

# CAN INNOVATION AND TECHNOLOGY OVERCOME THE CHALLENGES FOR EDUCATION RAISED BY THE COVID-19 PANDEMIC?

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## Abstract

*The paper stresses the permanent relation between the evolution of innovation and technology and education pointing out to the increasing need for a substantial / fundamental change in education that has been manifested before the Covid-19 crisis. Against this background, the Covid-19 pandemic and its consequences (such as social distancing, lock downs, limitations or banning of international travel) have raised serious challenges to the education process at all levels but also to other related processes such as lifelong learning, up-skilling, and re-skilling. The pandemic also exacerbated the inequality issues, the digital divide, and the lack of proper skills for delivering large scale online course from the part of professors themselves. The paper explores several ways in which innovation and technology may help in overcoming these challenges and draws some lessons from the 2020 experience.*

**Key words:** relation between technology and education, intensive information-based society, impact of pandemic on education, online education.

**JEL classification:** O14, O33, O35, O43

## Overview: the relation between education and technology

Since the beginning of civilization when education was rather a form of apprenticeship and most of the learning was represented by “learning by doing” or “hands on approach” an intrinsic relation has been manifested between technology and learning: on the one hand the young had to learn the use of tools and the skills available at that time and, on the other hand, the existing level of knowledge was used for transmitting the skills and abilities. Much later, we can even say some millennia later, education ceased to be just a passive receptor of knowledge and started to participate in the research that led to new or enhanced knowledge about the near and far away environments.

After the onset of the First Industrial Revolution, as science became more present in all human activities (including education, training, and systematic research), education and technological innovation entered a more complex and biunivocal relationship<sup>1</sup>. The main aspects of this relationship were:

- By means of education students were taught various aspects of human knowledge, including the most up to date discoveries;

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<sup>1</sup> Purdue University, (2021): *The Evolution of Technology in the Classroom*, Purdue University Online, at page <https://online.purdue.edu/blog/education/evolution-technology-classroom>

- Education determined a solid base for further research and innovation in the academic circles and, at the same time, a higher number of people could participate to the development of new technologies, even as lonely inventors, simply because they were educated and could contribute to experimenting and the expansion of knowledge;
- According to the specific circumstances of each historical period, new technologies started to be used in education, from printed books to radio and from overhead projectors using slides and transparencies to movies. Since the second half of the 20<sup>th</sup> century until present times new technologies have been added to the list of tools used for education activities, such as: audio and video cassettes, CDs and DVDs, PCs and laptops, tablets, smartphones, internet, artificial intelligence, and so on.

The perception on the relation between education and technology can be illustrated by an interview with the famous inventor Thomas Alva Edison who made in 1913 a prediction that proved to be at the same time visionary and (for a long period of time) substantially wrong. Asked about his opinion regarding the future educational value of motion pictures Edison's replied: "Books will soon be obsolete in the public schools. Scholars will be instructed through the eye. It is possible to teach every branch of human knowledge with the motion picture. Our school system will be completely changed inside of ten years<sup>2</sup>."

While Edison's prediction was not fulfilled in ten years, one can say that after the first decade of the 21<sup>st</sup> century his vision became reality to a large extent as younger generations (and not only) are using images and movies from their TV sets, tablets, computers, or smartphones to access the news, to learn, to socialize and so on while the number of readers of traditional printed books has declined constantly. Nowadays, for many, as Edison predicted in his interview from 1913, the written text is too abstract and difficult to understand, while an image or a movie are self-explanatory, albeit they do not guarantee the understanding of the mechanisms and the relations existing behind the respective images.

One can say that for almost a hundred years since Edison gave the interview technology has been gradually used by education (as an instrument/tool) and incorporated into education (as a body of knowledge to be transmitted to the students). After the first decade of the 21<sup>st</sup> century it was technology (manifested as internet, search engines, mobile communication, social networks, cable TV) that changed the individual and social behaviors of a large part of the population, requesting a significant if not a fundamental rethinking of education because of 2 reasons:

- The human understanding of the environment at micro and macro levels has become much more complex and the notions, concepts, skills, and abilities that must be transmitted to the younger generations require new curricula and new

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<sup>2</sup> Smith, F.J., (1913): *The Evolution of the Motion Picture: VI – Looking into the Future with Thomas A. Edison*, The New York Dramatic Mirror, July 9, Page 24, Column 3, New York.

teaching methods. At the same time, long life learning became a necessity with its own agenda and curricula, adapted to the needs of more senior people;

- The students themselves (from 6 to 70 years but particularly the young ones) changed themselves due to their exposure to incessant distractions: they may be less patient and with a smaller span of attention, more inclined to find the answer and not to learn how to find the answer themselves, more tempted by electronic means and media than by using printed books. Many of them represent the so-called Impulse Generation, characterized by an attention span of 8 seconds<sup>3</sup>. The marketing experts have become aware of the phenomenon long before the teaching staff.

Nowadays one can say that a significant part of the world population lives in an **intensive information-based society**, a society where information and communication are available on different media and technological infrastructures, and they are used for determining and justifying most of the decisions and actions. In this **intensive information-based society** job-related activities, spending of leisure time, social interactions, and education (including life-long learning) are based on internet and supported by a variety of devices that allow access to internet. Without further comments, one can say that the **intensive information-based society** is a **post-industrial society** that was made possible by the availability of new technologies.

In essence, in today's world innovation and technology are essential for human survival, they are used by economy and society and there is a need for a permanent correlation of the level of knowledge with education, both as regards the content and the instruments to deliver the content.

### **The dynamics of the relation between education and technology**

Understanding reality and harnessing the knowledge obtained from this understanding have been the key for the evolution of human societies. Innovation has been essential for the survival of the human race, for the economic development and for the ascent of capitalism as well as for adapting the education process to the characteristics of different historical periods.

Being essential for the survival of human race, innovation had to be permanent, adding layers upon layers on the wealth of knowledge of humankind. On a daily basis, particularly in market economy-based societies, the need for innovation is determined by competition and globalization increased many times the magnitude of competition and therefore the need of innovation. On the other hand, global challenges, such as climate change, put the need for innovation in a new perspective as this time is not about gaining a larger market share at a company level but about keeping planet Earth in a range of parameters that allow the continuation of human existence.

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<sup>3</sup> Murphy, C., (2019): *The Shrinking Attention Span & What It Means for Marketers*, Boston Digital, August 27, at page <https://www.bostondigital.com/insights/shrinking-attention-span-what-it-means-marketers>

In a similar way, during the long periods of history, education has been a perennial, fundamental and systemic human activity. One can say that each technological period has interacted with education because:

- education prepares the young generation for the use of technologies in economic activities;
- education uses technology and innovation;
- education is closely related to research which, in turn, generates innovation.

In order to illustrate the relation between each technological period and the application of innovations in education one can highlight some key moments for the implementation of innovations in classrooms during the 20<sup>th</sup> century<sup>4</sup>:

- The use of radio and the on-air classes, particularly for remote areas, since the 1920s;
- The use of the overhead projector since the 1930s, of the ballpoint pen since the 1940s and of the headphones (particularly but not only for learning foreign languages) since the 1950;
- The use of videotapes since 1951;
- The use of the photocopying machines since 1959 and of the handheld calculators since 1972;
- The introduction of the first personal computer by IBM in 1981;
- The use of Apple's Macintosh computer in 1984 and of the first mass-market consumer laptop made by Toshiba in 1985;
- The beginning of the World Wide Web in 1990 and of the commercial use of the Internet in 1993;
- The use of the first Personal Digital Assistants (PDAs) that were made by Apple Computer Inc. in 1993;

The above list is not complete but presents some moments that changed not only business activities and business models but also education activities, making easier to teach and to learn and thus helping tremendously both teachers and students.

In connection with the above-mentioned concept of **intensive information-based society**, one can say that these key moments (related to the period 1920-1993) represented in a way **the pre-history** of today, a period of building the knowledge and infrastructures that allow the online and virtual existence of today. The interactions and presence in the virtual space involves much more people today than 30 years ago and, at the same time, the frequency of these interactions increased substantially.

One aspect that differentiate the period since the onset of the First Industrial Revolution until 1993 (when the commercial use of Internet became a reality) is that during that pre-history the hardware part (the radio, the overhead projector, the photocopying machine, etc.) represented tools used for the presentations delivered by teachers. After 1993 and the more so nowadays the hardware part became less and less relevant (because it is largely available), the users focusing more on information, content, and message.

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<sup>4</sup> Purdue University, (2021): *Idem*.

During that pre-history of the intensive information-based society the people learned how to understand and how to explain phenomena from the surrounding world and they used a number of tools (represented by certain technologies) during the learning process.

Nowadays, the people are inclined to search the answer (even if that answer can be an outdated, biased, utterly wrong or buried in a huge number of results from the search that offer conflicting views), being much less interested to understand the explanation and, the more so, to be able to demonstrate themselves the explanation. The widespread use of search engines, such as Google, or of social platforms like Facebook, Instagram, Twitter have made each participant both an emitter and a receiver of information, and as result, “what everybody is saying” or “how vocal some groups are when they are saying” became **more important** than “why everybody is saying” or “what is the logic of what individuals and groups are saying”.

One can note that a characteristic of the period that more or less started after the large scale use of search engines (for which we may consider the year 2000) and social platforms (for which we may consider the period 2004-2006) is that with the exception of researchers, scientists and technicians the majority of people is flooded by a huge quantity of data and information and, as result, people can no longer separate the essential from non-essential, the false from the true and the current news from old or fake ones. Learning how to navigate the universe of data and information became a skill that requires adequate education. As result, a new domain of research and a new profession emerged around 2008, namely data mining or knowledge discovery in databases. A sub-field of this domain of research, related to monitoring and improving the education activity is represented by educational data mining<sup>5</sup>.

As a reflection of these changes, during the period 2010-2020 several new technologies found their way into the classrooms and training facilities, among them being<sup>6</sup>:

- large scale access to internet and the common use of smartphones and tablets;
- the use of cloud services and data storage;
- the partial replacement of former audio-video equipment by media streaming;
- the partial transition from laboratories where real life experiments took place to smart laboratories where computer simulations can be used for a variety of domains;
- the large-scale use of distance learning, both synchronous and asynchronous;
- the emergence of MOOCs (Massive Open Online Courses) as a modern manifestation of distance learning<sup>7</sup>;
- the use of AI (artificial intelligence) for teaching and monitoring the progress of students;

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<sup>5</sup> Peterson, P. Baker, E., McGaw, B., (2010): *International Encyclopedia of Education*, 3<sup>rd</sup> Edition, Elsevier Ltd. All, p. 96, 112.

<sup>6</sup> Graves, R. (2018): *How Technology Has Changed Education in the Last 15 Years*, May 9, at page <https://info.thespotonagency.com/how-technology-has-changed-education-in-the-last-15-years>

<sup>7</sup> Rollins, A., (2018): *What's A MOOC? History, Principals, And Characteristics*, eLearning Industry, September 3, at page <https://elearningindustry.com/whats-a-mooc-history-principles-characteristics>

- the larger scale use of collaborative learning (based on more frequent interactions among students and between students and professors using online communication);
- learning outside the classroom (decoupling from the classroom);
- the use of social media in education;
- the emergence of interactivity with the teaching support which reflects the transition from printed text (a fixed form teaching support) to augmented reality (teaching support that reacts to the decisions and answers of the students);
- The use of digital games in education (gamification of education).

We stress again the fact that the above list is far from complete. But being long and diverse it reflects the magnitude of changes that took place in the field of education as result of the emergence and wide scale use of different communication technologies. As in many other cases and areas of human existence the dissemination of innovation and technology in the classrooms have been unequal and differentiated by countries or regions of the countries, by social statute and by other social classifications (age, sex, race, etc.).

The transformation of human interactions that include education will continue, without any doubt, during the next years and we can only estimate that 2030 will represent a vantage point from which the new picture of human society and of its education practices will present itself in more vivid colors.

For the rest of this decade, that is from 2021 to 2030, innovations and technologies that may be implemented and influence education in different areas could be<sup>8</sup>:

- the use of biometrics and of artificial intelligence (AI) for adapting education to individual needs and even to physical and emotional disposition of students, thus making reality the so-called adaptive learning<sup>9</sup>. Education may become at the same time collective (taking place in a classroom) and individual (based on AI evaluations and interactions between each student and the AI based software);
- the use of AI for automatic grading and for providing feedback to both students and professors<sup>10</sup>;
- the large-scale use of augmented reality (AR) and virtual reality (VR) in the teaching and evaluating process;
- the use of blockchain technologies for securing education relating data and the personal data of students and professors.

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<sup>8</sup> Dani, V., (2019): *8 Trends in Education Technology That Will Have A Major Impact*, Kitaboo, 2 January, at page <https://kitaboo.com/trends-in-education-technology/>

<sup>9</sup> Vander Ark, T., (2018): *32 Ways AI is Improving Education*, Getting Smart, 10 August, at page <https://www.gettingsmart.com/2018/08/32-ways-ai-is-improving-education/>

<sup>10</sup> Onlineuniversities.com, (2018): *The Future of Learning - 10 Roles for Artificial Intelligence in Education*, at page <https://www.teachthought.com/the-future-of-learning/10-roles-for-artificial-intelligence-in-education/>

If successful, one concept may put all the above in a completely new perspective. By the end of July 2021 Mark Zuckerberg announced its intention to transform Facebook with its 2.9 billion users into a “metaverse”, a virtual reality world in which people can work, play, and live, or, in his own words, “the ultimate social technology”<sup>11</sup>.

Zuckerberg’s idea is not new. What is new in case of Zuckerberg and Facebook are the resources available and the existing number of users. In 2003 Linden Lab started a virtual reality world called Second Life that claims today, 18 years later, about 1 million regular residents that spend time as avatars in a totally fictional existence. Among other activities that can be performed in Second Life (explore, socialize, create, buy, or sell virtual objects), there are education events such as virtual meetings, classes, or conferences<sup>12</sup>. Without any doubt, such approaches will find a place for education in the virtual reality of tomorrow.

After all this long list of technologies and innovations one can ask: “But where is the role of the teacher?” Or “Is there any more a role for the teacher?” The short answer to this question is a firm: „Yes”. While almost infinite quantities of data and information are available today to everybody able to connect to the internet, the understanding and application of these data and information still requires skills and abilities that cannot be achieved without the presence and interaction with a teacher / mentor. We quote here an illustrative statement that goes beyond simply explaining the role of the teacher and stresses the value of human interaction represented by body language and feed-back: “The act of teaching isn’t just imparting what’s in your head to a captive audience. Teaching is a performance; it’s reading the room and working it. This is where technology really falls short.”<sup>13</sup>

### **The impact of Covid-19 pandemics on education**

The onset of the Covid-19 pandemic and the restrictions that were imposed in various ways on a global scale generated numerous effects in all areas of activity, including education. As education deals mainly with the formation of the young generations, any interruption or distortion of this activity has both immediate or short term and long-term effects. The long-term effects are particularly negative as they may manifest for a large part or even for the whole life time of the persons involved.

### **The immediate impact of Covid-19 pandemic on education**

Under these general circumstances created by technologies that build up since early 1990s, the Covid-19 pandemic affected more than supply and demand, it affected human interactions that represent the basic element of personal lives, performance of arts and

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<sup>11</sup> Wagner, K., (2021): *Zuckerberg Says Facebook’s Future Lies in Virtual ‘Metaverse’*, Bloomberg, 29 July, at page <https://www.bloomberg.com/news/articles/2021-07-29/mark-zuckerberg-explains-metaverse-vision-to-facebook-fb-investors-analysts>

<sup>12</sup> Second Life, (2021): Remote Work and Event Solutions, at page <https://www.connect.secondlife.com/about>

<sup>13</sup> Purewal, H., (2016): *Can technology replace teachers? You asked Google – here’s the answer*, The Guardian, 7 December, at page <https://www.theguardian.com/commentisfree/2016/dec/07/can-technology-replace-teachers-google>

education. A clarification is necessary. Although for the vast majority if not for all the people the Covid-19 pandemic came as an unexpected event, some even called it a “black swan”, based on the concept popularized by Nicolas Taleb<sup>14</sup>, the truth is far from that. The threat of a pandemic situation had been announced for at least 30 years and ignored because it was too unpleasant and costly to be taken into account<sup>15</sup>.

The sudden decision to stay at home and avoid social gatherings has a number of immediate consequences on education. Among them one can mention<sup>16</sup>:

- abrupt discontinuity of traditional, face-to-face classes;
- the frantic search for improvised and ad-hoc solutions for most schools;
- the difficult and many times impossible task for the decision makers at central government and local levels of finding a balance between providing continuous education and securing health;
- an increased role for parents and mentors (who, in many cases were not up to the task for a variety of objective reasons);
- the revelation of the digital divide in a dramatic way (separating children and students into those who could access education and the rest);
- the manifestation of numerous constraints related to education (regarding the curricula, time, and technology available, etc.).

As mentioned above, for most schools the initial responses to the close downs determined by the Covid-19 pandemic were based on improvised and ad-hoc solutions. Everybody used what they had available and what they could implement in the shortest of time. In the following we try to identify some challenges and some responses that were present during these initial responses taken during March – April 2020.

Among **the challenges** one can mention<sup>17</sup>:

- the brutal manifestation of physical limits where online solutions could not be applied (areas with no electricity, no internet, lack of equipment, etc.);
- the lack autonomous learning ability at home for students and lack of expertise for teaching online for teachers. To this one can add the lack of skills and abilities of parents or tutors in helping their children with online education;
- the need to identify alternative means of delivery for content (for instance, the delivery of teaching support in a physical format by mail where internet was not available);
- the need to adapt the curricula and exams to the new circumstances (for instance, the so-called Coronavirus syllabus in some US states or in India);

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<sup>14</sup> Taleb, N., (2007): *The Black Swan: The Impact of the Highly Improbable*, Random House.

<sup>15</sup> Henig, R.M., (2020): *Experts warned of a pandemic decades ago. Why weren't we ready?*, National Geographic, April 8, at page <https://www.nationalgeographic.com/science/article/experts-warned-pandemic-decades-ago-why-not-ready-for-coronavirus>

<sup>16</sup> Reimers, F.M., Schleicher, A., (2020): *Schooling disrupted, schooling rethought. How the Covid-19 Pandemic is Changing Education*, OECD – Global Education Innovation Initiative.

<sup>17</sup> Miks, J., McIlwaine, J., (2020): *Keeping the world's children learning through COVID-19*, UNICEF, 20 April, at page <https://www.unicef.org/coronavirus/keeping-worlds-children-learning-through-covid-19>

- the need to develop and implement mechanisms for interaction among teachers, students, parents, authorities, etc.;
- the need to alleviate the aggravation of long-term inequality.

Among **the responses** to the above-mentioned challenges there were<sup>18, 19</sup>:

- the use of whatever technology was available and its adaptation in innovative ways (for instance by sending teaching support by mail in rural areas or transforming school buses into Wi-Fi - hotspots);
- the decision to deliver teaching content according to curricula to the maximum extent possible (that is to do the maximum that could be done and accept the limitations);
- to allow for more initiative at level of schools and teachers in order to face immediate problems.

### **The long-term impact of Covid-19 pandemic on education**

Although as of mid-year 2021 the impact of Covid-19 pandemic is less acute than one year ago, the crisis is still far from being finished and therefore there is a need to assess the long-term impact of it on education.

The first long-term impact can be estimated at a macro-economic level. Because many children in many countries or regions of countries lost some classes or had a lesser understanding of the subjects during the 2020 lock downs, they have a lower level of qualification, are less likely to finish or continue their studies and these facts may affect their entire life because they will have lower salaries. This phenomenon can be called “unfinished education” and it is not specific to the pandemic period. But the pandemic magnified the phenomenon, while at the same time amplifying the inequalities. According to a study for the United States done by McKinsey & Company, these implications may represent a loss of GDP between 128 to 188 billion US dollars<sup>20</sup>.

Beyond the economic implications of the education losses, in our view the assessment of the long-term impact of Covid-19 pandemic on education needs to take a holistic approach, including in the discussion at least 4 stakeholders:

- society at large from political decision-makers to psychologists and sociologists, from business to innovators, including the system of values, the education targets for each education level, etc.).

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<sup>18</sup> Tugend, A., Jordan, P.W., Stein, M.A., (2020): *How Schools and Colleges Are Innovating During the Pandemic*, Future Ed, 9 December, at page <https://www.future-ed.org/how-schools-and-universities-are-innovating-in-the-pandemic/>

<sup>19</sup> OECD, (2020): *The impact of COVID-19 on student equity and inclusion: Supporting vulnerable students during school closures and school re-openings*, 19 November, at page <https://www.oecd.org/coronavirus/policy-responses/the-impact-of-covid-19-on-student-equity-and-inclusion-supporting-vulnerable-students-during-school-closures-and-school-re-openings-d593b5c8/>

<sup>20</sup> Dorn, E., Hancock, B., Sarakatsannis, J., Viruleg, E., (2021): *COVID-19 and education: The lingering effects of unfinished learning*, McKinsey & Company, 27 July, at page <https://www.mckinsey.com/industries/public-and-social-sector/our-insights/covid-19-and-education-the-lingering-effects-of-unfinished-learning>

- students of all ages, based on dialogue with their representative associations;
- teaching staff at all levels and school administrations;
- parents or tutors.

Such an assessment that can be carried out at a regional, national and international levels should capitalize on the experiences and best practices of 2020, thus identifying solutions that worked and those that didn't work. What we have today is a relatively large number of partial assessments done at a local level or done from an individual point of view. A systematic, national, or even international approach is still to be done and, in our opinion international organizations like OECD or the World Bank can play a positive role in catalyzing dialogue.

Anyway, an overview of the point of view expressed until now reflect some common issues and topics that require further examination. Among them there are the need to:

- develop future abilities for students of all ages such as: self-motivation and self-monitoring, capacity for independent learning, capacity to learn on-line including the use of communication technology and software;
- provide the infrastructure for on-line education from access to internet to the availability of computers, tablets, smartphones, etc. for all children;
- provide training and even full courses for teachers for using online teaching technology as well as for communicating and interacting with students while being online;
- re-design the curricula at all levels both for adaptation to the needs of the 21<sup>st</sup> century and for teaching online. A continuous collaboration with society at large, with the participation of parents and business environment is more than welcome.

### Conclusions

While the immediate risk of a massive pandemic has been known in scientific circles for at least 30 years, the onset of the Covid-19 pandemic came for the general public and the vast majority of administrations as a big and unpleasant surprise. The Covid-19 pandemic has had a major impact on economic and social life, including the area of education. In the following we try to synthesize some results, measures taken and things to be done in the field of education in order to overpass the consequences of the losses and, at the same time, in order to align the curricula and teaching methods to the current level of development of science, economy and society.

In the field of education, the restrictions imposed by authorities due to the Covid-19 pandemic have acted as a catalyst/accelerator for implementation of new technologies and innovations. A rethinking of the curricula and education methods and tools has been anyway necessary due to technological, social, and economic changes that took place in the last 20 years. As the Covid-19 pandemic happened, all this re-thinking has been done due to necessary, rather than due to a plan.

Given the dimension and implications of the losses in education at all levels, due to lower quality of teaching during online courses or during blended courses as well as due to the impossibility to attend classes in either format **the remedial actions have to be designed on the basis of a wholistic and long-term scale** (including at least several years of action).

In our view such remedial actions should take into account, be adapted and be specific for:

- the less favored social categories;
- the types of individual cases because the impact of Covid-19 pandemic on education has been rather differentiated;

At the same time, the existing and emerging technologies and innovations should be implemented in education in order to:

- provide an up to date and larger scope of knowledge, skills and critical awareness;
- prepare students for the new national and international environment, including aspects related to climate change, the new context of globalization, new technologies, changes on the labor market;
- Include new categories of competences like “creating new value” and “reconciling tensions and dilemmas”<sup>21</sup>.

Because education is first and foremost about students (the persons that are educated, irrespective of their age) the new approaches to education should provide adequate measures and techniques for:

- preparing the students, particularly during the early years for 2 aspects: self-motivation and critical thinking. These 2 traits may prove to be the key to their success and adaptation to an ever-changing world;
- preparing the students for remote study in different formats (including in augmented reality and virtual reality);
- providing a clear understanding and balance between what is essential, what is desirable and what is optional in education.

Putting things into a simple perspective, the difference between success and failure in education in the coming years will be made the following option: to reject the change or the embrace the change. How adequate and successful the embracing of change will be is everybody's guess. But one thing is clear: it better to go with the flow of history rather than to oppose it.

A final thought was inspired by a Dr Edward K. Brown, a senior director with African Center for Economic Transformation:” Education must be a crisis priority, not an afterthought”<sup>22</sup>. The real recovery and adaptation of societies and economies to the challenges of the coming years can happen only by prioritizing education, by allocating serious resources not only financial, but also human and political, so that humankind can recover, adapt to climate changes, transition to new technologies and still remain human.

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<sup>21</sup> OECD, (2020): *The OECD Learning Compass 2030*, at page <https://www.oecd.org/education/2030-project/teaching-and-learning/learning/>

<sup>22</sup> Brown, E.K., (2021): *Education must be a crisis priority, not an afterthought*, 2 April, at page <https://acetforafrica.org/media/opinion/education-must-be-a-crisis-priority-not-an-afterthought/>