreciate the efforts of institutions, professionals and the community, from some centers that set up replicas quite close to ordinary teaching, which was what it was all about, to the numerous images, as moving as extravagant, of spirited and hard-working educators improvising their first video or sweating pixels (ink could no longer be) to organize and maintain a videoconference, what was actually done was something else. *Emergency remote teaching* (Hodges *et al.,* 2020)

was implemented, a very partial and limited copy of ordinary teaching, severely diminished by the limitations of the technology itself (equipment and software), connectivity and digital skills in schools and homes, teachers and students.

As the pandemic began to subside, and the alarm about children's supposed role as super-infectors proved to be unjustified, the situation began to change, slowly and perceptibly. Before the pandemic, in the setting of non-university formal education, the worst that could be said of anyone, especially families, was that they considered school as a kindergarten or a parking lot for children but when some also thought that they saw the writing on the wall with the replacement of teachers by technology (saying that it would be robots, the ultimate nightmare, would be going too far), then they started singing the praises of the essential nature of proximity, the importance of care, etc. The experience of remote teaching in case of emergency, largely a fiasco by the standards applicable in normal times, was seen as a demonstration of the limits of digital technology, not of its possibilities. Particularly at the university, where the institution, faculty and students were considered to be technologically equipped and capable, the adult learners were more or less mature and the teaching and learning activities were more duly information-centered, the experience was better, but not good. Some lecturers, only a few but more than cero (which should have been the case), adopted an evasive attitude; others, more numerous, did not know how to proceed, beyond the usual uploading on the virtual platforms some educational resources, mainly texts and, struggling to use videoconferencing applications. The university's IT services urgently scaled up and reinforced their storage and connectivity capacity and installed cameras in classrooms for the hybrid or limited in-person teaching period, with bizarre performance. In addition, assessment procedures proved difficult and in some cases inadequate, insecure, or conflicted. While on the whole it was much better than isolating oneself and staying home until the pandemic was over, in the end most people were overwhelmed by the improvised and accidental use of a medium they did not master.

The fact that the balance is not very good perhaps explains why, in principle, such stocktaking has not been done. In December 2020, the year of COVID-19, the Conference of Rectors of Spanish Universities presented the report *La Universidad frente a la pandemia* (CRUE, 2020). The text was a perfect example of what is usually called administrative *grey literature*: an imprecise enumeration of a series of measures that would prove the rapid and effective response of universities to the epidemic and the lockdown, all with a certain tone of self-promotion, but without sufficient descriptions or precise figures (except for some on expenditure and investment, which in themselves did not mean much) and without a proper balance sheet. This should have come later, since this publication, as it was stated a dozen times, was only a first "preview

of results" in anticipation of the "final report" to be published in mid-2021. However,... this never happened, the CRUE never published this report. In one way or another, before or after, formally or informally, all the universities had to take stock of the lockdown period and the successive variants of the *new normal,* and the university authorities often issued statements about their satisfaction with the efforts made. However, the truth is that in general and with a few exceptions, such the public in-person universities (UAM, UdN, UPC), the logical exhibition of the Spanish Open University UNED and some private universities (which, due to the nature of their offer or their business model, were much more experienced in online teaching and had to replace only partial or even marginal in-person activity), there was no systematic and public stocktaking.

III. THE RETURN TO THE ALREADY MORE THAN OLD NORMALITY

Although, according to the rumor mill, the hybrid university *was also here to stay,* what is certain and logical is that, after a rise during the pandemic of virtual and virtualized teaching (*i.e.,* of degrees designed directly for online teaching and those forced to migrate due to the lockdown or the simple subsequent precautions), what has come is the predictable fall of the virtual and the return to the in-person teaching. To date, there are no reliable statistics on MOOCs, but indicators of the interest in them and indirect indicators of their demand, such as visits to information sites or the stock price of the major providers, seem to show that, after a sharp rise in 2020, there has been a fall to a new valley only slightly above the previous level (Shah, 2023). As for traditional in-person universities, everything seems to be back on track: students are back in the classrooms and lecturers are teaching as they did before the pandemic; perhaps with a slightly higher use of digital resources but only as a support or passive recording of information rather than as a means for collaboration (in virtual groups) and (autonomous) learning, with slightly more intensive use of virtual learning environments (LMS), and undoubtedly in a better position to face another potential pandemic such as the 2020 crisis or other less catastrophic events, such as the Philomena storm in 2021.

Perhaps there is no reason to be surprised. As we said at the beginning, we are talking about a centuries-old institution. There is a tendency to think that the university is at the forefront of knowledge, which seems quite correct, both in terms of its research function (which, however, is increasingly shared with other public organizations and, above all, private companies) and in terms of its vocation to transmit the most advanced knowledge, while the old joke about the monk, who hibernated centuries ago, but who would feel at home if he woke up in a classroom, is repeated with reference to a school, that is, non-university education. But the reality is different: the classroom of

today's elementary school or high school may look familiar to a Jesuit, Piarist, or Lasallian monk of the nineteenth century. However, it would not be so familiar to any monk or even less so to a lay teacher who hibernated in the eighteenth, seventeenth or earlier centuries, for the egg-carton classroom we know today, with its group of students of (almost) the same age, who are taught the same thing and at the same level (without almost), is a modern phenomenon that was developed with the universalization of the school system, which was conceived and designed only in the seventeenth century, but was not generalized until the nineteenth and twentieth centuries (Fernández Enguita, 2018). Apart from that, what would be surprising for a monk of the nineteenth century is the diversity in the organization of space and activity (not time) that can be found today in different levels of education or in different schools or classrooms of the same level of education. This is pitiful in relation to what is possible and necessary, but surprising for those who have in mind the idea of a strictly unique model, *the one best system*, or coffee for all. Who would not be surprised by a current classroom would be a university professor who hibernated even before, whether it was Fray Luis de Leon in Salamanca of the sixteenth century (the classroom where he taught is still preserved with the same physical structure), Laurentius de Voltolina in Bologna of the fourteenth century, Constantine the African in Salerno of the eleventh century, or even Hypatia in Alexandria of the fifth century, because the layout was already the same: a scholarly teacher addressing a group of students collectively, from the chair; a dissertation without a book or a lesson with a book, from the one who possesses the knowledge (or the book) to those who do not possess it but demand it and, moreover, are adults, aware of its value, whatever it is and for whatever purpose, and therefore willing, if not always, at least in principle, to make the effort of the only possible way to acquire it.

But we no longer need this model. The university teacher can, in master class mode, introduce a subject, adapt it to the specificity of his students, link it to nearby or current issues, reveal its hidden implications, try to make it attractive, etc., but he no longer has to be the only carrier of all the information and knowledge that the student needs, and even less to be it all the time, live and on stage. With online teaching, it is almost always possible to watch or re-watch recorded lessons at any time. Normal in-person teaching can also be supplemented by recording and replaying lessons, as was often done in the post-lockdown era of reduced presence and blended learning, and as can be done again to facilitate combining study with any other activity. In fact, there are initiatives such as the flipped classroom, based on the traditional master class being delivered digitally to be prepared beforehand by students outside the classroom and regular hours. Many teachers have long provided support material for their lectures, especially presentations with digital slides (but also, and even earlier, summaries, diagrams, graphs, data tables, printed

transparencies, etc.) during class (usually on paper), before or after class (more feasible on digital media). However, it should be added that there have been, and still are, teachers who have refused to provide them, even though they use them in their classes, thus forcing students to take notes as if they were purely oral presentations (there are people who theorize about the student's manual note-taking as a mnemonic device, but there are also people who see it as a trick to fill the teacher's time, not to mention a frankly sloppy idea of intellectual property).

There have always been teachers who did not go beyond the textbook, even some who could not even arrive to the textbook. In fact, at least this was an important part of their original function, precisely in the university: *lectio* and *lector*, an etymology that is still present in terms such as *lección* (lesson in Spanish) although the word *lector* (like *lettore* in Italian) has remained to name the native collaborating teachers of a foreign language – although in Catalonia the word has been recovered for doctoral assistants; lecture, lector, lecturer or reader are still fully in use in English; *lesen, Lektor* or *Vorlesung* in German, etc. The words referred to the act and the actor of reading the text contained in a book, which the students generally did not have and could not have. But university teachers, and all the more so with the advent of the textbook, soon took on another function: to integrate into their masterful teaching some or much of what was contained in the text with other external elements, *i.e.* other texts or authors more distant in space, time, or the division of disciplines, their own and others' experiences and reflections, theoretical or practical demonstrations, activities other than reading and writing, communications and collaborations other than the teacher-student interaction, etc. At the end of the day, the teacher was already acting as a *curator* of an *exhibition*, although his material was mainly information records and his exhibition was basically oral, that is, a lesson. Of course, there were also compilations of readings, invited experts, extramural excursions, laboratory exercises, etc., but always with the essential limitation that the basic stage, the classroom, was for speaking, listening, and writing, and the main information support was the book. The digital transformation of information, communication and culture (but not, as of today, of education), available to everyone (at least to all university students) with the *digital gadgets,* or with the underlaying *digital trinity*: personal device, software and connectivity, and particularly powerful for the management of information and knowledge thanks to software as a *meta-medium* or as a medium of all media (those already used in university education and all others, old and new, those that already exist and those that will come), radically changes the scenario for the teacher, which is no longer characterized by abundance but rather by superabundance and overabundance of all kinds of resources, which takes him out of the traditional role of transmitter, even transmitter of the most advanced knowledge (which is already an increasingly demanding challenge in itself), to take her to the role of curator of this dynamic and changing professional capital, to the role

of designer of activities, environments, situations, experiences and learning itineraries.

IV. AI AT THE TEACHER'S SIDE AND SERVICE

The world of computer science has always offered and promised to the world of general education to be more than a medium. On top of other promises, such as developing the intellect, paving the way to better employment, fostering creativity, stimulating interest, etc., the promise of smart tutoring has always stood out. Almost half a century ago, Patrick Suppes wrote: "We can predict that in a few years millions of schoolchildren will have access to what Philip of Macedon's son Alexander enjoyed as a royal prerogative: the personal services of a tutor as knowledgeable and attentive as Aristotle. (Suppes, 1966: 207). As a polymath, Suppes' guild was philosopher, in addition to his solid scientific and mathematical training and advanced computer skills, which made him prone to overestimate and idealize, as most do, Aristotle's tutorial relationship with Alexander (see Brunt, 1993; Gómez Espelosín, 2019). Suppes' idea, however, was strongly anchored in a very traditional and transmissive concept of teaching, or a very passive and receptive concept of learning. The computer would be "programmed to follow the history of each student's successes and failures in learning [his successes and failures on successive questions or tasks] as a basis for selecting the new problems and new concepts to which he should be exposed next." Suppes nurtured a larger ambition, specifically that computers would become capable of understanding a student's question in natural language (which would potentially open the door to everything), and a big question mark about how far one would be willing to go with diversification based on ability. But in any case, both the practical power of computers at the time (Suppes was leading an applied project with Richard Atkinson in a group of Palo Alto elementary schools) and the author's apparent pedagogical approach meant that those experiments focused on highly standardized areas (language and mathematics), where customization was limited to a tightly structured curriculum.

Despite the rapid advance of computer science and the unlimited availability of information and knowledge on the Internet, it can be said that, virtually until yesterday, the promise of smart tutoring, syllabus customization, etc., through artificial intelligence remained within the conceptual –and arguably political, inasmuch as they imply a choice about the distribution of power in the educational process– limits of the individualization of teaching, not learning. In short, the teacher would continue to retain full control. The variant in which the pupil or student, after having followed some instruction (coming from the teacher, the book or the computer) answers some questions or does some exercises and, depending on the correctness or incorrectness of

his answers, is allowed to advance or is kept at that level or even returned to a previous level, or is referred to explanations adapted according to his errors or shortcomings or even according to the time of the answer; or the variant in which this information does not provoke decisions by the program, but is sent to the teacher who will decide about it (*human in the loop*). Both are similar because they adapt, diversify or personalize the *teaching*. Of course, they may be more flexible than Skinner's programmed teaching and machine books, or even Crowder's branched teaching books, which already did that on paper, but they are always on the side of teaching, wherever it comes from.

In this model, which we could call *docentric,* a greater and better personalization is expected only on the teaching side. It has always existed in the university, but with a clearly limited scope: in the direction of a doctoral thesis in any university –although not always– or in specific and very expensive models, such as the Oxford tutorial or the Cambridge supervision model. Any ambition for a wider extension leads to the hackneyed problem of the student/classroom ratio, whether in the university or in any other part of the educational system. But this is a demonstrably ineffective and inefficient path, even if it attracts the maximum consensus among teachers (as happens with the overall superiority of the master class at university, grade repetition in secondary school or the intensive and morning day in primary school: all groundless). Reducing the student/classroom ratio, at any level of education, is very expensive and produces little or no results, both in comparison with other measures. Although the weakest analyses can receive an unusual response when they say what everyone wants to hear (*e.g.,* Glass and Smith, 1979), most research and meta-analyses have repeatedly concluded that there are no effects or that they are spurious or negligible (Slavin, 1989, 1990; Odden, 1990; Shin and Chung, 2005; Opatrny *et al.,* 2023), especially as long as they remain within the range of what makes economic sense: from thirty students to twenty, to fifteen, to ten... The effects only really appear at the lowest ratios, three or two students and, of course, one, the ultimate personalization. Part of the plausible explanation is that, in reality, the teaching method does not change until these minimum numbers are reached. This has at least two implications: one is that co-teaching, the presence of two or more teachers in the classroom, may be more effective, not because it reduces the ratio (which will be the same in principle if it is part of the accumulation of groups), but because it allows, almost forces, any teacher who is not teaching to deal, in a more personalized way, with the students; the other is that the teacher's ability to teach differently will depend on his or her prior training in this regard and on the precise information he or she has about each student. I will not discuss that training here, but I will discuss the information available and how to use it.

Universities swim in an ocean of data – as does society as a whole, but even more so because their infrastructure includes a good deal of equipment, their public will always be mostly young people who are uniquely receptive to and fully equipped for technological innovation, their operations include a long succession of administrative records (the digital footprint), and their main activities are already largely digitized (though hardly transformed). However, this gigantic arsenal of data and its continuous flow cannot be exploited by itself. The information that is processed for ordinary administrative processes, annual reports or "transparency" policies are far from ideal; this is evidenced by the widespread preference for presenting data in pdf format, *i.e.* in such a way that it can only be read in the format that the competent authority or office wants to read it and to do it in another way requires a considerable amount of time, which for most is a deterrent in itself. Apart from the necessary availability of the raw data (the suitably anonymized *microdata*) for researchers, such data must be easily readable and interpretable to make this wealth of data truly useful to academic decision-makers; in particular to teachers, on their student groups in the short term and their teaching methods in the long term; as well as to intermediate authorities such as head teachers, coordinators of subjects, degree coordinators, etc., and all the more so for the often promised *personalization,* which is supposed to be agile, practically on the fly. In fact, relevant and manageable data have been available for many years now, and even decades, but they have hardly been used. Spreadsheets are now over forty years old (Lotus 1-2-3 was released in 1983, and Excel was incorporated into Office in 1989 for MacOS and 1990 for Windows), but for decades we could see many teachers ignoring them or using them to make lists and tables (for saving and editing, not for calculating). Virtual environments or learning management systems (EVA/LMS) are not mature yet but they have come of age: Blackboard was launched in 1997, Claroline in 2000, Moodle in 2002, Sakai in 2005... They all include a thorough record of the student activity: how much and when they accessed, what they viewed or downloaded, what they handed in or not, how much time they spent on any interactive functions, etc. This poses the usual privacy issues (as does a paper-based exam or a tutorial in an office) and could conceivably lead to a panoptic drive, but system administrators can easily regulate what data and in what format it goes to whom, particularly to teachers and other academic bodies. The point, quite simply, is that no one, or almost no one, is leveraging this information: neither the university authorities nor the lecturers, many of whom are not even aware of its existence.

The organization of the education system, including the university system, has evolved largely for the sake of simplifying information for and by teachers: one single textbook and one lesson, a frontal classroom, strict schedules of one-hour lessons, standardized exams to the extreme of the multiple-choice test on graded paper, grades from zero to ten, the binary division between pass or fail

in any subject, course, or degree, grade repetition as the ultimate and often the only adaptive response... Any alternative to these summary procedures that goes beyond the limits of quick thinking (in Kahneman's sense) or intuition adds uncertainty and is time consuming, so it tends to be rejected or reabsorbed. It will not be possible to leverage the growing flow of information if it is not organized and presented in a way that is agile, accessible and easily interpretable by those who have to use it, especially teachers. This implies, on the one hand, a precise selection of what is relevant and what is not, and, on the other hand, sufficient elaboration so that it does not lead to an avalanche of information or to anxiety, so as not to burden the teacher with information that is not very useful or even counterproductive (a certain Spanish university, a leader in many technological applications, introduced a videoconferencing platform with real-time information on the level of attention or interest of the students – how many are paying attention, how many are distracted, etc., measured in real time with facial recognition software... and they had to withdraw it because its main effect was to provoke distraction and anxiety in teachers). However, this is an area that is little or not at all developed in the field of education, despite the fact that in the social sciences there is a very long tradition of symbolic and graphical representation of information, for which it should not be difficult to develop appropriate user interfaces: dashboards for organizational managers, control panels for teachers, and so on. In this field, and particularly in the field of data visualization, we can learn a lot from the financial world (*e.g.* banking applications and stock exchange information), from medicine (the numerical data of an analysis or the graphical visualization of diagnostic imaging for the professional ordering it), from the printed or digital press (the increasingly common infographics), etc.

In short, the university, like the educational system as a whole, needs a double movement. On the one hand, a shift from the teacher to the data, because although the other side of the university's work, research, is completely data-oriented, and the teaching disciplines focus on content, the practice of teaching is not, either in terms of its scope or its procedure, focusing on data, *i.e.* the data of learning (the digital footprint, clicks) and evaluation (traceability, longitudinal and transversal recording) are not used to adapt the learning and teaching processes. The average teacher today already has approximations through exams and other tests and a necessarily very limited dialogue in tutorial sessions, but digitization offers new, incomparably richer possibilities to study aggregate data from any group of students, more representative for any size, and longitudinal data from each individual student, much more detailed than a small number of tests or a very limited tutorial session. Of course, the more holistic elements, non-verbal communication, theory of mind (what the other is thinking), empathy, mirror neurons, etc. will be missing, but we are not talking about replacing, but combining, coordinating and otherwise complementing

direct and indirect information, subjective perception and objective data... On the other hand, the algorithms that collect, process and deliver the data must be closer to the user's experience, *i.e.* to the teacher's perspective, to what she really needs to know, or how it will improve her work if she learns it, and to what he can really handle and assimilate, so that the new information is a support and not a nuisance, a plus and not a minus. This requires not only the specific work of the designers and developers of these information algorithms, but also the participation of the users, *i.e.* the education professionals, from the initial design to the final use, and not only by "dreaming a dream" at the beginning and rating it between one and five stars at the end, but by entering into a dialog at all stages of the process, from conception to implementation, in its alpha, beta and stable phases.

Meanwhile, the character of the year was ChatGPT, and it will do it again; or, in more general terms, it will be Generative Artificial Intelligence (GenAI), especially conversational GenAI. First, it gave teachers in their evaluation role cause for alarm, if not panic. The fact that a statistical program, incapable of understanding the meaning of a word, should cause such anxiety says a lot about the prevailing evaluation procedures and their limitations, but in any case, the waters have calmed down in this respect, while various solutions are being experimented with: ethical codes, exams with panoptic surveillance, digital watermarks, new detectors, etc. More discreetly, the GenAI is already making its way into the preparatory work for the lessons, the teacher's back office, as an assistant (performing tasks) and, if we are to believe the technologists, sooner rather than later as an agent (pursuing objectives, setting tasks itself). In general, GenAI is already remarkably efficient in producing what we could call *metatexts*, *i.e.* texts that are produced from a base text: summaries, identification of the most important points, reworking at a lower level of complexity, translation and transcription, outlines, keywords, suggestions and extensions, exposition plans, presentations, etc. The Internet is already full of applications and websites that offer lesson plans, syllabi, different types of exams, etc. based on GPT. In reality, they are and will be versions of GPT that are somewhat more adapted to a specific educational environment, with stricter but not infallible gatekeepers and improved interfaces that are more or less designed for effective mediation (*e.g.,* anticipating possibilities, suggesting requests or prompts...). Time will tell to what extent these aids open up or close down teaching practices, and to what extent teachers with more time, if any, will spend it on more creative teaching.

V. CONVERSATIONAL AI AT THE SERVICE OF THE STUDENT

The great leap that GenAI can and will make in education, however, is for the student. What was a bombastic promise a little more than half a century ago

is now beginning to make sense. Conversational algorithms such as ChatGPT, Gemini, and the like, already as they are and even better with additional fine-tuning for more specific knowledge domains, age groups, or use environments, can now hold a conversation of appropriate content and level for any learning objective. They are not on a par with Aristotle, as Suppes ventured, nor do they surpass or replace the teacher, as technologists and technophiles (not to mention technophobes) keep reminding us in an already tiresome preventive litany, but they can replace teachers in the most ordinary and routine discourse, with limitless availability and immeasurably lower cost. If a substantial part of the information and conversation can be entrusted to an algorithm in terms of quantity and with more than sufficient quality, then teachers will be able to focus on the higher-level information and conversation and being the last resource function after cyber-conversation (whose risks of error, hallucinations, bias, etc. are well known), on the one hand, and more importantly, on the design, curation and improvement of learning processes, which have as one of their active resources the teaching intervention itself, from the master class to the personal tutoring, but no longer the only one, just as the textbook or the handwritten notes are no longer the only inactive resources (and, if in some scenario they were not, horrors!).

It could be said that students would have two teachers: a brilliant, creative, absolutely reliable, intuitive and sensitive, etc., in flesh and blood, assigned by the university, but to whom the student unfortunately will not always have access and will only benefit from him with some regularity during his lectures and the student will very occasionally receive his personal attention because the teacher will be very much in demand. On the other hand, the student will also have another teacher at her disposal, maybe called support teacher, made of silicon and other metals and rather mediocre, not very or not at all creative, not always aware of his limits and therefore unreliable, but on the other hand also very hardworking, always available and in the best sense a know-it-all.

In the university setting, where students are adults, responsible and no longer need to worry about grooming, the essential problem of GenAI, as it happens with all digital and non-digital information (including, though to a much lesser extent, teachers and textbooks, despite the filters they have overcome), is the induction of error. It is obvious that in a new ecosystem where, unlike the Gutenberg galaxy and the old audiovisual world, information is first published and then edited, the risk of false data, unfounded conclusions, informational or interpretive bias, deep fakes, conspiracy theories, pseudoscience(s), etc. is omnipresent. Therefore, the temptation, even the intuitive response, is to build a sanctuary of reason where neither frivolity nor unreason can penetrate, but this is simply impossible. It is feasible to try and limit teaching to an unquestionable content and an uncontaminated ritual, like religion with the catechism and

the Mass, but this will be useless without the monopoly of information, as the churches have had to learn. But universities have always sought the opposite, to arrive at knowledge through independence of thought and criticism. Both the contemporary world in which students live and the professional world that awaits them at the end of their studies are already flooded, for better or worse, by digital information and artificial intelligence, that is, by information without filters or with inappropriate filters (and, of course, with appropriate ones), by speakers who are not thinkers, by language-generating algorithms that have no idea of what they are talking about, even if they seem to (but also by the results of an increasingly powerful science and an increasingly rich and pluralistic thought). The role of education, all education and especially higher education, cannot be to isolate and protect children and young people from *bad influences*, but to prepare them to live in a world where they exist.

VI. A NEW ORGANIZATIONAL AND MATERIAL ARCHITECTURE

So far this century, there have been many voices of alarm about the skyrocketing costs of higher education (increasingly difficult for families to afford and/or more expensive for the public purse), the inflation of university degrees (with a consequent reduction in the guarantee of access to the most sought-after professions or even of a return on investment in education), or the divorce between academic culture and youth culture, with a special feed(back) from mass media, the digital ecosystem and social media. Each of these bad omens can, of course, be nuanced: costs are rising, but not in the same way for public and private universities; specific higher degrees may be devalued, but the overall gap between having a degree and not having a degree has not stopped growing; and school and academic degrees have positional value anyway, so the differences in value that separate a good education from a not-so-good one are simply shifting upward; university studies may be losing expressive interest for young people, but this does not necessarily mean that university life as a stage of transition and rite of passage is losing interest, nor does it necessarily mean that degrees are losing instrumental value.

What is indisputable, however, is that the student body is changing and will continue to change. Demographic reports on the student body already point to the growing presence of older students with work and family responsibilities. The extension of secondary education, the scourge of grade repetition, the openness of the vocational training system and its alternative pathways, the introduction of the gap year (a one-year break in the long schooling before going to university), the transition from diploma courses to four-year degrees, the widespread generalization of master's degrees, and the access of young people who need to take more time to complete their studies because they need

their own source of income: all these factors contribute to increasing the age at which students start their higher education and to prolonging its combination with work and motherhood, as shown by historical and longitudinal data (Ariño and Llopis, 2011; Hauschildt *et al.,* 2015). The number of young people (up to 29 years old) who study (not only at university) and work (to varying degrees) is already around one million, or one in three, according to the Spanish Labour Force Survey. According to the latest data (school year 2021-22) from the Spanish Ministry of Higher Education (Ministerio de Universidades, 2023: Table 1.3), 27% of those enrolled in bachelor's programs and 40% of those enrolled in master's programs are studying part-time, and there is every reason to believe that the long-term trend will be to increase these percentages.

Thus, on the one hand, we have activities and resources that were inseparable from university space and its collectively organized time, but which are now available independently: digital publications that no longer need to be searched for, used, or borrowed from libraries; classes that can be seen and heard outside the classroom; group work and tutorials that can be coordinated and conducted online, and so on. This is not to say that they should necessarily be cut off from these times and spaces, or that they will necessarily benefit from them, or even that they are guaranteed to retain their value, but it should be remembered that the residential and in-person models also have not only high costs, but also clear limitations: of cost, capacity, transportation, and so on. The most promising way forward –although unfortunately there is no simple formula or guarantee of success– is to seek new combinations of online, in-person and residential learning and teaching (the latter being of little relevance in Spain). For the predominant and dominant university model among us, which is the in-person and local model (with a large majority of students attending –but not necessarily studying– full-time at the university; in the traditional morning or, to a lesser extent, afternoon schedule; and residing in the family home of origin), this simply means that the same learning can be offered with fewer regulated hours and on-site. In fact, students have been slowly but progressively reducing their attendance at schools and even more so at classes, except for reasons of punitive control.

On the other hand, the demand for lifelong learning is increasingly shifting to the university. The idea that we should learn something every day, and that no one should go to bed without it, as the Spanish expression says, may pre-date universities and schools, but the idea of lifelong learning did not. It was born as a proposal for a second chance for those who did not have sufficient basic education (adult education, vocational training), for more specialized and *ad hoc* training in the workplace (continuing education), or simply for cultural or personal development purposes (cultural extension, classrooms for the elderly, university of experience, etc.). All this continues and will continue in various

forms, old and new, but the dissemination, intensification and acceleration of technological change raises a different issue. Peter Drucker (1995) pointed out decades ago that the transformation of industrial workers into knowledge workers would be difficult, if not impossible, at least far more difficult than the transformation of peasants or servants into industrial workers (Drucker was obviously not moved by the personal costs of urbanization, wage labor, insecurity, shock, etc. that the process of industrialization without a protective state entailed, but he was right about knowledge or skills). The point is that industrialization, in reality, replaced more complex jobs, though not very formalized or iterative, with simpler ones, as a result of the division and subdivision of industrial labor, but computerization and digitalization do not do such a thing, but bite directly into the informational and cognitive component of work. Some of the new jobs will be low-skilled or unskilled, consisting of not very complex handling of information, which everyone learns in elementary education, or in the complex skills that are so difficult for machines and algorithms, but which all humans already have by *default, i.e.* as a result of biological evolution and mere upbringing. Those who find themselves replaced in complex tasks and jobs and who want to have access to others with comparable qualifications, especially in the perspective of an increasingly longer independent and active life, will have to go through processes of re-qualification, new learning, equally or more complex, which, for this very reason, neither the employer with the best of intentions will often be able to organize, nor society will be willing to take for granted after any accreditation. In other words, an increasing part of the requalification processes will have to be offered and accredited by institutions of proven solvency, and this, despite all conceivable criticisms and objections, will in many cases increasingly mean universities.

This strength is reflected in the evolution of students enrolled in non-official postgraduate courses (*títulos propios* in Spanish), which are more adapted to the retraining needs generated by retraining, innovation, etc. In the last six-year period with data, from 2013 to 2019, they grew by 28% worldwide, much more than the 6% of official courses; within this specific type of education, the non-official postgraduate courses, in-person public universities saw a 16.3% decrease in enrollment, while in-person private courses grew by 32.9% and online private courses by 197.8% (no data are provided for the period, for online public courses) (CRUE, 2023: 180, 388). Although the pandemic was a shock that affected postgraduate courses more (most of them were of one year, maximum two, so it was easier to interrupt them than the four years ones) as well as private universities (since their tuition fees were more expensive, it was more tempting and rational to do so), the general trend seems clear. Graduate education will continue to grow faster than undergraduate education, unofficial postgraduate courses will grow faster than official degrees, private offerings and enrollments will grow faster than public, and online or blended learning will

grow faster than in-person and, of course, residential. This new mix of offerings is comparatively easier for private universities, which have to find a niche in the market (compatible with state regulation of the sector) from the moment they are born, but not so for public universities, whose internal continuing education services, which are usually entrusted with all non-official teaching, are rather routine, bureaucratic, and have grown up in the bad school of continuing education for non-teaching staff (continuing education for teaching staff as such almost does not exist).

The obvious redundancy of traditional teaching, the new technological possibilities, the new type of students, the rising costs, the experience of the pandemic, and the new configuration of curricular offerings, all in the context of profound social changes in information, culture, work, and family, will converge to push for the relativization of the prevailing model, inherited from the pre-Gutenberg *lesson* and the post-Gutenberg *manual*, and the questioning of quite a few prevailing practices. In my humble opinion, this can, should and must be done along two lines that in principle converge, or which at least should indeed be aligned. The first, which is on the mind of all those interested in innovation but in different ways, is the combination of learning and teaching in-person and online, in-person and distance, synchronous and asynchronous, group and individual, classroom and collaborative. Not simply *blended* formulas, at least not if they are understood as a juxtaposition of in-person and online activities, but hypermedia scenarios and configurations that allow the combination, simultaneity and seamless transition from one medium to another, between different forms of autonomous, collaborative or structured work.

The second must be a reorganization of space and time, especially toward more flexibility and ubiquity and less presence and regimentation. Although in practice Fridays are falling into disuse in traditional higher education (like Saturdays before them), it is still shocking that there is so much talk about a four-day work week but not about the university week. In short, there is too much time in the classroom and not enough time for individual and collaborative learning. There are too many hours in classrooms for the same reason there are too many chairs in libraries: because they are no longer necessary, much less essential, for access to information and knowledge. On the other hand, there is a lack of physical spaces and means for individual and collaborative work –means of communication and sharing and guidance in the sea of digital resources– and a lack of guidance, curation and tutoring in them. Higher education could easily afford to reduce classroom hours. Scaling up tutoring in the current way would be prohibitively expensive, but doing so with a combination of personal tutoring, smart tutoring based on predictive data analytics (direct and teacher mediated, depending on what for), and dialog with a cool generative AI-based algorithm or robot could be a promising way forward.

This journey has already begun. Chatbots abound in administrative life, and have been in the news as assistants at least since the Jill Watson case (Dede *et al.,* 2018); smart tutoring has not yet delivered what it promised, nor can it be approached without caution, but analytic prediction offers potentially very valuable information for teachers and institutions; conversational AI is already being used in various forms by many teachers and in every imaginable way by students (and by their teachers in the backroom); several universities are already experimenting with hyperhalls (*hiperaulas*: Fernández Enguita, 2018), innovative learning environments and other forms of flexibilization of the use of space and, subsidiarily, time. The university gives a great deal of freedom to the lecturer in his classroom and with his group, but at the same time, its distribution of responsibilities and its very fragmented decision-making mechanisms hinder and slow down any innovation (Fernández Enguita, 2023). Digital transformation benefits from the previous existence of powerful research and management infrastructures but suffers from this fragmentation. Innovations related to spatial and time organization, especially the deployment of blended formulas, tend to grow on the fringes (the training offer for a non-traditional public and in some private universities), but it is a path that could be opened to pre-existing teaching groups, subjects and degrees precisely because of their fragmentation, because of their *loose coupling* (Weick, 1976).

Universities are not the best place to implement a major top-down reform; the closest example is the so-called *Bologna model*, which changed the structure in cycles, but did little and did not even achieve the most basic thing, which is that the teaching load became a common measure and not just a nominal one. Digitalization and digital transformation, in short, whether in the old normality, in the new one, or in the emergence between the two, have generally not gone beyond reproducing what can be reproduced from in person environment, but in the digital one, often exacerbating all its components of transmission, unilateralism… in other words, the characteristics of traditional pedagogy, and leaving behind, at least for a while, the best previous innovation, which was not much, but at least there was something. But the growing power of personal infrastructure and equipment, in particular the increasingly developed synergy of the more and more developed digital *trinity* of device-software-connectivity, and above all the interactive, dialogic element of generative AI, which was previously practically absent, are now forcing the institution to choose between trying to ignore them and being overwhelmed by them (as distraction, as plagiarism, as parallel learning, as alternative knowledge…) or increasingly integrating them into its regular activity. Its captive audience has allowed the university, in its teaching dimension, to be protected from the digital transformation, but the external pressure and the internal forces are already too strong, especially with the irruption of GenAI. Being an institution facilitates, through decoupling (Di Maggio and Powell, 2012), the creation of small spaces for innovation, even radical innovation, although this is also something that hinders its expansion

and often the necessary scale. We hope that the internal flexibility, combined with the external storm, will allow us and make us move in the new direction.

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