RAREDUCANDO DIGITAL EDUCATION

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Lesson No. 3
New technologies and cognitive processes
the relationship between human beings, robots and artificial intelligence.

Humane Technology Lab is currently engaged in various research areas, including robotics and the world of work; artificial intelligence and legal issues; machine learning and transformation of educational models; Cyberpsychology; technology and environment.

As regards, specifically, **robotics and the world of work**, studies on new technologies and cognitive processes focus on the interaction between workers and collaborative robots, called cobots or co-robots, as "collaborative robots". Notes the director of the Lab:

"*From the studies we have carried out, some issues emerge in human-robot collaboration. The first concerns decision-making: who makes the final decision in the performance of a given task? It often happens that companies entrust this to the machine, because it is considered objective. And this has the consequence of a sense of demotivation on the part of the worker, who tends to feel less important than the robot. Another problem is, on the other hand, processing times: cobots are very fast, making it difficult to adapt human speed to their own, with the risk of a very strong cognitive stress in the person*"
The relationship with artificial intelligence is also not without criticality. "The problem with AI systems is that they make decisions, but they don't explain why. And this, from the cognitive point of view, causes in those who use them a sort of inner dichotomy. If I can't understand the decisions of the machine, I have two possibilities: entrust myself completely to it, with the risk that this mistake, or remain in skepticism and not use it, renouncing all its possible advantages"

So, in one hand, there is the delegation dimension, on the other the lack of confidence in a technology which, as an instrument of innovation, could prove to be a source of problems. The real knot — concludes Giuseppe Riva — lies in this: whatever the choice between the two options, you will face thorny. And we have only one external mechanism — the tests — to assess the effectiveness of an artificial intelligence algorithm. We're not allowed to "enter" his gears.
The impact of new technologies on cognitive processes: the point of view of psychology about the tech-human relationship.
In Milan a laboratory was born that probes a different point of view on the relationship between human beings and new technologies, choosing an angle that does not look at the wonders (and business) of the latter, but at the changes that are capable of triggering in those who use them, starting with the impacts on the mind and its mechanisms.

New technologies and cognitive processes under the lens, to investigate the impact of the former on the human mind and its mechanisms, through a reflection that became more pressing and urgent during the pandemic. There are two, in particular, the macro phenomena directly related to the restrictions on mobility and social relations that have marked the COVID health emergency — forcing students and workers from all over the world to reorganize their daily activities — and that see technologies as protagonists: distance learning and distance work. Never had there been the global need for such close contact, now after hour, day after day, with technologies. Never had human beings been so dependent on them as part of their school work and work, moving to videoconferencing platforms and social networks a whole series of interactions that — in the pre-pandemic phase — were normally lived in person.

In the wake of this scenario, Humane Technology Lab (HTLAB) was born, a laboratory of the Università Cattolica del Sacro Cuore in Milan, whose aim is to investigate the relationship between human experience and technology through a holistic and multidisciplinary approach. We talked about this with *Giuseppe Riva*, director of the new laboratory, as well as ordinary general Psychology and professor of Communication Psychology at the same University:

"*I am interested in understanding the effect that technology has on the functioning of our minds. I wanted to create a laboratory that would bring a different viewpoint, not necessarily centered on the great miracles of technology, but on what happens to the human being when he uses it. The first work of the Lab was to analyze the cognitive aspects of distance learning and smart working, asking us what happens in the minds of children and adults when they pass — in educational activities and work in the office — from a daily 'face to face' dimension to a fully digital one*"

New technologies and cognitive processes: how distance learning and smart working act on our brains

Professor Giuseppe Riva
In terms of new technologies and cognitive processes, the recent results of neuroscientific research — explains Riva — tell us that distance learning (or distance learning) and smart working have a fall on what are the "three pillars" on which the organization of our brain rests when engaged in school learning and work in the office.

Pillars that want teaching and work related to a dedicated physical environment (class and office), carried out under the supervision of a teacher and a superior and distributed among classmates and team members. Well, the use of videoconferencing has destroyed these three fixed points, affecting the specific cognitive processes related to them.

"*The daily use of videoconferencing affects the functioning of GPS neurons, a kind of 'Global Positioning System biological' that allows the brain to constantly have the spatial coordinates of the place where we are*," the professor points out.

These neurons are activated when we are in certain places and have a central role in autobiographical memory, which, through them, "attacks" the experience of our daily life to the physical places we frequent: it follows that "I am a student because I attend school rooms" and "I am an employee because I go to the office".

What happens when a student "goes school" by connecting — from home — to a videoconferencing platform and when an employee has meetings, he interacts with his superiors

and colleagues — from home — in online mode? That GPS neurons do not activate, i.e. they do not hook the "school" and "office" experiences to the physical place of their home, resulting in a negative impact on personal identity and motivation and with the resulting psychological discomfort.

Another critical point — Riva continues — concerns the interaction with the teachers, the superiors within the company and, more generally, with the reference figures, with those who have the leading role. Interaction — this — which passes through non-verbal communication, made of body movements, gestures, eye movements that, in turn, activate — in the pupil and in the worker - mirror neurons,through which it is possible to recognise in the other intentions and emotions and understand their actions, establishing an empathic relationship, focal in the effectiveness of teaching and in the way of making leadership.

The approach of transformative technology: the example of virtual reality

In addition to dealing with new technologies and cognitive processes and investigating the relationship between human experience and technologies, the goal of Humane Technology Lab is also — the teacher says — to "build positive experiences by exploiting the potential of new technologies, in the perspective of what we call 'transformative technology', able to transform, to change for the better the condition of people where they manifest an discomfort".

The first level of intervention is to follow the directions that come from cognitive sciences, sociology and education sciences, to find more effective ways of using technology. With regard to distance learning, for example, the practice of blended learning — or "hybrid learning", in English "blended learning" — is more productive with a mix of different learning environments, combining the traditional classroom method with activities mediated by computers or mobile systems.

From the perspective of transformative technology, a profitable use of technologies requires rethinking, reimagining the way distance learning and smart working are carried out, finding new and creative ways.

In this regard, one possibility comes from the simulative power of virtual reality, the only technology that can activate GPS neurons and generate empathy, allowing the development of more authentic relationships through online interactions. In line with this approach, several companies have developed social VR platforms that will be able to support distance learning and work, starting with Facebook Horizon, AltspaceVR, Spatial and VRChat.

Also on the subject of virtual reality, Riva cites the example of an activity that the laboratory organized during the lockdown, initially studied for students of the University:

"*Coronavirus is a source of strong psychological stress, capable of putting our identities and relationships to the test. To combat this negative state, we created COVID Feel Good, a virtual experience lasting twenty minutes a day — to be repeated for a week — simulating the visit to a Zen garden of which the user is the only visitor, while a narrating voice induces calm and relaxation. It is a tool that we have tested, assessing its effectiveness in reducing the level of anxiety and stress due to the pandemic emergency*".

Paola Cocci

Integrated digital teaching and pupils with special educational needs. Indications

In the Guidelines for Integrated Digital Teaching, which is understood as an "innovative teaching-learning method", addressed to all students in secondary school of 2nd grade, "as a complementary teaching method that integrates the traditional experience of school in presence, as well as, in the event of a new lockdown, to pupils of all school degrees.

These are the indications contained in the document

“The 2020 School Plan, annexed to Ministerial Decree 39/2020, provides that the Central Administration, the Regions, local authorities and schools, each according to their level of competence, shall work to ensure school attendance in the presence of pupils with disabilities with the involvement of support figures (Educational Operators for autonomy and communication and Communication Assistants for pupils with sensory disabilities). For these pupils the point of reference remains the Individualized Education Plan, together with the commitment of the Central Administration and the individual school administrations to ensure attendance in the presence.

Particular attention should be paid to the presence of pupils in possession of diagnoses issued in accordance with Law 170/2010 and non-certified pupils, but recognised with special educational needs by the teaching team and the class council, for which reference is made to the respective Personalized Education Plans. For these pupils, it is very necessary for the teaching team or the class council to agree on the daily workload to be assigned and to ensure the possibility of recording and listening again, given the difficulties in managing ordinary teaching materials in compliance with the aforementioned sector discipline and the indications provided by the Guarantor (see Vademecum scuola). The possible involvement of these pupils in complementary DDI activities will have to be carefully assessed, together with the families, verifying that the use of technological tools is a real and concrete benefit for them in terms of the effectiveness of teaching. The decisions taken will have to be reflected in the PDP.

For pupils hospitalized or cared for in their homes and attending prison schools, the activation of integrated digital teaching, in addition to guaranteeing the right to education, helps to mitigate the state of social isolation and thus becomes one of the most effective tools to strengthen the relationship. The School Manager activates every necessary dialogue with the various competent actors in order to identify the interventions necessary to successfully activate integrated digital teaching.”

Download the document

HTTPS://WWW.PROVERSI.IT/TESI/DETTAGLIO/496-1-USO-DI-TECNOLOGIE-A-SCUOLA%C2 %AD-FAVORS-L-INTEGRATION-OF-DISABLES-F

PRO\VERSI
Technologies offer valuable and undisputed help in teaching for students with disabilities or special educational needs.

First, they allow an individualized didactic, calibrated on experiences and objectives within a context-class that does not marginalize the student. The so-called “digital” class forms a cooperative and collaborative working environment. Technological tools have both an enabling and rehabilitating use. The first group includes tools that allow the student to carry out activities that would otherwise be prevented (such as, for example, motor and visually impaired aids). Rehabilitating functions, on the other hand, are those that make it possible to bridge attention and learning difficulties.

Teaching support between and benefits from technologies

The positive effects of the entry of technologies into the teaching activity are significant for the supportive teaching of pupils with disabilities and specific learning disorders. Francesco Zambotti and Alessandro Colombi analyse the use of interactive technologies for inclusive teaching.
So the two scholars: “Italian pedagogical and didactic reflection cannot ignore the potential benefits that the introduction of innovative teaching technologies can bring to a school system that for more than thirty years has been based on the integration of pupils with BES (Ianes and Macchia, 2008) and which seems to evolve increasingly towards an inclusive perspective. In fact, research and theoretical in-depth research and deepening have been concentrated on the use of Lim in relation to specialty conditions due to disability or learning disorders (Gage, 2004; Schuck and Kearney, 2007; Lots, in Biondi, 2008; Zambotti, 2010), both due to ethnographic and socio-economic causes of uneasiness (Sciapeconi et al., Biondi, 2008; Camizzi and Goraci, in Biondi, 2008).
The Lim highlights some of its own characteristics that can encourage the introduction into the classroom of teaching methods and activities based on the inclusive perspective. In particular, we can say that the benefits appear to emerge in the use of the instrument compared to the four pivotal dimensions of the inclusive perspective: teaching individualisation; the creation of a cooperative class group; the development of metacognitive educational strategies, the creation of a resilient class group (Zambotti, 2009; Ianes, in Zambotti, 2010). Research has highlighted the valorisation of Lim as a space for classroom learning; space that does not only translate into a facilitated use of multimedia and interactive materials, but as a physical classroom space in which to co-build knowledge and include the many enriching differences that make up the panorama of Italian classrooms. However, much is still to be researched in relation to the relationship between interactive technologies and pupils with BES (Special Educational Needs). systematic research into the interaction between students with cognitive and sensory disabilities and interactive devices within class dynamics is still very lacking. The rare studies on the use of Lim with pupils with BES often do not refer to the Italian school landscape oriented" (Francesco Zambotti and Alessandro Colombi, Digital Class Inclusive: Lim and Classmate Pc. An experimental research design, “Form@re”, November 2010).
Researcher Michela Ott (DidacticTechnologies and School Integration: some reflections,"Rivista TD Tecnologie Didattiche"1998) deals with various aspects related to the use of the computer: "We are all aware that the use of the computer can validly support teaching [Kulik, 1991] and improve its effectiveness; when it comes to the teaching of the disabled, the use of technological tools can even radically change the quality and levels of learning [Graziani, 1997]. Emblematic examples of how the computer tool can even open possibilities previously precluded are the fact that today even the motor disabled can write, using a computer equipped with appropriate peripherals and the fact that a blind person can have access to lyric reading thanks to the use of speech synthesis [Marchello, 1997]'.
According to the researcher, the use of computers, with reference to educational integration, has a dual value: “‘habilitating’ or ‘rehabilitating’. The computer, i.e., can be used to put the disabled in a position to carry out otherwise excluded activities (e.g. writing for severe motors with disabilities)

or can be used as a support to traditional teaching to improve its effectiveness, to fill any gaps, to stimulate complex cognitive and/or operational processes, to promote the acquisition of operational skills in some sectors, to structure the learning method, to allow deepening paths. Using the computer with a 'enablement' function first raises the problem of identifying the most appropriate aid and, only subsequently, that of the structuring of the educational path; however, the latter must have the requirement to be as synchronous as possible and consistent with that of the whole class, it must follow, as a supporting idea, that of 'adjustment' and 'conformity of contents': it's basically about defining 'how' you can use a 'different' tool to do the same. Much more multifaceted is the nature of the problems that arise when looking at the computer as a 'rehabilitating' tool, that is, when it is intended to make an eminently re-educational use of it [Ferlin, 1996], when the objective is to use the computer medium to fill the prerequisite deficiencies and/or overcome learning difficulties linked to problems of understanding, processing and structuring information and knowledge. Recovery and marginalization in this sense, traditionally referred to as 'recovery' and this idea is linked, on the one hand, to the individualisation of the educational intervention and, on the other, to the extrapolation of the subject from the class group; generally, that is, recovery is considered as a highly personalized activity, mainly based on didactic activities other than those involving the rest of the class, implemented with tools, modes and times of its own. The introduction of technology into the school, in fact, can lead to a significant change in the way recovery is implemented and can therefore radically change the idea that we currently have. The use of technological tools, in fact, allows a high degree of individualisation [Scascighini, 1997] of training interventions (otherwise unthinkable) and allows to reinvent situations of individual, cooperative or collaborative learning in which the activity of students is diversified, but contextual, pursues the same objective, but with different methods, tools and rhythms, moves on separate but parallel tracks, in the same direction [Ott, 1997]. One of the most concrete objectives that we can propose is to exploit the individualisation potential offered by technology to take new steps towards more real integration, to give a new impetus to the strategies of adapting skills, improving and acquiring new skills, including those with difficulties" (ibid.).

According to the pedagogist Ugo Avalle(From Skinner's machine to the Lim, technology in aid of disabilities,"La Ricerca", 1, 17 October 2012)): "With the approval of Framework Law 104 of 1992 on disability, the speech on the use of technological aids as an aid to all people with disabilities has become more stringent and, in parallel, it has begun to build technological tools and develop programs suitable for the various types of difficulties. These instruments and related programmes can promote communication, autonomy and generally the social integration of people with disabilities. The possibility of compensating, with technological aid, the functions compromised in these subjects, with the aim of strengthening their self-esteem through the facilitation of learning, is of considerable educational and teaching importance, as well as psychological from both an individual and a social point of view. Talking about inclusive school therefore means considering both the accessibility of physical space and the learning setting: these two areas underpin the reflection on learning disorders. For the above reasons, the use in the classroom of the laptop as a means of learning specific disciplinary content, thanks to prepared teaching software and computer environments where simulating any situation (real or hypothetical), allows all students with deficits and difficulties to interact constructively with classmates and teachers. Self-correction, processing speed, feedback immediacy and technically 'clean' correction are factors that facilitate and stimulate learning. Learning software, voice synthesis, interactive multimedia boards (Lim), netbooks and tablets create an 'integrated network' that allows, thanks to different and multimodal languages, to enhance the self-esteem of people with disabilities/difficulty and promote their autonomy".

Rosanna Ghiaroni, head of high school in Rome, explores some specific fields of use of technologies

in teaching: “today technology in general, and computer technology in particular, offer help only a few years ago unexpectedly. More precisely, computer science is playing a leading role [...] The importance of information technology in the rehabilitation and integration of people with disabilities temporarily or permanently in school and in social and working life is therefore shared and is indeed considered a strong idea, an innovative response in the scenario of techniques and aids for disability" (Rosanna Ghiaroni, Informatics and Disability Technologies in the Italian School,"Rivista TD Tecnologie Didattiche", 1994).
In detail, the author analyses the advantages that technological tools can provide for the integration of disabled people of different kinds: “New technologies to support integration concern different types of disability, ranging from communication deficits to problems of motority or cognitive development (examples of tools for the blind, visually impaired, handicapped motors)” (ibidem). According to the author, the greatest advantage that can be gained from the use of these tools is the educational inclusion of children with disabilities: "On the school side it is important to emphasize that often the use of the computer is common to the whole class. In this case it is important to point out that the most recent development of machines using special interfaces to be applied to normal personal computers no longer forces the disabled pupil to use a machine other than that of his companions but, if ever, allows him, through the use of some additional instruments, to perform only partially differentiated activities" (ibidem).

Authors cited:

1. **Colombi Alessandro** — Professor at the University of Bolzano
2. **Oct Michela** — Researcher at the Institute for Educational Technologies — CNR in Genoa
3. **Avalle Ugo** — pedagogist and trainer
4. **Ghiaroni Rosanna** — Head of High School in Rome
5. **Zambotti Francesco** — Professor at the University of Bolzano

http://www.vita.it/it/article/2022/01/22/alunni-con-disabilita-in-presenza-durante-la-dad-si-ma-da-soli/161645/

Pupils with disabilities in presence during Dad? Yes, but alone

by Sara De Carli— 22 January 2022

Ministry of Education and Ministry of Health yesterday sent to schools a note that says that pupils with disabilities and special educational needs even when the class is in Dad is guaranteed the teaching activity in the presence, however ensuring the telematic connection with the pupils of the class

The Ministry of Education and the Ministry of Health issued yesterday's evening a joint note (the 71 of 21 January 2022) to indicate the measures for pupils with disabilities and special educational needs in dad/ddi classes, guaranteeing them the teaching activity in the presence. This is a conquest on paper already last year, when the right to teaching was recognised in presence also in the red zone and also with the superiors in DAD and not alone but with a small group of companions in order to have an inclusive and social context. Notes were needed to clarify the matter (from Article 43 of the Prime Ministerial Decree of 2 March 2021 to note 662 of 12 March 2021) and the indications were disregarded by many schools, but there were. Pupils with disabilities and special needs were no longer explicitly mentioned in the many indications arrived in this school year and in particular in those that followed in this tormented beginning of January, with the resumption of the school and the Omicron wave.

Common sense would say that, since there are indications that no one has revoked, those are valid: but the testimonies that come from the territory say the opposite, all at home, even children with disabilities. So here is the FAQ on the website of the Prime Minister's Office, which asks if pupils with disabilities in Dad classes are allowed (therefore where at least one positive case occurred — but here things as we know are different for each school order) to carry out the teaching activity in presence? The answer reads as follows: "Pupils with disabilities and special educational needs, who are not COVID-19 positive and do not have a body temperature higher than 37.5 degrees, are guaranteed, with maximum safety and in the absence of specific symptomatology, **in any case, the performance of the teaching activity in presence to maintain an educational relationship that realizes the actual inclusion of school, while ensuring the telematic connection with the pupils of the class who make use of integrated digital teaching**".

So things are a little different from last year: pupils with disabilities — it seems from the FAQ — can attend yes in the presence, but on their own, given the relationship with pupils in the class who make use of integrated digital didactics, it happens with the telematic connection. It is true that the dad we are talking about this year is not "preventive" and tied to the indexes of the territory but to the fact that in that precise class there have already been one or more cases of positivity depending on the order of school we are talking about.

The note explaining the FAQ confirms that "school institutions are required to lay down specific conditions for pupils with disabilities and special educational needs (BES)", **that "even where it has been ordered to suspend teaching activities in the presence, pupils with disabilities or BES should be guaranteed, whenever possible, to carry out their teaching activities in person" and that "in any case the telematic connection with pupils in the class who use integrated digital teaching" should be ensured.** What do you mean? The dotted situation would seem to be this: the pupil in class alone with the teacher of support but connected with the rest of the companions who are in DAD/DDI.

The note further states that for school staff and pupils, where there is no specific exemption in this regard, the use of FFP2 respiratory protection devices is mandatory, that the teaching in the presence must be carried out under conditions that ensure adequate interpersonal distancing; meals may be taken at school provided that an interpersonal distance of at least two meters can be maintained.

https://www.governo.it/it/articolo/scuola-misure-alunni-con-disabilit-e-bisogni-educativi-sp-in-class-dadddi/19045

School, measures for pupils with disabilities and special educational needs in classes in dad

21 January 2022

Following the FAQ published on this website regarding a question concerning the possibility for pupils with disabilities of classes in distance learning or integrated digital teaching, to attend lectures in person, the Ministry of Education and the Ministry of Health have today signed a circular addressed to educational and educational institutions.

Taking into account the constitutional principles and the rules in force in the school system, designed to protect the full inclusion and integration of pupils with disabilities, the circular clarifies that educational institutions are required to lay down specific conditions for pupils with disabilities and special educational needs (BES), as already provided for in the current Dpcm of 2 March 2021, which introduces the possibility to carry out teaching activities in the presence, in certain circumstances, even where strict restrictive measures have been put in place to contain the spread of the virus.

In view of the imperative need to maintain an educational relationship that achieves the effective inclusion of schools, the circular states that, even where the suspension of teaching activities in the presence has been ordered, it should be ensured whenever possible, as specified below, pupils with disabilities or BES to carry out their teaching activities in the presence, while ensuring the telematic connection with pupils in the class who use integrated digital teaching.

https://tech4future.info/metaverso-didattica-scuola-futuro/

From the evolution of immersive technologies, new teaching methods that need guidelines
A new didactic, based on the experience of the metaverse, is on the horizon. In your expectation, let us prepare a ground for the world of education to seize the best of new technology.
PAOLA COZZI

07/03/2022

TAKEAWAY

- Among the future areas of application of the metaverse also the school sector, with repercussions on teaching methods and learning by pupils. A document from the Center for Universal Education of the Brookings Institution looks ahead and proposes a series of guidelines for the design of educational products based on new immersive technologies.
- Two, in particular, the focal points: the synergy between technicians and developers on the one hand and experts in education sciences on the other — with the aim of developing tools that put at the center the dynamics of learning and not the metaverse itself — and make the immersive context a truly educational space and not a simple virtual place of pure evasion.

- The advent of the metaverse in the school world also implies taking care of the problems of access to immersive technologies by all students, regardless of the socio-economic level, as well as ethical reflections on the contents disseminated, so that they do not contain prejudices of any kind.

Is the world of the metaverse destined to intertwine with the world of education and teaching? Is the Education sector among its potential application areas? The questions are not at all in the air, since, recently, Gartner has inserted the metaverse between those technologies that, in the future, will transform entire markets, even if with extended development times (over the time span of eight years) and still without an absolute definition of the scenarios that we can expect.

What, today, seems certain are only the expectations of the metaverse, also related to the school sector. A sector in which the evolution of immersive technologies will have an **impact on the teaching methodologies adopted, as well as on**the **learning processes of students, for which it is good to be prepared, in order to be able to seize all the opportunities and not to lag behind in other sectors.**

In this regard, with the aim of laying the foundations for the design of future quality educational products based on the technologies that belong to the metaverse, the paper "A whole new world: eucation meets the metaverse", curated by the Center for Universal Education of the Brookings Institution — a non-profit US social policy organisation — proposes a series of principles, guidelines that draw on evolutionary psychology and the sciences of education. Let's see together which ones.

Metaverse and didactic, passing through the educational app market: the principles governing the learning process in children must be followed.
The document quoted starts from some considerations regarding the educational app market and its history that, since 1997, the year of the first game called Snake usable by mobile phones, has seen it reach, in 2015, more than 80,000 apps, defined — by those who developed them — "educational".

"***The vast majority of these apps, at their beginning, were not based on a design that took into account studies and research on how children learn****. They were, in fact, designed for use by adults, so by people with a defined and complete cognitive development. And, even today, developers often use the term "educational" in a free and improper way, with reference to products that educational possess only a shy nod*"

so wrote, in April 2015, the same authors of the paper on metaverse and didactic (all psychologists and experts in education sciences) in an article entitled "Putting education in 'educational' apps: lessons from the science of learning", suggesting a number of principles aimed at developing valuable educational apps, based on cognitive processes that regulate learning during childhood.

Among these principles is that **learning must be 'active' and not passive, in which children must have their own defined role within an educational context and do not passively suffer the game contained in the app**. In addition, an app, to be said to be educational, must "involve" and not simply entertain or distract by interrupting the game with ads and invitations to purchase. The educational app must then be related to content that the child already knows instead of projecting it into a space foreign to him and should stimulate social interaction, inside and outside the same space as the app.

A few years later, precisely in 2018, the team added to these principles those for which an educational app of value should also:

- encourage children to achieve learning goals through different paths (iterative learning)
- to be joyful
- be playful
- set articulated learning objectives

Working on synergy between developers and education science experts
After the article of 2015 and subsequent integrations, in 2021, the study team author of the paper on metaverse and didactic, in taking stock of the situation, came to the conclusion that the principles set out are not prevalently present in the educational apps available today. Even, "***of the most downloaded paid apps for children, 50 % scored in the low quality range, with only 7 apps in the highest quality category. While, free apps got even lower scores*. And for one reason: app developers and education science experts don't communicate with each other.**

And the gap in time since the educational apps became a reality for children and the moment when the scientific community was involved in the debate around their pedagogical value, was perhaps too long, leading to a proliferation — on the market — of low-quality teaching materials and making it complicated, for parents and teachers, to select products that really fall within the range of "educational" ones.

At this stage, however, while we await the developments of the metaverse, it is necessary to lay the foundations for a collaboration between the parties, in order not to let technology "be done", that it becomes the central protagonist of new educational apps without the support of education and didactic experts. **The risk, if the synergy between app developers and education science experts is not fulfilled, is to have educational tools that exploit immersive technologies, but that are not effective in teaching because they are not conceived and not designed in line with the dynamics related to the learning process in children.**

Metaverse and didactic: the game as an educational set for learning the skills of the future
The authors of the paper on the subject of metaverse and didactic refer to the **value of the experience of the game in learning certain skills from the child**. In particular, it distinguishes six of them which — together with the basics of writing, reading and mathematics — constitute those interconnected skills that will be demanded by employers of the future. Among these, the **ability to collaborate** - understood as a fundamental social commitment to building communities and understanding between different cultures — is the first. It follows, then, the **ability to communicate** that, together with collaboration, is at the origin of all subsequent skills.

The third competence is given by "**content**", which refers not only to traditional content represented by reading, writing, mathematics, science, etc., but also to cognitive skills such as attention and memory, i.e. the basics of children's educational performance. "Critical Thinking**"** is, on the other hand, the ability to assess — as adults — the quality of the information that is received from outside. Competence — this — which, together with reasoning, can be taught and learned.

Creativity and the ability to innovate - reads in the paper — represent "*the synthesis of content and critical thinking, allowing students to use what they know to create something new. Moreover, since the game encourages curiosity and exploration, it also promotes creativity, classified by the World Economic Forum as the third most important skill in the world of*work.

Finally, **confidence** in one's abilities is the competence from which tenacity and flexibility arise, even when a failure occurs: "*confidence is closely related to perseverance and"growth mentality", i.e. to the belief that one can improve one's abilities because they are not rigid or fixed over time, but can be modified*".

The metaverse as an educational virtual space and not as a simple distracting experience
To say "educational", the playful experience must not be an end in itself, but produce in the student a change — from a cognitive or relational point of view — as measurable as possible. This is achieved by setting precise and defined learning objectives such as those described above, following which technicians, developers and educators who work in synergy, come to designvirtual spaces in the destination that allow truly educational experiences and not simply distracting, entertaining or a way to spend time.

In this way, for example, a lesson in Greek mythology that, using the metaverse, projects students into the world of the gods, surrounded by Zeus and golden floats of Olympus, with the walls of the classroom transforming into images of old temples and columns scattered on the ground and in which every child has the opportunity to become an archaeologist using his own avatar, it can be transformed — also thanks to the expert guidance of a teacher prepared in the field of metaverse and didactic, who monitors the achievement of the objectives set — in a time of teaching-learning of a high level, engaging and stimulating, followed by a list of activities to be completed to earn "points", in turn related to a final vote.

"*In these lectures* — explain the authors of the paper — *children become solitary agents in a fantastic space and with great attractive power. But those who design these spaces must be clear about the difference between "diverting attention", diverting it to the same tool used, and "directing attention" towards strategic content".*

To understand us**, the example quoted is not a lesson on the metaverse and its use in school classrooms, but a lesson in Greek mythology, in which every element of the virtual space has been strategically positioned to direct the attention of children to certain educational content and to foster their understanding, with learning objectives to be achieved and a final evaluation.**

Metaverse and didactic: the importance of teachers and educators in creating the relational dimension within the immersive context
In the field of metaverse and didactic, one of the critical aspects concerns the absence of the relational dimension within theimmersive contexts, considered — always — by psychologists of the evolutionary age, pedagogists and experts in the sciences of education, a cornerstone of the learning process.

Interactions, emotional expressions, physical contact, touch, smell and body language are all forms of communication absent in the virtual world. But it **is the human element represented by the figure of the teacher that has — as mentioned — a pivotal role in accompanying children within virtual spaces and — a salient point — in helping them to relate to real life the educational experiences lived in those spaces.** Here then the aspects of sociality and interaction in the experience of the metaverse rest on the figures of teachers and educators. It is up to the latter — explain the researchers who worked on the paper — that it is up to*"find ways to merge virtual world and real world, so as to preserve the social relations teacher-child, caregiver-child and child-child".*

Moreover, we remind that only teachers and educators have the faculty to select the contents of

the lessons in the reality of the metaverse based on the interests of the students and their actual level of preparation, as well as being of help in those immersive contexts that could bring out in children negative feelings such as fear, insecurity, anger or distress and to guide them in addressing school and social challenges based on individual strengths and difficulties. Thus, **"it*will be a human figure in the flesh to act as a lateral guide and, through the experience of the metaverse, to help children to see beyond their world".***

Ensure cultural and social inclusiveness and initiate ethical reflections

In terms of metaverse and didactic, in addition to the need to have clear principles governing the learning process in children and the objectives to be achieved, it will also be important to ensure that the immersive context embraces different and distant cultures, in order to foster education to different people. It **will also be necessary — at the political level — to consider the problems of access to the experience of the metaverse by those socially and economically more fragile communities, so that all students can take advantage of the new didactic, regardless of income and census.**

As is the case for other emerging technologies, then, there should not be any lack of ethical reflections, not so much about the use of the metaverse itself, but on the content that will be disseminated in the school environment through the technologies that support it, in particular **by ensuring that, in addition to being relevant and authentic, these do not contain gender, ethnic-racial or related to sexual orientation and religious faith prejudices.**

I mean, a new school is on the horizon. They don't know when he's going to debut, but expectations are high. While waiting for the metaverse to invest in the world of education, technicians, IT, developers, psychologists, pedagogists, teachers, educators and policy makers are called to prepare the ground so that we can get the best out of this new opportunity offered by technology and create valuable educational experiences for all students.

Paola Cozzi

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Augmented reality: what it is, how it works and the application examples
Augmented reality is one of the most flexible and user friendly emerging technologies, thanks to its ability to "increase" the reality around us with contextual information, useful to improve our operations. Despite the very young age, the HR has managed to gain a place of absolute importance both in the consumer field and in business strategies in various business areas. It's the future looks rosy.
FRANCESCO LA TROFA

11/03/2021

In order to consciously approach an emerging technology such as **augmented reality** and its applications, it is necessary to understand what is meant by reality in the digital environment. In our introduction on virtual reality we found that reality has been at the center of the theoretical debate since the times of classical Greece, where scholars and thinkers have alternated over the centuries with their respective theories, up to the present day, thanks to the work of philosophers such as Nick Bostrom, able to inspire all-round influencers like Elon Musk and involve an audience infinitely wider than that of the scientific community.

Despite some obvious theoretical and conceptual analogies, **augmented reality should not be confused with virtual reality**. At the moment, from a technological point of view, the supported AR and VR applications are quite distinct, although there are opportunities for contact and co-existence. So let's see, specifically, what augmented reality is, how it works, what the main technologies are, as well as the most widespread fields of application.

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- Augmented reality in the office
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- Virtual Reality for Defense

Definition of augmented reality and how it works

Even before selecting which of the dozens of definitions best suits our needs, perhaps it is precisely when comparing the two immersive technologies that lies the most practical definition of augmented reality.

Unlike virtual reality, which totally isolates the user during his immersive experience by projecting it into an entirely alternative dimension, augmented reality is in fact distinguished by **projectingcontent in 3D on the vision of the real world**, of the reality that surrounds us.

The user experience is based on the **interactive coexistence between real and virtual elements**. Rather than isolate us to live a situation entirely alternative to the truth, augmented reality aims rather to **"increase" reality with a series of contextual information,** with which users can easily operate, thanks to their exact spatial correspondence with the real elements with which they are accustomed to interacting.

Augmented reality does not offer us a different environment than the familiar one, it keeps us in close contact with the reality that surrounds us, adding information layers in 3D to enable a range of potentially infinite functions. Augmented reality has some distinctive strengths of its technology, including:

- contextual and intuitive information**:** the technological paradigm of augmented reality makes it possible to obtain information that is otherwise impossible to visualize in the real environment. The digital superimposed information layer enables interaction with many content, real and digital, giving rise to applications in any area it provides
- **show the invisible**: augmented reality is capable of detecting what, under normal conditions, the human eye could not see. From the pipes of a plant in a building to the composition of the elements of a complex machine: when they are not physically available, before they are carried out (e.g. construction phases) or to have feedback in the assembly and maintenance phases
- **hands-free operations**: in the case of augmented reality on a viewer, the user can interact with the surrounding environment, as the application allows him to keep his hands free. This is an essential feature both to increase the efficiency of operations and to perform them more safely, without the distractions arising from the simultaneous use of other devices.

Among the disciplines in which augmented reality is more recurring are those related to education (learning/training), operations (guided procedures, maintenance, etc.), collaboration (workplace in

multi-presence) and marketing/sales (omnichannel), but its potential applications are in fact infinite.

Rather than isolate us to live a situation entirely alternative to the truth, ***augmented reality*** *aims to "increase" reality with a series of contextual information, with which users can easily operate.*

Technologies for Augmented Reality

The main technological formats of augmented reality include an output on two types of computer devices: **mobile (smartphone/tablet**) and **dedicated headsets**. In most cases, it is not a question of providing an application variant on the respective formats, but of very different experiences both in design and in the solution to the problem for which AR is used.

Despite the skepticism of some schools of thought, other multimedia formats capable of projecting 3D content into the real environment are often associated with augmented reality. This is the case of projection mapping and 3D holograms, widely used technologies in the event sector, based on influences that derive, as already mentioned, from cinema and science fiction literature (e.g. Star Wars Holodeck etc.).

Augmented reality for mobile devices

This is the widely popular augmented reality format at the moment, with surprising results, considering the success of the most well-known applications, the growing general spread and the fact that AR is a very young technology in all respects.

Technologically, augmented reality applications for mobile use the **integrated technology of smartphones and tablets**, including cameras and sensors for tracking the surrounding environment.

The reason for the success of AR mobile is soon said: a simple app that can be published on the

marketplace of the main mobile ecosystems. There is no need for dedicated hardware, as most consumers already have a smartphone for their own use. In terms of marketing, we are talking about a potential audience of billions of people.

The case of Pokémon Go is already in history. A real killer app, from almost two billion downloads, with millions of coaches simultaneously active in the search for Pokémon in every corner of the world.

An epochal success, in which the game largely surpasses the experience, ends in itself to become the catalyst of online events and in the presence where the pulsating soul of the initiative is the same community. All **thanks to an AR app that makes Pokémon magically appear on the real world**, although obviously they only exist on the smartphone screen.

Its extraordinary success has played a pioneer role, generating confidence in investing by the enterprise brands, who have had the practical demonstration of the power of augmented reality as a tool that can generate a very high involvement for their audience.

Augmented reality for viewers (mixed reality or mixed reality)

Augmented reality for viewers is otherwise known as **mixed reality.** It is not uncommon to find this technological definition in both ways. Due to the average high costs, the spread of augmented reality headsets is currently rather limited. Nothing comparable to the numbers of the mobile AR, but not even to the emerging figures of virtual reality viewers.

At the moment, if we exclude smart glasses (e.g. Vuzix Blade), de facto a smartphone in glasses format, augmented reality viewers mainly enable enterprise applications, where the extraordinary application advantages justify the investment.

From a commercial point of view, the model of mixed reality is therefore rather opposite to augmented reality in its B2C mobile applications: need for dedicated hardware, with high costs and subject to rapid obsolescence.

The current technology reference for mixed reality is characterised by Microsoft Hololens 2, although the offer is rapidly crowding thanks to names such as Magic Leap, NReal, Vuzix, Epson, varjo and many others. These hardware systems are very complex to develop, as they are called upon to miniaturize a very critical computing and vision capability. There are essentially two areas of research and development: increase device local computing power and leverage resources in cloud or other distributed IT architectures. In both cases, the evolutionary path will not be short.

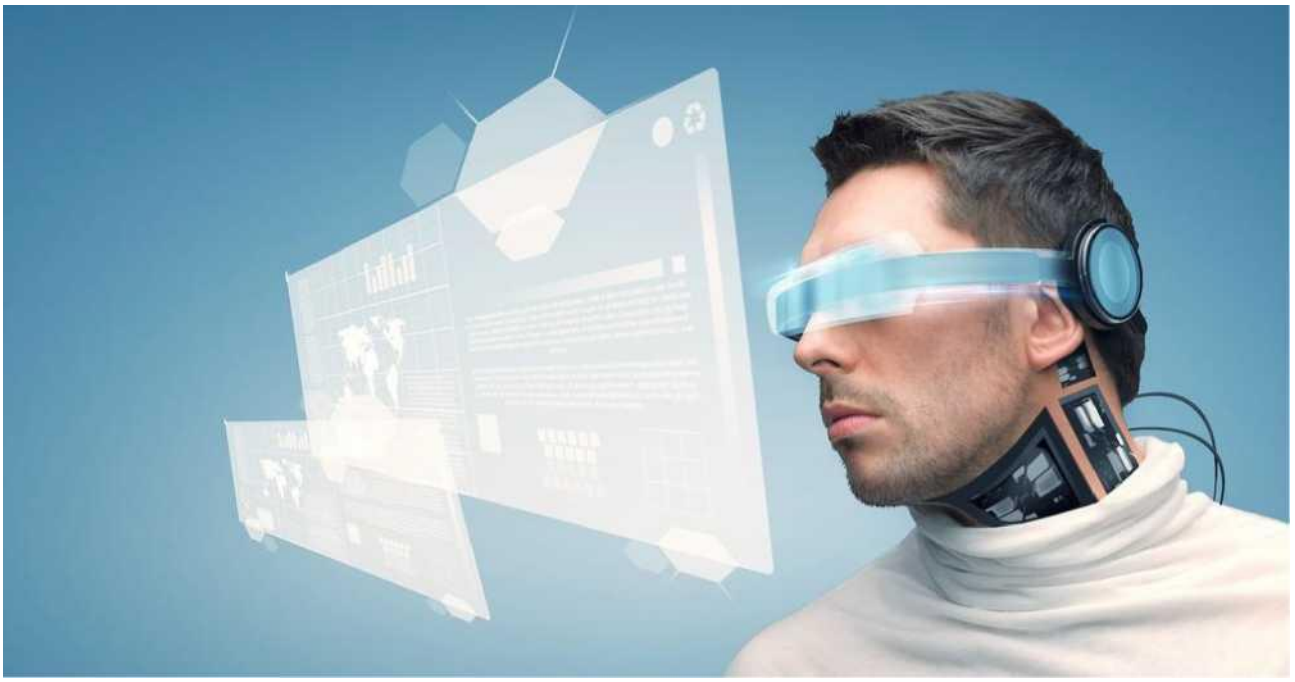
When it comes to exploiting cloud computing resources, the latency times between remote rendering and user interaction on the local application are still critical. In this perspective, the most effective IT architecture to support this logic is probably edge computing, where we already see the augmented reality protagonist of numerous IoT applications in industry (IIoT).

From a technological point of view, the evolution and maturation of this sector could mark the definitive convergence between virtual reality and augmented reality, with a single type of device capable of representing in an interactive way the whole spectrum of reality-virtuality continuum.

Software and applications for augmented reality

There are many development environments for augmented reality applications ranging from a complete and complex 3D engine like Unity, with which you can develop virtually any experience, to many stand alone frameworks that can program within a range of lower possibilities, but tend to be

simpler.
The development frameworks refer both to specific hardware-software ecosystems, such as Apple ARKit for iOS and Google ARcore for Android, and to a more transversal use, as in the case of Vuforia, not bound to a specific platform.
Thanks to its "digital lightness", **augmented reality is able to easily integrate even in applications where it was not natively foreseen**. A particular case is offered by filters. After the great success achieved by Snapchat, Facebook itself has quickly developed Spark AR, a framework capable of creating AR filters for Instagram. These features are able to involve the public immediately, leveraging above all the youngest target, easily inclined to spending on digital channels.



*The technological paradigm of **augmented reality** makes it possible to obtain information that is otherwise impossible to visualise in the real environment. The digital overlay information layer enables interaction with lots of real and digital content.*

What augmented reality is used for, examples and applications

Augmented reality for medicine and health

Although the scope of application is quite different, in medicine we find an approach quite similar to that in the industry, which sees VR employed especially in the training phases and AR for field operations.
In particular, while virtual reality proves useful in the pre-operative planning phases, to simulate and predict any criticality, augmented reality will be in a decisive perspective to provide contextual information during surgery, guiding doctors in the planned operations, detecting in real time any anomaly with respect to the predetermined picture.

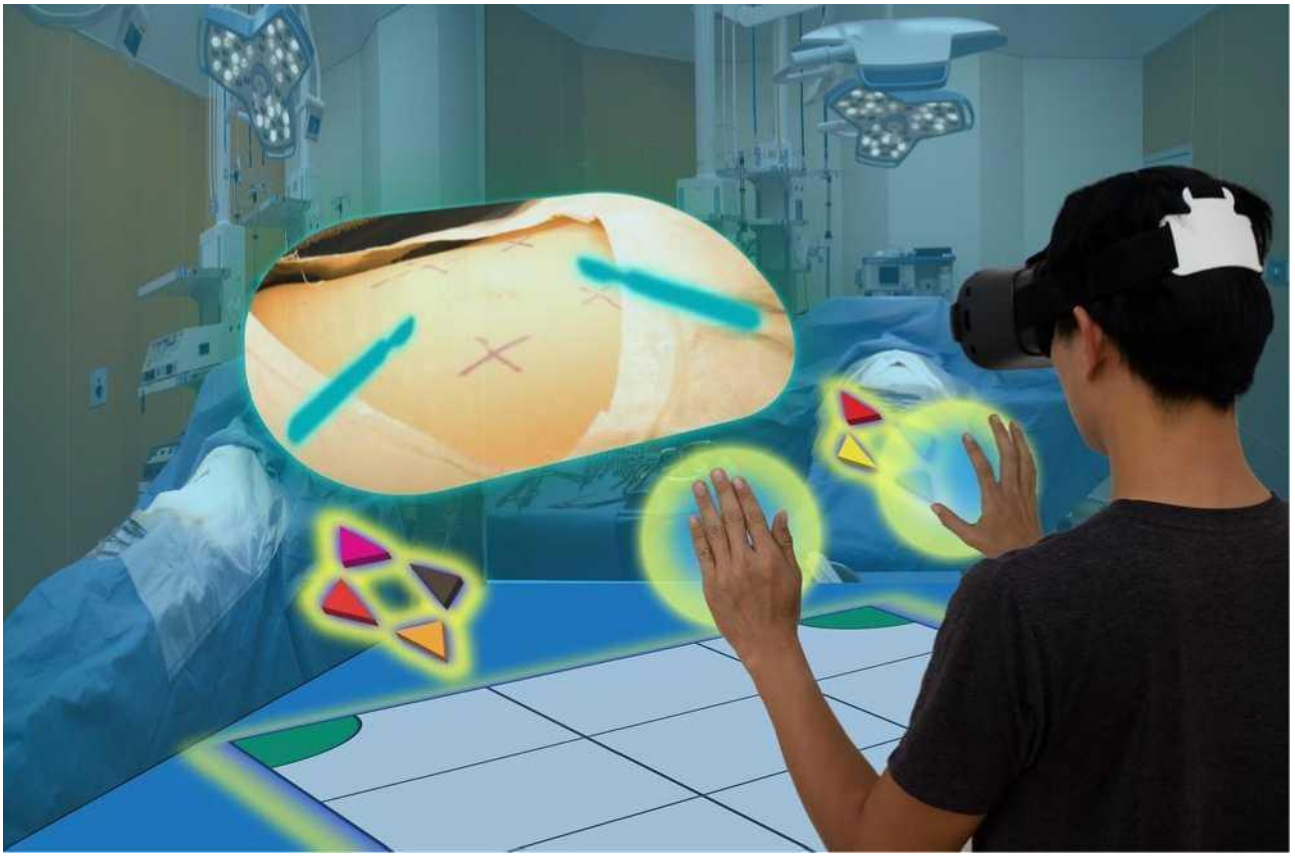
One of the most useful functions of augmented reality is **the tracking and projection on the surface of the body of the internal apparatus**, an area in which significant progress is being made.
Contrary to what one might think, even because of an excessive media emphasis, they are in any case technologies that do not yet have a massive diffusion regarding applications in surgery, where however there is great attention and interest from the medical community, as evidenced by the many experiments taking place. At the moment there are distant applications that involve interventions in

The most frequent uses are to refer to rehabilitative therapies, psychological support, pain therapies or very practical functions, such as identifying the position of a vein to give an injection. Also very interesting is the use of augmented reality in medical communication, for example to visually represent molecular behavior within cells, a useful function for disclosure in the field of cancer.

Augmented reality for school and education

AR offers valuable tools to support teaching, to support **learning by doing processes.** The interactivity of AR applications allows students to develop applications with which students learn by performing operations step by step through a wizard, offered precisely by contextual information in augmented reality.

Learning by doing learning processes are on average more immediate and more effective than learning by book, as it is more immediate and easier to memorise an operation directly. It is therefore possible to develop teaching experiences in AR at various levels, ranging from childhood to university with regard to school education, as well as for all courses related to vocational training and refresher training.



*Interactivity of **augmented reality** allows you to develop applications with which students — even in the university — they learn by performing the operations step by step through a wizard, offered by contextual information in augmented reality.*

Augmented reality in sport

The relationship between AR and sport is very varied, and ranges from applications for training up to those for marketing, which allow sports brands to position themselves in the same strategic orbit already highlighted at the point related to marketing and sales. A further application is the integration **with live events, to** improve the quality of broadcasting with contextual information, useful to the public to better understand what is happening during the competition.

In addition to real-time statistics on matches and races, it is possible to deepen for example the biography of a pilot or athlete engaged at that time, as well as analyse his performance under certain circumstances. Secondly, this kind of application is also useful as an indirect support for sports betting.

Francesco La Trofa

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Virtual reality: what it is, what it is for,
Virtual reality and immersive technologies will revolutionise the way we live reality, thanks to the digital extension to the physical context with which we are accustomed to interacting. Virtual reality is the maximum expression of this concept, thanks to its ability to project the user into a world entirely alternative to the real world.

Virtual reality for learning (training)
VR is widely used in the context of Industry 4.0, to present the operation of complex machines and plants, even without their physical availability. Training is probably the discipline that has so far been able to exploit the full potential of VR, thanks to the ability to develop immersive applications that offer the user the possibility to simulate various situationsand have to make choices, based on the instructions received or evaluating as a result of his instinctive decisions in a given context. This is a horizontal property, as we find VR training applications in virtually all business areas.

Virtual reality in medicine
VR is used by doctors especially in the so-called preoperative planning,in order to evaluate the procedures to be carried out on the patient, in order to detect possible criticalities and increase the chances of success. The simulations also allow to present to the patient the path he/she will have to take in the operating room, in order to increase his confidence and psychological security in overcoming a very traumatic moment.

Patients use VR especially in rehabilitative areas, to recover functions more quickly. In the paediatric field, especially with regard to long stays, in addition to the rehabilitation function, VR is very useful for psychological support.

https://www.disabili.com/scuola-a-istruzione/articoli-scuola-istruzione/scuola-e-disabilita-disponibili-online-resources-per-the-didactic-digital-inclusive-per-students-with-autism
School and Disability: online resources for Inclusive Digital Teaching for students with autism

Some guidelines for distance learning strategies for students with autism for parents and teachers

The pandemic has catapulted us into a new reality, where **many established paradigms are skipped**: one of the many, that **of traditional school and teaching**. In particular compared to pupils and students with disabilities, these changers involved and EADV
They are facing a great challenge, and in the face of this new need, **teachers have had to reinvent methods and tools**.

ANGSA Piemonte section of Turin, Association of Ideas, Centro Rehabilitation Ferrero, Lunetica and Spazio Blu wondered **how to enhance the autistic pupil in distance** learning: from the reflections that have arisen, **some cards have been produced, available online for teachers and parents**, summarising strategies that can be adopted for all students and, especially, children and young people with autism.

The cards start from an important consideration: **that is, the need for all children not to lose their precious connection with the school, their class, comrades and teachers, and with everything that until recently represented their daily lives**. This is even more true for those children who have a particular need for routine and stability, in activities and relationships, such as autistic children. From here some suggestions, which we summarise briefly below, inviting you to consult and download the complete sheets **available free of charge at this link.**

1. CREATE ROUTINES

One thing that can help the child not to miss some points of reference related to the school is to **create routines** in which to also insert the educational activities at a distance. Useful would be to foresee **moments of the day dedicated to school activities**, possibly to be scheduled in advance. The suggestion is also to create **visual agendas** to schedule the activities of the day or the week. These tools can be easily used by the parents themselves, and if **shared** between the different figures that revolve around the child, they can be even more effective.

2. USE IMAGES AND VIDEOS

The second suggestion concerns the activities that can be carried out by the child independently, which should be accompanied by **clear and easily understandable instructions**. For students with autism it is suggested to **support images** to make the information contained in the activities more accessible. The **presentation of videos** is also referred to as another complementary way to facilitate their learning, as it allows contextualisation and consolidation of content.

Any professionals (**educators, psychologists, therapists), who have the opportunity to continue to follow children even at a distance**, have the valuable role of introducing them to these new forms of learning, supporting children in the process of **familiarising children with the new tools**, in particular with online platforms. Among those mentioned, Skype and Zoom, free and easily accessible. Skype is definitely the best known, Zoom right in this emergency period has made free access without time limits. Both, in addition to allowing group video calls, have another important function, namely **"screen sharing".** This **allows teachers and educators to display content directly from their computer and at the same time to support the explanation by voice**; in turn, even the child, sharing the screen, can show the task he is performing, managing to receive immediate feedback. Zoom also allows the division of the class into subgroups, to facilitate cooperative learning and support relations between pupils.

Other tips are available in the **downloadable** online tabs**at this link**

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