Education for the Future : New Challenges, New Responses

Report of the EvalUE expert group prepared for UNESCO in the framework of the Global Education Coalition

EvalUE
EVALUATEURS & EXPERTS DE L'UNION EUROPÉENNE

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INTRODUCTION

. INTRODUCTION

When UNESCO, during the Covid-19 pandemic, launched the Global Coalition for Education and invited the various actors in education, civil society, and the public and private sectors to work to guarantee educational continuity, the Association of Experts and Evaluators of the European Union (EvalUE) wanted to contribute to this reflection and share the proposals of its experts within this Coalition. Its members work as experts in the fields of education and training for several European agencies and at international level.

The work of the Coalition takes place in the context of the ongoing work of the International Commission for the Future of Education exploring 'opportunities for anticipated, possible and preferred futures'1, intersects with the work of the European Education Area 2025 and beyond and the launch of the new European programme Erasmus+ 2021-2027, whose key theme is inclusion.

The new European area of education and training under construction aims to achieve more cohesive, inclusive, sustainable and resilient societies, and should thus contribute to the personal and professional development of citizens in a rapidly changing world, and allow the development of active and responsible citizenship by ensuring a digital and ecological transition.

Our contribution aims to formulate new objectives for education (chapter 1), to define more inclusive and equitable models (chapter 2), to explore new ways of learning with digital technology and to propose a draft charter on the protection of the rights of users of the internet, websites and social networks (chapter 3), to question the governance and steering of educational institutions and the ways in which education systems are evaluated (Chapter 4) and to reflect on lifelong learning by sharing recent developments in the expertise available in this strategic area (Chapter 5).

In doing so, we seek to respond to the multiple emerging needs in many areas and to bring about learning societies that are more supportive, more responsible, more inclusive and therefore more resilient. We need to convince people by aiming for sustainable education that is accessible to everyone and by proposing the amplification of mobilising narratives on the scale of large regions, coupled de facto with partnerships.

In this respect, the European Charter of Social Rights sets out as principles for the European Union the right to inclusive, quality education, training and lifelong learning, the right of children to affordable, quality early childhood education and care, and the right of children from disadvantaged backgrounds to benefit from specific measures to strengthen equal opportunities.

Building on these foundations, our association offers this report on the issues and challenges of tomorrow's education. The working group that produced this report is made up of experts from EvalUE and members of IDEFFIE, Initiative pour le développement de l'exper- tise française et francophone à l'international et en Europe, our partner association.

1 https://fr.unesco.org/futuresofeducation/

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Our work was coordinated by one of the members of EvalUE, Armand Beuf, former member of the European Commission's Steering Committee on Training. EvalUE is deeply committed to the Global Coalition for Education and is guided by the provisions of the Treaties which allow the European Union to develop relations and build partnerships with third countries, and with international, regional or world organisations which share its fundamental values such as the ...principles of equality and solidarity ... and to promote multilateral solutions to common problems, in particular in the framework of the United Nations'[2].

We are convinced that education and training will undoubtedly remain privileged vectors for the construction of these long-term partnerships and we hope that our forward-looking report, which concludes with mobilising stories, will be able to inspire those working in the fields of education and training and thus accompany and even anticipate the changes of the years to come.

Viviane DEVRIESERE, President of EvalUE

2 Article 21 of the Treaty on European Union in OJ of the EU C115 of 9 May 2008 page 28.

CHAPTER 1 :

THE NEW OBJECTIVES FOR EDUCATION IN THE WORLD

. CHAPTER 1 : The new objectives for education in the world

In the space of a few months, with the onset of a pandemic that no one could have foreseen, the world situation has been turned upside down to the point where it is now accepted that
It is now clear that the "next world" can only be permanently different. It is therefore necessary to prepare for it. Since it cannot escape this inevitability, education, like all other sectors, must also change radically. While major reforms are therefore essential, a distinction can be made between those that concern all countries and those that are the responsibility of countries with medium and modest GDPs.

. New objectives for all countries

In all countries of the world, education must now focus on meeting all the new challenges that concern it by transforming itself profoundly to become "sustainable" and by ensuring that the following seven objectives are achieved

1 Integrate into educational programmes lessons that lead students, enriched with new skills, to know how to behave in a more responsible way in terms of the environment and health (grouped together under the term "eco-citizenship") since the current pandemic, which is likely to last, could well be followed by others. These new programmes will enable future citizens, i.e. pupils, to be more socially responsible, to assume more responsibilities together and thus to contribute to sustainable development, "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (3).

2 Enriching education by integrating key elements of emotional intelligence, enabling students to acquire emotional intelligence skills (social-emotional skills) and thus to be more successful in the classroom.

3 Create a digital education in the sense that didactics and pedagogies will be completely rethought to adapt to the use of digital tools instead of doing the opposite, i.e. adapting digital tools to current didactics and pedagogies without changing them. This is a major paradigm shift. This new education will facilitate the inclusion of students with difficulties, regardless of their social background. It will also facilitate broader professional development for teachers because it is less costly.

4 Implement digital governance in schools and universities in the sense that digital tools will make it easier for teachers and parents to become more involved in the running of schools.

5 While recognising that the use of social networks can serve collective purposes, enable students to be more informed about current issues and develop their creativity, capacity for expression and sociability, teach them how to use them to their full potential. social networks by knowing how to identify fake news, and why they should refrain from using them; they should also be taught why they should not contribute to various conspiracy theories and how to avoid certain abuses (denunciation, mockery, publication of private photographs of others, capture of private data).

3 Brundtland Gro Harlem, Our Common Future, World Commission on Environment and Development, 1987

6 Designing and implementing educational justice that consists not in giving pupils in difficulty, often from disadvantaged backgrounds, the same education as pupils from other social classes, but a different education, based on John Rawls' principle of "justice as fairness" (4), enabling them to compensate for their initial handicap resulting from their lesser vocabulary, their poor command of school codes and their insufficient general education. This educational justice will increase the educational and social inclusion of these pupils.

7 Evaluate the quality of education systems and then establish the remedies needed to improve it. This evaluation will be based on the following six criteria used in the synthetic quality index: effectiveness, efficiency and equity of education systems and the engagement of students, teachers and parents (5).

By transforming itself into a sustainable education, the new education will contribute to the development of a more cohesive, responsible, inclusive and therefore resilient civilisation. It is indeed essential to recognise that today education is no longer only a humanistic project, as developed by Jacques Delors for UNESCO (6); it is now also a project with linked political, social and democratic aims.

In today's world, characterised by the rise of individualism, communitarianism, populism and illiberal democracies, which weakens social ties and is fuelled by social networks, societies are undermined, as are solidarity, mutual aid and the common good. Only a sustainable education, involving a major change of scale in its role, can protect democracy from the perils that threaten it, as is already the case in illiberal and populist democracies and authoritarian regimes where freedoms are diminishing, while elsewhere a certain democratic despotism, already denounced by Tocqueville, is taking hold under the pressure of the principle of equal rights, which must now be replaced by the principle of equity.

Hence the importance of education, an essential vector of primary socialisation which enables pupils to learn to live in society, i.e. to accept differences, respect the rights of others, and internalise social norms and democratic values. It is through education that a peaceful democracy is built, because it is through education that we learn to resolve conflicts and disagreements peacefully. Moreover, the indispensable democratisation of culture requires, as Bourdieu noted, that schools privilege the culture that is

It should be the culture that is transmitted, not the culture that is inherited (7). Finally, a sustainable education requires the integration of citizenship education into the curriculum so that students learn and understand their future responsibilities.

4 Rawls John, A Theory of Justice, Belknap Press, 1971.

5 Hugonnier B. and Serrano. G., Reconciling the Republic and its school, chapter 7. Éditions du Cerf, 2016.

6 The project was based on four pillars: Learning to know, being, living together and doing. At the time, it was more a technical than a political project, Delors himself stating that it was "a broader conception of education which should lead each person to discover, awaken and increase their creative possibilities". Delors Jacques, Education: The Treasure Within, UNESCO, 1999

7 Bourdieu Pierre, Les Héritiers, Éditions de minuit, page 35, 1985

It is also necessary to take into account the serious problem, highlighted by the PISA surveys, of the current trend whereby in a growing percentage of countries the number of students experiencing difficulties in school is increasing while the number of high achievers is decreasing. As a result, the number of students who will be able to control their own destiny is decreasing, while the number of hands by which their future will be decided is decreasing, thus increasing the risk of despotism and thus the challenge to democracy.

Education should not only consist of the acquisition of knowledge and skills; it should also, as Dewey already emphasised, help students to develop their potential and to become citizens, thus leading to social changes but also to reforms (8).

Sustainable education is not a choice, it is a categorical imperative. Without falling into an educational Leviathan, it is essential, through a political project, that current education systems recognise their shortcomings and their entropic nature in relation to humanist, social and democratic objectives so that democracy is less the consequence of education than its source (9).

. New, more specific objectives for countries with medium and low GDP

While the goals of developing sustainable education are universal, it is useful to put forward additional goals for countries with a medium or modest GDP. Following the outbreak of the pandemic, the education sector in these countries was forced to opt for distance learning on the spur of the moment. This situation has revealed, in addition to the great precariousness of health, other weaknesses: the lack of technological infrastructures and the lack of continuous training of human resources and the need for reforms to establish or even complete, or even rectify the educational policies carried out up to now. Ten objectives should guide these reforms :

1 Ensure free access to the Internet for all. As education is to be democratised, all school-age pupils must be able to follow their courses whatever the existing impediment: pandemic, confinement, physical incapacity to travel, lack of means of transport, absence of teaching aids, or others. A stable and free internet connection is the only guarantee of schooling for all.

2 Provide digital education in the most widely used international languages such as English, French, Spanish and Mandarin for science and cross-curricular subjects, and in other local languages of each country for subjects related to religion, culture and civic and artistic education, throughout the pre-school and primary cycle.

3 Provide access to schooling for all pupils of the appropriate age : from five years to 18 years for formal education, and from five years and throughout life for non-formal and informal education10. Education should no longer be thought of only in terms of preparation for the labour market, but rather as the cornerstone for building a global citizen.

4 Revisit the classification of disciplines in the commonly accepted fields of study when it comes to the knowledge taught. Since Aristotle, a distinction has been made between scholarly knowledge and knowledge that is taught or teachable. It is important to offer a range of courses that could be suitable for all types of students: academic courses (basic or specialised) and vocational courses (with targeted outlets).

8 Dewey John, Democracy and Education: An Introduction to the Philosophy of Education, New York: Macmillan, 1019.
9 Fleury Cynthia, The Pathologies of Democracy, Biblio-essays, Livre de poche, 2005.

5 Provide each family with a "smart device" as a minimum (a television, a computer, a tablet or a telephone, depending on the capacities of each country) and ensure all payment facilities to enable households to acquire new ones, at the rate of one connected device per person in each family. In other words, one free device for the whole family to start the operation and low-funded devices in the long term, to ensure the autonomy of each family member over fifteen years (see 2021-2036 strategy).

6 Pragmatically mix face-to-face and distance learning based on the experience of educational partners during the Covid-19 pandemic in terms of hybrid learning.

7 Rethink existing pedagogies, by calling on specialists, in order to propose new innovative methods that would rethink the teacher/pupil relationship, since there will no longer be any question of face-to-face contact. Call on producers and directors in the media industry to optimise future educational products. The teacher is an animator, and should therefore receive training and treatment similar to that of his or her fellow journalists and TV and/or social network animators.

8 Train educational partners in digital distance learning by declaring 2023 a year dedicated to digital. The education sector would benefit from devoting one year of each student's education to the initiation and then mastery of digital education. Training sessions will be organised for all partners in the sector: pupils, professionals (teachers and administrators), parents and NGOs.

9 Prepare the content of training for educational partners in 2022. Through collaboration between education and media industry professionals, a range of educational products such as tutorials, video clips, documentaries, educational films and other innovative products deemed useful will be produced and will constitute the content of the training courses planned in 2023 for all educational partners.

10 Create a new body responsible for the implementation, monitoring and annual evaluation of the objectives of the New Digital Education Strategy 2021-2030. The participants in the EvalUE-UNESCO education coalition could form the core of this body, which could be joined by other international experts to design and monitor a new strategy capable of meeting the expectations of current schoolchildren and preventing any slippage that could undermine the operations undertaken to train a world citizen who is cultured, open and useful to himself and to those around him.

. What objectives and priorities for the world in terms of education?

It has thus been possible to put forward that for all the countries in the world seven objectives prevailed and that in the case of countries with a medium or modest GDP, there were 10 other objectives. All these goals can be grouped into four main families:

10 UNESCO, Educational Reasons, Olivier Maulini, Cléopâtre Montandon, University of Geneva, Observatoire Compétences-emplois, Canada, 2004.
Http://www.oce.uqam.ca/article/apprentissage-formel-informel-non-formel-des-notions-difficles-a-utiliser-why/

Table 0: Families of goals

Family of objectives	Objectives for all countries	Objectives for countries with medium and low GDP
Rethink knowledge, skills, pedagogy in the light of current societal, health and economic issues	- Global skills (acquisition of eco-citizen and socio-emotional skills)	- Review the classification of subjects in the commonly accepted fields of study when it comes to the knowledge taught. - Rethink existing pedagogies, calling on specialists, so as to - Rethink existing pedagogies, calling on specialists, in order to propose new innovative methods - Prepare the content of training for education partners
More inclusive and equitable education systems	- Educational justice	- Provide access to schooling for all pupils of the required age: from five to 18 years old - Ensure free access to the Internet for all.
More inclusive and equitable education systems - Digital didactics and pedagogies	- Digital governance - Good use of social networks - Providing digital education in the most widely used international languages	- Provide digital education in the most widely used international languages - Providing digital education in the most used international languages - Equipping every family with a - Provide digital education in the most used international languages - Provide every family with a "smart device" as a minimum - Phase out face-to-face teaching face-to-face teaching - Train educational partners in digital distance learning
Regular evaluation of institutions (effective use of digital technology for steering and governance), education systems and policies.	- Regular evaluation of the quality of education systems	- Create a new body responsible for the implementation, monitoring and annual evaluation of the objectives of the New Digital Education Strategy 2021-2030.

CHAPTER 2 :

INCLUSIVE AND EQUITABLE EDUCATION SYSTEMS

. CHAPTER 2 : Inclusive and equitable education systems

The goal of any education system is to ensure the academic success of all students. This is also the dream of every parent: that their child gets good grades at school and moves on to the next grade; it is also the criterion on which the PISA surveys are based, assessing the performance of students in more than 90 countries around the world in reading literacy, mathematics and science.

However, in recent years, emphasis has also been placed on two other factors, this time of a social nature. The first is to ensure that the principle of equality is respected, according to which all pupils, whatever their gender and origin, must have access to schooling free of charge: the norm is now between 10 and 12 years of age for primary and secondary education (i.e. between 6 and 16 or 18 years of age). This is the principle that education systems should be inclusive.
The second is to ensure that the principle of equity is respected, which, according to the OECD, requires, on the one hand, a minimum level of education for all (e.g. that by the end of the first year of primary school all pupils are literate and numerate); and, on the other hand, equality of opportunity, which means that personal and social circumstances (gender, socio-economic status, ethnic origin) should not be an obstacle to the realisation of pupils' educational potential. This means that the role of any education system is to compensate for the possible disadvantages of pupils, whatever their nature, and in any case to avoid aggravating and perpetuating them.

. The level of inclusion in the world

Depending on their level of development, major differences in inclusion prevail between countries. According to UNESCO11 , universal education for all by 2030 could be achieved for primary education. However, by that date, only 6 out of 10 young people in the world will have the opportunity to complete secondary education. But while this will be the case for 89% to 62% of young people living in the richest countries, it will be the case for only 53% to 26% in the poorest countries (see Table 1).

Table 1 : School completion rate in % by 2030

	High-income	**High-income countries Middle-income countries**	**Countries Low-income countries**	**World**
Lower secondary	100	93	68	89
Lower secondary	97	89	53	81
Upper secondary	91	62	26	60

11. http://uis.unesco.org/sites/default/files/documents/meeting-commitments-are-countries-on-track-achieve-sdg4-en.pdf)

. Equity in the world

Many factors, both endogenous and exogenous, are at work in educational equity. Exogenous factors are listed in Table 212. Their frequency and the severity of their consequences for children in developing countries increase down the list.

Table 2 : Exogenous risk factors affecting the quality of education

1 Pauvreté
2 Maladies infantiles
3 Famille monoparentale
4 Sans-abri
5 Famine
6 Travail des enfants
7 Situation de conflit armé
8 Trafic d'êtres humains

Of course, some of these factors may also be present in developed countries - notably poverty, disease and single-parent families - but this is out of all proportion to the situation in many developing countries, where sometimes all of these factors are present to a much greater extent and with greater effects on the quality of education. According to the World Bank13 , half of the world's poor are children (nearly one billion) and about 70% of the poor aged 15 and over have never attended school or have received only basic education. More than 150 million children are forced to work and therefore cannot receive any education14 ; and more than 350 million children live in conflict zones15 where, of course, receiving an education is difficult if not impossible.

The question is whether the importance and impact of these factors will diminish over time or not. This may be the case for the first five. It is much less certain for the others so that the final outcome is uncertain.

Table 3 lists the endogenous factors that can directly influence the quality of education. Consider for example the first one (access to kindergarten). According to the PISA surveys, students who receive one or two years of kindergarten education have on average an increased performance in mathematics in PISA of 26 or 37 points respectively (38 points representing one year of education). Unfortunately, while kindergarten is increasingly common in most OECD countries, it is still rare in developing countries.

Table 3 - Endogenous factors affecting the quality of education

Accès à la maternelle
Nombre d'années de formation des enseignants Qualité du matériel didactique
Qualité du curriculum
Ratio nombre d'élèves / enseignant
Langue d'enseignement différente de la langue maternelle
Utilisation de pédagogies interactives Utilisation de moyens numériques
Utilisation d'une évaluation formative Qualité du climat scolaire

12 Hugonnier B. Unequal World, Unequal Education, in Léna, P. (ed.), Children and Sustainable Development : A Challenge for Education, Springer Verlag, 2016.
14 https://www.unicef.fr/dossier/exploitation-et-travail-des-enfants
15 https://www.reuters.com/article/us-global-war-children-idUSKCN1FZ00M

A similar analysis can be developed with regard to most of the other endogenous factors listed in Table 2, the first five of which are often considered the most important. In almost all cases, developed countries are making progress, while developing countries are making less progress, with some exceptions. Therefore, the impact of endogenous factors on the quality of education increases the inequalities in education between developed and developing countries.
As a result, combining the impacts of exogenous and endogenous factors on the quality of education in both groups of countries leads to the conclusion that educational inequalities between developed and developing countries can only increase over time.
The question remains as to whether inequalities within each of the two groups of countries tend to decrease or increase.

. Inequality among developing countries

Table 4 clearly shows that large disparities prevail among the enrolment rates of students in the six major developing regions of the world. The two extremes are sub-Saharan Africa, where 18% of primary school-age children are not enrolled, and Oceania, where the percentage is only 3%. The differences are even greater when it comes to secondary school, with the percentages for sub-Saharan Africa and Oceania rising to 36% and 5% respectively.

Table 4 - Schooling rates by world regions in percentages

Region	Primary	Secondary / Tertiary
Sub-Saharan Africa	18	36
North Africa and Middle East	10	13
Central and South Asia	7	15
East and South-East Asia	3	9
Latin America and the Caribbean	3	7
Oceania	3	5

Source: UNESCO - 2019 estimates - © Inequality Observatory

But there are also significant differences within a region. For example, in Africa, the inhabitants of Congo benefit from a higher number of years of education than the inhabitants of Somalia and within these countries other inequalities also prevail according to the area.

Table 5 : Years of education by country and area

Country/area	Country/area	Rural area	Urban area Poorest	Urban Richest area
Somalia	0.95	3.11	0.30	3.80
Congo	6.54	10.05	5.61	10.92

Source: UNESCO, 2018.

It can even be concluded that educational inequalities will tend to increase as long as some countries develop faster than others; this implies better educational opportunities for their population than in countries lagging behind in their development.

The latter countries should, in theory, be better supported by official development assistance (ODA). However, most of this aid is directed towards industrial and technical projects and very little towards education. Combining the results of the two cases (inequalities between regions and within a region), one can only conclude that inequalities in education tend to increase in developing countries.

. Inequalities among developed countries

In all countries, students' performance is on average explained by their socio-economic status (social determinism). Where schools cannot compensate for this factor, educational equity generally changes less rapidly than in the average country and vice versa. Table 6 lists the OECD countries where these two situations occurred between 2015 and 2018.

Table 6 - Changes in educational equity 2015-2018

Change in equity below average	Change in equity above average
Australia, Austria, Canada, Czech, Republic, Estonia, Finland, Greece, Iceland, Ireland, Korea, Latvia, Lithuania, Luxembourg, Netherlands, New Zealand, Poland, Portugal, United Kingdom, Slovenia, Sweden, Switzerland	Germany, Colombia, Chile, Belgium, Bulgaria, United States, Israel, Hungary, Luxembourg, New Zealand, Mexico, Portugal, Slovak Republic, Turkey

Source: OECD, 2018.

As the table shows, in 21 countries (60%) out of 35, equity in education has changed less rapidly than the average. This means that inequalities between students from low-income backgrounds and other students are not sufficiently reduced in these countries.

. Conclusion

This chapter has shown that inclusion in education, which is almost no longer an issue in advanced countries, often still is in developing countries. Equity, on the other hand, remains a problem in a significant number of countries in both groups.

The chapter also found that inequalities in education are likely to increase between developing and developed countries, as well as within this group. Such inequalities need to be addressed. If not for humanistic reasons (why does a child born in Peru receive an education that is, on average, 7 years lower quality than that of a child born in Japan?), then at least for economic reasons: higher human capital leads to better employment and higher income; and for social reasons: as the educational level of the population rises, so does civic and civic participation and general health.

It should be remembered that the United Nations' fourth Sustainable Development Goal states that inclusive and equitable quality education and lifelong learning opportunities should be ensured by 2030. This requires major reforms but also massive official development assistance for education for developing countries.

The following measures are therefore necessary: exogenous risk factors should be greatly reduced in developing countries, with priority given to reducing poverty, health problems and child labour, all of which limit young people's opportunities to access quality education.

Regarding endogenous factors, in developing countries, priority should be given to the quality of school buildings, teacher training, the quality of the curriculum and teaching materials, and the reduction of pupil-teacher ratios. Furthermore, development aid for education should be significantly increased and better targeted.

Finally, in all countries of the world, equity in education remains an important issue that should be given much more attention and more active action plans.
CHAPTER 3: Digital technology as a tool for inclusive, equitable and effective teaching and learning, and for better social relations in educational institutions

While digital technology was already being used to some extent in schools prior to the global pandemic, it has since become a powerful tool for teaching, learning and socialising, as well as for social relations between the various stakeholders in education.
However, the optimisation of this tool still requires reforms in order to achieve its primary objectives of inclusion, equity and also innovation. This applies to teaching and learning; to the training of teachers in the use of digital technology; but also to the use of mobile phones and social networks in schools.

CHAPTER 3 :

THE USE OF DIGITAL TECHNOLOGY IN TEACHING AND LERANING

. CHAPTER 3: The use of digital technology in teaching and learning

The arguments in favour of the use of digital technology are the following: it allows for learning that is more adapted to the level of the pupils; more personalised learning, with each pupil learning at his or her own pace; better relations between pupils and teachers; the development of useful skills such as communicating with others, working collaboratively; the awakening of curiosity and imagination in pupils; and finally, preparation for professional life, where digital technology is becoming more prevalent.

There are objections to digital technology in schools, namely that it leads pupils to type more often than they write; that it leads to a habit of using only the computer and the Internet instead of using research, reflection and analysis skills; that it can lead to a loss of critical thinking and encourage pupils to choose the easy way rather than the hard way.

. Why has digital technology not yet been as successful as hoped in education ?

The main reason is that many teachers still use it mainly as a support for their didactics and pedagogy when the opposite should prevail,

That is, they should adapt their current didactics and pedagogy to the new digital tool. This is a crucial paradigm shift because the resulting new education facilitates the inclusion of pupils with difficulties, regardless of their social background, and ultimately leads to a more equitable education because pupils from modest backgrounds make more progress in the classroom. It also allows for much greater professional development of teachers at lower costs, which is essential for countries with low GDP where initial teacher training is often still limited. The use of digital technology in teaching and learning can therefore only take place if certain conditions are met.

There is also the clear question of materials and infrastructure for easy access to information. It is therefore essential that each pupil has a computer in good working order and that the WIFI is sufficiently powerful to allow good connections between the pupils' computers and the teacher's, even during busy periods. The equipment should be able to cope with the demands, while the continuation of school activity at home should be accompanied by the provision (donation or loan) of computers or tablets. The recent health crisis has revealed the great need in this area. The deployment of digital technology in the classroom must be backed up by very substantial investments, for which it will be necessary to ask what proportion of public funds should be earmarked for education, and what cooperation/collaboration can be implemented between the public and private sectors, and even between countries. Even at this early stage of deployment, the costs of maintaining these materials and networks must not be overlooked.

It is therefore to be expected that the rich countries will be the first to make these investments and that the other countries will fall behind in educating their populations. Unless consortia can be developed that allow several countries to pool their financial and research resources, which is desirable. The resulting expansion of digital use around the world should obviously be done in an environmentally friendly way to limit greenhouse gas emissions.

However, there are still other obstacles to the widespread deployment of digital technology, this time in the professional practices of teachers, which are still often not very well served by this tool. This may certainly be due to the lack of interest of some teachers in new technologies, but it may also be due to a lack of impetus from the authorities or a lack of training.

. How can digital technology be successfully introduced into schools ?

It must be recognised that the most important thing is the successful introduction of digital technology into schools. This objective implies the following measures :

- Establishing a legal framework (see the draft UNESCO Charter at the end of this chapter) to secure and protect all Internet and digital users in schools to control the proper use of the Internet and digital technology. Establish a legal framework (see draft UNESCO Charter at the end of this chapter) to secure and protect all internet and digital users in schools to control the proper use of social networks and data.
- Digital transformation of schools along business lines, i.e. digitising all functions and tasks in schools that can be digitised.
- Digitise all school curricula and abolish textbooks.
- Train all staff, teachers and pupils in the use of digital tools (computer, tablet, internet, social networks, etc.).
- Rethink teaching methods and pedagogies to adapt them to the use of digital tools.
- Develop student self-assessment programmes for all subjects and train teachers and students in their use.
- Provide all pupils with a computer (starting with the most disadvantaged pupils).
- Provide schools with sufficient WIFI to serve all students and teachers in the school.

. Training teachers in the use of digital education

The massive arrival of digital technology and its use during the lockdown has highlighted certain issues relating to teachers' relationship with digital technology. Until the recent health crisis, many were wary of digital technology because they did not master it, often because of a lack of training.

In practice, the following salient facts can be noted: teachers are not always comfortable using digital technology and/or designing teaching tools adapted to digital technology; the time required by teachers to prepare lessons has increased, as the switch to digital technology is time-consuming; in a hurry, teachers do not have the necessary hindsight to know how to use digital technology wisely; they do not always have the necessary digital equipment to be trained in its use, especially in countries with a medium or modest GDP.

In-service teacher training (or professional development) is a sensitive issue in both OECD and non-OECD countries. In all cases it is a question of lack of time, and in the second group of countries of lack of financial resources.

The use of digital technology can address both these problems and increase efficiency. Indeed, digital technology offers the following advantages :

- Offering training according to personal needs and on a continuous basis (MOOC, online courses, etc.)
- Letting teachers choose when they want to train as several sessions are available.
- Offer different levels of training on the same topic.
- Leave tools available after the training is over.
- Create a platform for exchange and collaboration between participants who can
- continue after the training.
- To follow training courses around the world and thus have richer points of view.
- Connecting teachers from OECD countries with those from medium and low GDP countries.

- Considerably reduce the cost of training as it does not require premises or travel.
-

. What incentives are there for teachers to make greater use of digital training ?

- Provide teachers with quality digital equipment for professional use.
- Implement initial and in-service training programmes to develop a genuine digital culture and
- and develop strong digital skills.
- Develop online certification courses (MOOCs) that allow for more and cheaper training.
- Create platforms for teachers so that they can share their practices and difficulties and also consult each other on possible solutions and new approaches.
- Fostering the collective intelligence of teachers through the creation of Learning Labs in schools or through the creation of
- Labs within schools or other similar means by vir- tual means. These are innovative spaces that provide the educational field with ecosystems for experimentation and innovation, new forms of work and collaborative learning.

. Social relations within educational institutions

Too often, schools are seen as having education as their sole purpose, but they have another major purpose, which is socialisation. Not only that of the pupils, but also that of the social relations between teachers and pupils and between teachers and parents.

Mobile phones and social networks, modern communication and socialisation tools that were banned in schools for a long time, are now recognised as essential tools for communication, socialisation, teaching and learning.

Everyone can see that young people now rarely leave their mobile phones behind and use them very frequently. Does this mean that the smartphone should be excluded from the school environment and that teachers should be prevented from using it? On the contrary, new teaching practices must be adapted to integrate this tool, which facilitates interaction between pupils, between pupils and teachers and between pupils and their parents, into teaching.

. The benefits of mobile phones

For the teacher, having the possibility of reaching a pupil, or the community of pupils, the class group, without waiting for material conditions conducive to face-to-face exchange, reinforces his or her capacity to react. In the same way, the almost immediate feedback that the pupil can have makes the relationship effective: work on errors, for example, can find favourable ground. Taming the mobile phone can thus help pupils to learn better and also to learn at their own pace, leading to more equitable teaching.

For the pupil, asking the teacher a question immediately when he or she is out of inspiration or in a situation where he or she needs help, and knowing that he or she will get the answer without delay, is beneficial for his or her motivation and maintains interest.

As a new tool, perfectly mastered in its daily use by young people, the mobile phone can also be a source of creativity and invention in the artistic fields, but also in the more intellectual disciplines, when, for example, the pupil will share his or her thought process in order to solve a question that has been put to him. Moreover, the almost permanent presence of the smartphone can be seen as an assurance for the pupil not to feel isolated in case of difficulties.

All sorts of educational or pedagogical situations are thus given a new light thanks to the use of this object. Educational sites (ministry, universities, associations) are full of ideas.
A charter of use should necessarily be signed by the parties (school institution and teachers on the one hand, parents and young people on the other) on the conditions of use of mobile phones at school so that school life remains harmonious for all.

. The contribution of social networks

The use of social networks in the classroom is profoundly changing the nature of the relationship between students and teachers. The vertical, top-down relationship between the teacher giving the lesson and the student listening is being replaced by a horizontal, quality relationship between the actors using the same tool, the social network. The masterly position of the teacher disappears, he/she takes on the posture of a companion to propose work to the pupils and together they will be able to research/exchange/test/construct which obviously constitutes new and more stimulating relationships for both the pupils and the teacher. Finally, as the pupils have a much more active role, the acquisition of their knowledge and skills can be expected to be much higher.

While digital technology facilitates individual student learning, it can also help them learn collectively: for example, a small group of students can form a focus group working together on a question or problem posed by the teacher by exchanging information with each other by e-mail during class time or from home. This collective work allows everyone to participate, which is in itself an effective experience to encourage pupils to build together in a democratic process.

. Socialisation of pupils

It is well known that adolescents and young people in general have a great need for socialisation, whether in terms of family relationships and friendships, exchanging information, communicating and sharing all kinds of activities with other young people, or meeting new people. Mobile phones and social networks, which have developed over the last ten years, undoubtedly offer them a number of ways of satisfying these needs, with a quality and speed of execution that did not exist before, and almost free of charge. These tools would therefore have a positive effect on adolescents since they can improve their communication and social links, but also their collaboration and communication skills, which ultimately leads to a higher level of civic engagement and also to a greater understanding of the problems and issues of society. It is also important to recognise that these tools help to break the isolation of children with disabilities or who are geographically isolated.

However, social networks have certain shortcomings that are often denounced by pedagogues, sociologists and psychologists. Three problems prevail: the first is withdrawal. By staying connected for a long time on social networks, young people disconnect from the real world and unconsciously withdraw into a virtual world. The second danger is the risk of harassment that social networks allow, which can include insults, dissemination of personal information and private photographs. The last danger is the dissemination of false information (Fake news) that young people do not always know how to decipher and whose harmful effects are now known to everyone.
It is up to schools to alert pupils to the limits of social networks and their dangers, but also to the responses to be made to limit their effects, which can sometimes be disastrous.

. Relations between teachers and parents

Here again, a new world is opening up with digital technology: that of transparency. Communication between teachers and parents is now facilitated by electronic messaging and SMS, so that a delay, an absence, an illness, a problem or any other misunderstanding can be settled quickly. The electronic lesson and homework book also avoids many 'misunderstandings', as does the electronic notebook. The relationship between teachers and parents, which used to be tense, is now much less so.

The health crisis, which has forced them to work together even more, has brought them closer together. Of course, the situation is not yet ideal, but it must be recognised that digital technology is a force for progress in many areas: archiving, sharing, retrieving and transmitting documents facilitate, if not automate, many administrative tasks, and make it possible to keep a large number of people informed quickly with few resources and little effort. The effects on the quality of human relations and consequently on the efficiency of the systems are out of all proportion to the financial investments required.

. Draft UNESCO CHARTER ON THE PROTECTION OF THE RIGHTS OF USERS OF THE INTERNET, INTERNET SITES AND SOCIAL NETWORKS

Preamble

1 The development of websites and social networks of all kinds has profoundly changed the way the world communicates, interacts, seeks information and consumes. In addition to the General Data Protection Regulation (GDPR), the guidelines presented here aim to protect the rights of users of these sites and networks in due consideration of.

2 **Data flow*** : Personal data* is free to flow freely and completely from its original owner* into and between all countries.

3 **Ownership of data** : the physical and intellectual ownership of data deposited on a website (private or public) or on a social network by a natural person is de jure in its entirety.

4 **Use* of data** : every natural person must be informed if a company or an administration processes or uses his or her data. He or she may exercise the right to obtain a copy of the data; to prohibit their storage and use; and to demand their rectification if they are inaccurate or incomplete; as well as their deletion, re-capture and reduction of the duration of their use.

5 **Confidentiality** : any use of personal data must respect without exception their personal nature and confidentiality.

6 **Transparency** : All sites that can be consulted on the Internet, as well as all social networks, must indicate whether they use cookies; inform the owners of the data of the purpose of these cookies; specify the use they can make of them; and give the users of the site the possibility, in all cases and without exception, of choosing in the order of: refusing cookies, selecting them or accepting them, without this choice limiting access to the site in whole or in part.

7 **Remuneration of original data owners*** : Given the impossibility of remunerating the original data owners, 70% of the revenue from the commercial use of the data must be paid to national or inter-national public interest funds.

8 **Child protection** : Manufacturers of any digital device, which allows the viewing of images or films from the internet, must commit to blurring human rights and the risks to children.

Guiding principles

***9* Use of websites and social networks** : Apart from reasons of national security and data privacy, there should be no restrictions in any country on the free use of the internet, the connection to websites and the use of social networks.

10 all those of a pornographic nature where the user is under 16 years of age.

11 States undertake to take all necessary measures to ensure compliance with these principles and to protect Internet and social network users against cyber attacks while preserving their cyber freedom.

*** Definitions**

- *Personal data is information of any kind that identifies a natural person by any means.*
- *An Initial Owner is any natural person who voluntarily or involuntarily deposits personal data on a website or a social network.*
- *The use of data includes all operations on data aimed at collecting, recording, consulting, copying, modifying, altering, transmitting, disseminating, lending and selling them. Data collected for private use are not concerned.*

CHAPTER 4 :

A NEED FOR NEW FORMS OF GOVERNANCE STEERING AND EVALUATION OF QUALITY

. CHAPTER 4 : A need for new forms of governance, steering and evaluation of quality

. Introduction

In the 21st century, education systems have seen the rise of globalisation and the acceleration of the development of many phenomena: technologies and artificial intelligence, mobility, and climatic, economic or political exoduses; pressure exerted by supranational organisations, by NGOs, by the market or by philosophical or religious bodies, but also social networks; invasion of GAFA in all areas of life, including schools... The current Covid-19 pandemic has shown more than ever that education is not just a matter for the school: it is no longer 'framed' but scattered in the private homes of children, teachers and parents; pupils and their teachers are together without being in the same place, sometimes in an office, sometimes on the dining table, next to adults who may be teleworking or other children who are playing more or less noisily. The pandemic has shown that this 'school outside the walls' needs media to function: teachers need a laptop and a good quality internet connection, and for convenience a printer and a mobile phone (or landline) to contact pupils and their families, especially in cases where spontaneous contact has not been possible; pupils need to have similar adapted tools and to be able to use them under acceptable conditions. This is far from being the case and inequalities have increased with the pandemic. Thus, in addition to the need to set new objectives and take into account new approaches to learning and socialisation, it is essential to rethink the governance, management and quality assessment of the education system and the school. This is the purpose of this chapter before addressing the issue of new capacities for lifelong learning.

. A new form of governance to be constructed

Governance is much more than government or management. In the original and practical sense of the term, to govern is to steer a course. To lead is to decide the course.

The concept of governance appeared for the first time in the work of the OECD: the role of managers in relation to that of shareholders was in question, the former sometimes tending to go beyond their responsibilities, particularly in countries practising Anglo-Saxon capitalism, unlike countries practising Rhenish capitalism (Germany, Switzerland, the Netherlands). Principles of good governance have thus been developed to promote a new balance between actors within companies (1) and governments (2). In the long run, companies and governments will be able to use digital technology to improve their governance, which will become de facto digital.

Especially in a world that is changing towards horizons that are very difficult to predict (it is said that to govern is to foresee), education systems can no longer be satisfied with the paradigm of government and must evolve towards an evolving paradigm of governance.

In this framework, governance refers to a complex system of decision-making entities that regulate one or more areas of activity. The notion of governance implies the notion of a complex system (in the sense of Edgar Morin) and of multiple entities, operating in specific contexts and interacting with each other and facing unexpected events. No single entity has the power to decide the course, but each one is concerned and wants to take part in decisions. Within the education system, "learning networks" are thus established and the interactions between them make it possible to build a learning organisation.

There is therefore no single "leader", at most a "moderator" appointed by the parties concerned for a very limited period of time, with numerous internal networks and substructures that are relatively autonomous (such as educational establishments, training institutions, research institutes, etc.), with numerous partners (agreements, contracts, joint projects, etc.), where the mechanisms for collective decisions are constantly being built around multiple projects, where the main thing is the regulation mechanisms and the evaluations carried out.

Moreover, the education system of a country maintains interactions of real dependence with other national (social, economic, cultural) and supranational systems (for example, it signs conventions with international organisations). An education system is therefore much more than a set of schools to be coordinated. Education takes place in many places, some of which are formal (schools), others non-formal (such as a youth centre), and still others informal (such as the places where they live). Furthermore, an education system is enriched by the experience of other education systems (e.g. the objective of the creation of a European Education Area (EEA) or the mobility experiences of the Erasmus programmes or the exchanges between schools in the North and South).

The sharing of experiences between networks, within the same education system and between education systems, enables each institution to become "increasingly learning organisations". This is indeed a new form of governance that is being built: it is no longer hierarchical and vertical, but horizontal, where the network's decision-making and regulation mechanisms are collective. Governance itself becomes learning. An eco-system, rather than a juxtaposition of entities, is built and evolves under the pressure of change, which is perceived much more as an opportunity than a constraint. Such an eco-system is a partnership: each of the institutional and personal actors brings its own specific expertise and learns from the expertise of the other.

In summary, we can hope that learning communities, learning organisations and learning governments are the precursors of a learning society, as desired by the Taddei report16.

. Schools : a need for governance and leadership rather than steering

It is easy to understand that in the context of navigation or aviation, the pilot has and takes full responsibility for decisions, especially at critical moments. One does not pilot an education system and one can no longer simply pilot a school.

In the bureaucratic model, the school is a specific organisation, where legal texts (e.g. statutes) define the areas of responsibility of the entity concerned and, within it, who has the power to decide, to act, to represent it before the courts, and to report externally and internally. The leader is generally surrounded by a team under his responsibility (often formed by him), to which he can delegate responsibilities (and take them over), surrounded by one or more internal councils whose opinions may be, depending on the case, consultative (without obligation for the leader) or executive (often on financial matters). This is a classic case of small and medium-sized organisations (public and private): an SME, a maternity hospital, a college, etc. The pandemic crisis showed that this model, which is hierarchical and rigid, could not cope with it. It showed the importance of the commitment of institutional or personal actors, of their emancipation from prescribed or tacit rules, of their dynamism in seeking opportunities to respond to the specific situations encountered, of the new interactions they established with other actors who became partners.

16 Taddei J-F., Becchetti-Bizot C. and Houzel, G., Vers une société apprenante, Rapport sur la recherche et développement de l'éducation tout au long de la vie. Paris: Ministère de l'Éducation nationale, de l'enseignement et de la recherche, 2017 https://www.education.gouv.fr/vers-une-societe-apprenante-rapport-on-research-and-development-of-education-all-round-5843

With the crisis, leadership has emerged as an indispensable component of school governance. Defined as the process by which a person influences or federates other people or organisations in order to achieve certain objectives, leadership can take different forms: authoritarian or top-down in reference to hierarchical status, charismatic due to the moral authority of the person, transformational or focused on the transformation of practices in the institution, instructional or focused on academic results, pedagogical or focused on teaching practices. These different forms of leadership can co-exist in a school, but what characterises learning governance is the negotiated sharing of responsibilities and the complementarity of the different forms of leadership.
This is an essential feature of the 'agile' and learning governance of educational institutions

While such developments are taking place, it should not be forgotten that governance within schools depends on the choices made in terms of decentralisation, school autonomy and the possibility of creating communities of schools. The long-term trend is towards increased decentralisation, with more responsibilities being given to local actors (regions, cities, other local authorities), but also to school heads. Greater autonomy for schools is another trend, while school communities are a model that is not yet widely used. As a result, the role of school heads is changing: instead of being subject to a number of instructions (and being evaluated on their ability to follow them diligently), they are called upon to take or encourage more initiatives (and are now evaluated on the choice and success of these initiatives); they are also led to take greater account of the opinions of other stakeholders in the school (other school managers, teachers, parents, local authorities, various interfaces, ministry representatives, etc.), which profoundly changes the governance of schools. This profoundly changes the governance of the school. School heads must therefore be better trained, not only for administrative tasks but also for pedagogical support and guidance; to encourage teamwork among teachers; to be able to work together in a team; and to be able to manage the school. To rely more on the commitment of the actors rather than on their compliance with injunctions; and finally to be more involved in the evaluation of teachers and to draw conclusions for a better and to draw conclusions for possible professional development.

. Digital governance, a necessity for schools

How can the transformation of school governance into digital governance contribute to improving the efficiency of education systems and their adaptation to societal changes? This is the question that must now be addressed in the era of the digital revolution.

Since the advent of the internet in the mid-1980s, the business world has understood from the outset that data is the 'oil of the 21st century', because now there is not a single function in an organisation that is not carried out with the help of a mobile phone, a computer, a tablet or a mainframe computer. Today, all companies, from multinationals to SMEs, as well as the self-employed, are in the process of making their digital transition (also known as digital transformation) by computerising everything that can be computerised. The management of a company must be distinguished from its governance. The former concerns the vision and organisation of the company, its general strategy and the means used to achieve its objectives. The second is the distribution of powers between the different leaders (shareholders, managers, executives, employees, etc.); but also the way decisions are taken. While management is the responsibility of the company's management, governance is the responsibility of the Board of Directors. Compared to the corporate world, the school world has fallen far behind.

Supported by increased school autonomy, digital governance of educational institutions17 is undoubtedly the next revolution in education. Indeed, thanks to the digital transition it implies, it will enable school heads and the various entities to have all the information they need to optimise their governance; teachers to further improve their practices in order to move towards a more inclusive and fairer education; all pupils to have access to the best learning methods; and other school services to increase their efficiency.

The digital transition of schools18 is a complex and lengthy process which, in order to succeed, requires the participation of all and, as we have seen, certain specific conditions to be met. Schools are lagging behind in the digital transition. It is therefore necessary to get down to work quickly. Especially as the possibilities of digital technology are increasing with, for example, blockchain, immersive simulations, serious games and connected objects, not forgetting the cloud, which allows considerable savings to be made on software.

Of course, digital governance is not a panacea that will solve all the problems of education. Progress will certainly be made, but it will not be enough to compensate for the contrary effects of educational policies if they are not themselves modernised. It is necessary to change the "classic school form" which closes and creates solitary work patterns. Actors can no longer be satisfied with attending training courses planned by external bodies, but must use digital tools to seize the opportunities available in the environment (not only on the Internet but also with colleagues and external partners) to continue to train professionally, to deal with problems encountered and to enter into new projects.

It is therefore about reassuring the actors in the face of the "arrogant digital" (generated by those who want to make it a power by reserving their control) and going towards those who share their experience. It means creating support and accompaniment strategies within the institution, and not simply providing an infrastructure and tools.

Digital embedding is therefore an accelerator of change, a strategy for stimulating innovation and change, and ultimately for creating 'collaborative intelligence'.

. Three essential postures to develop

Developing such collaborative intelligence in governance (communities of practice and learning, learning organisations and ultimately a learning society) requires three essential postures on the part of institutional and personal actors.

The first is the "co-" posture : collaborating, i.e. working as a team; cooperating, carrying out operations with others; co-constructing, building systems or pro- ductions with partners; forming communities of practice and learning; coordinating them to make the institution a co-learning organisation and an educational community or to constitute a learning network with external partners; to produce collective intelligence by giving to others and accepting to receive from others something valuable by trusting them and surrendering to their benevolence and good faith; and thus to work for the common good. Both organisations (schools, training institutions, research centres, local organisations, etc.) and individuals (the pupil in his or her class group or at home, the teacher alone in his or her class and isolated among colleagues, the manager hiding behind his or her hierarchical status, the parents remaining outside the school walls, the trainer holding theoretical knowledge, etc.) carry out a solitary and not very supportive work (references to TALIS reports). Organising time and space to foster a "co" posture is one of the challenges to be faced in developing the posture.

17 http://www.oecd.org/corporate/principles-corporate-governance/OECD. The OECD Digital Government Policy Framework: Six dimensions of a Digital Government, 2020.

18 OECD, Education Governance in Action: Lessons from Case Studies. OECD Publishing, Paris, 2016 http://www.oecd.org/corporate/principles-corporate-governance/

Linked to the first, **the second is a posture of recognition**. Recognising the other means situating him or her in his or her history, context and status, not only with his or her own resources and experience but also with his or her difficulties and needs. To recognise the other is to accept them as they are and as beings in the making. Recognising others means valuing them and highlighting the value they bring to the common project. Recognising others means showing them signs of recognition, signs that are too rarely shown (especially by the institution) and yet are a driving force for human commitment. As Paul Ricoeur points out, the posture of recognition makes the other "visible"; too many modes of organisation or communication make the other "invisible" despite physical proximity.

These two postures are characteristic of a third posture, if it is well understood : **the posture of accompaniment**. Accompanying the other means sharing the bread (cum- pane) with him or her, i.e. their resources and experiences. Accompanying another person means sharing with him or her the path (cum-camino), i.e. walking with him or her, doing a stretch of the road with him or her. To put oneself in a posture of accompaniment means that the accompanier is aware that by accompanying the other, the accompanied becomes in turn his or her accompanier, in the sense that not only does the accompanied learn from the accompanier, but the latter learns just as much from the accompanied. The "class labs" initiated by Europe are laboratories for supporting change in education in connection with digital technologies and the governance of action; the quality of the changes produced is largely the result of the support methods provided within the institution and between partner institutions.

. The essential evaluation of education systems

As is well known, quality education is of crucial importance for the development of the competitiveness of economies, the dynamism of societies and the well-being of citizens.

Until five years ago, there was no indicator to measure the quality of education systems; the first in the world was created in 2016 (Hugonnier-Serrano -2016). This indicator was then composed of five main criteria: the effectiveness of education systems, measured by student performance; the efficiency of systems, measured by the ratio of system efficiency to system costs; the equity of systems, represented by the system's capacity to reduce the educational inequalities of students regardless of their social background; and finally the commitment of teachers and students, without which an education system cannot obviously progress. Parental engagement, which was not taken into account in 2016 due to a lack of data, was also taken into account in 2018.
Each of the six criteria was composed of six statistics, making a total of 36 statistics for the summary quality indicator (SQI) of education systems in OECD countries.

. What lessons can be drawn from this indicator ?

The indicator led to the following ranking in 2016 :

Best quality education system : Finland, Switzerland, Ireland, Japan, Estonia.
Good quality : Canada, Poland, Korea, Ireland, Denmark, Netherlands, USA
Satisfactory quality : Germany, Australia, Portugal,
Insufficient quality : United Kingdom, Norway, Luxembourg, Spain, Slovenia, Belgium, Sweden, Czech Republic, Hungary, Austria, New Zealand, France, Mexico
Unsatisfactory quality : Turkey, Italy, Greece, Chile, Israel, Slovak Republic

The five 2016 criteria can be seen as policy instruments since - beyond their measurement - each can be seen as a tool that can contribute to increasing the quality of the education system. Moreover, acting on one of these tools can obviously have an effect on another: for example, improving teacher engagement can have a positive effect on equity. It is therefore interesting to calculate the 25 cross-correlations between the 5 criteria.

These correlations have led to the following highlights :

- Pupil engagement only has a significant effect on efficiency; this effect is negative: it is therefore not an effective policy instrument ;
- Teacher engagement has significant effects on only two levers (effectiveness and efficiency) and the effect on efficiency is negative: it is therefore an instrument to be used with great caution ;
- Effectiveness has significant effects on three levers - student engagement, teacher engagement and equity -: it is thus an interesting instrument, but it has a negative impact on students and should be used with caution ;
- Efficiency only has significant effects on two levers - teacher commitment and equity - and the effect on teacher commitment is negative: it is therefore an instrument to be used with great caution ;
- Equity only has significant effects on two levers - effectiveness and efficiency - but they are positive: it is therefore an interesting instrument.

The conclusion is that two instruments should be favoured : *equity first* and efficiency second. Equity is in fact the only one of the five instruments that leads to increases in the other four instruments. Equity leads directly to a marked increase in efficiency and effectiveness and to a lesser degree in student and teacher engagement or vice versa. It is therefore in essence the first tool to be used. Effectiveness can also be considered, but to a lesser degree, because while it increases teacher engagement and equity, it leads to a decrease in student engagement.

Another important piece of information of a political nature is the *summary quality indicator* (SQI), which tells each country where its strengths and weaknesses lie, since presumably each country can have good and bad scores across the five criteria. The QSI will therefore enable each country to take steps to capitalise on these strengths and to address its weaknesses.
Finally, the relevance of developing a synthetic indicator of the quality of education systems depends to a large extent on the use made of it by the countries concerned. If a country can already see from its ranking where it stands in relation to other countries and learn from this, it is probably even more important to determine the policy measures it can use to improve its score in the long term.

The approach taken by many countries in the past has often been to learn from the practices of the top-ranked country and, if necessary, to learn from them by implementing them themselves. The limitation of this approach is that practices that have been successful in one country do not necessarily produce the same results in another, as the context is often very different.
It is therefore no longer appropriate to look at the good practices of the best-ranked country, but at those followed by those that are making the most progress. It has thus been shown (Gerard, Hugonnier, Varin[19]) that the countries whose QSI improved the most between 2015 and 2018 were those that focused their education policy on improving the equity of their education system and on increasing the commitment of their teachers. This is an important paradigm shift from the previous focus on increasing the quality of education systems, as measured by student performance, and on student engagement. It is precisely this kind of unique education that makes a quality indicator of education systems valuable. The ISQ is a good indicator of the quality of education systems, especially in the context of the current crisis.

19 GERARD F.M. HUGONNIER B., VARIN S. Indicateur synthétique de la qualité des systèmes éducatifs des pays de l'OCDE (to be published in the Journal of Educational Sciences in 2021).

CHAPTER 5 :

DEVELOPING CAPACITIES THROUGOUT LIFE

. CHAPTER 5 : Developing Capacities Throughout Life

. Why is lifelong capacity building so important ?

Two international conferences were held in Helsinki in 2017 and Basel in 2018, where 150 and 100 experts from the Association for Medical Education in Europe (AMEE) respectively came together to share their thoughts on how to deal with the 'wicked problems' facing their institutions. Building on the work of these two conferences, Eyogang and Menning (2019), two researchers specialising in 'Human Systems Dynamics' (HSD), show that as a result of the increasingly rapid pace of change in our societies, the number of wicked problems is growing, the time to solve them is becoming shorter and, as a consequence, this requires the upstream development of skills to cope with the unexpected and to be able to live in a world of uncertainty, to learn throughout life20 and to adopt what Kant called "reflective judgement" and not just "decisive judgement "21.

But why are these problems 'wicked'? Eyogang and Menning note that they cannot be addressed by traditional strategies, because unlike traditional strategies: (i) they are defined differently by the multiple perspectives that can be taken; (ii) they appear differently in each context; and (iii) they cannot be completely resolved. The hindsight we are beginning to gain from the Covid 19 pandemic makes this particularly clear. We cannot solve the problems posed to education systems, let alone completely, on the basis of a health perspective alone (let alone on the even more reductive epidemiological basis alone). Even within a country, contexts are varied and call for analyses that are not strictly identical (e.g. two schools, one in an advantaged environment and the other in a disadvantaged environment); what can be said then about the way the problem is posed in different regions of the world ? Furthermore, a this pernicious problem always hides another, often more fundamental one, which implies a permanent posture of vigilance and awakening.

The observation by Charbonnier (2020) that the OECD has been able to identify more than 500 reforms of education systems since 2000 should not surprise us, because reforming education is indeed a wicked problem, because the three characteristics identified by Eoyang and Menning (2019) are well met. Similarly, the prediction by the American firm Wagepoin that 60% of occupations in 2030 do not yet exist confronts us with the pernicious problem of curricula, both prescribed or formal, and latent or informal, implemented and evaluated. We can no longer rely on pre-defined norms generalised to a whole system (i.e. the result of a single decisive judgement), but must live with uncertainty, which requires the use of reflective judgement that (i) circumscribes each problem from multiple perspectives, (ii) looks at how it translates into different particular contexts, (iii) does not seek to solve them completely because in the meantime the problem will evolve in its form or give rise to another one.

20 As far as the EU is concerned, the theme of lifelong learning remains a strategic focus of the Council of Education Ministers of the 27 EU Member States.

21 The decisive judgement is made by having universal categories or concepts, which have the value of certainty. The decisive judgement hardly takes into account the particular (context) or the singular (person). The degree of subjectivity in the decision is almost negligible, since it is based on general laws founded primarily on figures, calculations and statistics, in line with the principles of Cartesian mathematics (analysis of data from scientific studies, but also projections on mathematical models, the ultimate step in abstraction). The reflective judgement is stated without having universal categories, unlike the determining judgement. It is the particular situation that gives rise to a law, or what Cornelius Castoriadis calls the particular concreteness. For example, the choice of whether or not to hospitalise a patient, with the risk that this entails, or the choice of confining a population in an epidemic context, or putting a person in quarantine. In short, a decision based on measurement and the a priori defined norm of reality is a decisive judgement, unlike a reflective judgement that is part of praxis, i.e. experience hic et nunc, as conscious action.

Experts from all regions of the world who met in Sèvres on the theme of "From all regions of the world, the experts who met in Sèvres on the theme of 'Reforming Education' (RIES, No. 83, 2020)22 agree with Eoyang and Menning (2019) that we need to learn to live with the uncertainty that pernicious problems bring. This requires adaptive, cyclical, iterative and simple actions (simple, iterative cycle called Adaptative Action). A first component of the cycle is to discuss with stakeholders the different ways of looking at the essential parameters of a wicked problem. Since the problem cannot be solved but can be influenced, a second component is for stakeholders to imagine a wide range of options, but with a constant return to realism, by examining the opportunities and constraints of the contexts (no two contexts are ever quite the same, despite common profile elements). The third component is for actors to initiate a reasonable action at a specific time and in a specific situation and to observe its effects; this is called 'next wise action', since it follows on from an earlier action and will be followed by a later action in a new adaptive cycle.

In order to deal with the pernicious problems that are multiplying as a result of the acceleration of societal changes and the differentiated evolution of the contexts in which they arise, the spirit described above implies an emphasis on transversal competences, that is to say, knowledge-action-reflection that is exercised in situations and contexts that are not only differentiated but also in constant evolution. It is in this sense that we must understand the need to "develop capacities throughout life".

What are these capacities, these skills of the order of knowing-acting-reflecting, which enable us to face the unexpected and live with uncertainty ?

. Developing the concern and capacity to mobilise the learning opportunities present in each person's environment

Two famous quotes are more true than ever. Winston Churchill was fond of saying, "Better to catch change before it catches you by the throat". Albert Einstein, a lover of metaphor, said that "Life is like a bicycle, you have to keep moving to keep your balance".

In order not to be caught by the throat and lose our balance, we must have learned and be constantly learning to mobilise the learning opportunities present in our environments, whether they are actually designed to educate or train, or whether they are informal, such as our successive places of professional and social life.

The work of Billet (2001, 2009) on Learning in the workplace, later extended to adult education by Bourgeois (2014) and by Jorro, De Ketele and Merhan (2017) on engagement and professional development, and more specifically on supported professional learning, this work results in showing the importance of opportunities in learning conceived as a process of adaptation, as defined by Edgar Morin. Several formulations of the affordances theory have gradually been put forward. Applied to the adaptation process implied by the need for lifelong learning, we can operationalise the contributions of this theory as follows in the context of our purpose.

22 The Sèvres International Review of Education (RIES) organised an International Colloquium on "Conditions for successful educational reforms" from 12 to 14 June 2019. Sixty experts from all regions of the world were selected and invited to share their experience and analyse 26 case studies. In its issue 83 published in 2020, twenty-nine of them were asked to synthesise their views as recognised experts in a region of the world in a dossier entitled "Reforming education". The comments made in this text are partly taken from the dossier coordinated and concluded by Jean-Marie De Ketele ("Reforming education: working together for the common good by developing a collective intelligence", pp. 205-234)

In the various places along our life course (from early childhood to old age), we encounter new environments in which we live for a period of time. Each of these environments includes opportunities to learn. Previous research shows that, depending on the environment, the opportunities are more or less numerous, rich, accessible; it also shows that even the most constraining environments always include opportunities for learning (the testimonies of some concentration camp survivors emphasise the creativity developed in such contexts). But different people in seemingly similar environments react quantitatively and qualitatively very differently to the opportunities present. Some do not mobilise any of the opportunities; others, on the contrary, have mobilised opportunities and are developing more of their capacity to mobilise the opportunities present in their environment.

While the presence of opportunities to learn in an environment is obviously important (and should therefore be a concern of anyone responsible for education and training), the process of developing this capacity to mobilise the opportunities present in an environment (an even more important concern for educators and trainers) relies on certain interlocking conditions.

- The first condition is to learn to identify the opportunities present in the environment in which one finds oneself.
- The second is to perceive the greater or lesser value of the opportunities perceived to be present.
- The third is to examine the degree of accessibility (in terms of physical access, but also symbolic access and commitment) of the opportunities that are recognised as valuable for the person.
- The fourth is to mobilise the opportunities identified as valuable for learning, after possibly removing some constraints on their accessibility.
- The fifth is to mobilise them in a relevant and effective way, which implies a reflexive look at the mobilisation process and its effects in order to resort to mediation if necessary (professional actors and peers present in the environment are opportunities and tools for learning).

As the work of psychologists studying human development shows, young children spontaneously use the opportunity theory. It is an essential condition for their development. Curiously, this spontaneous tendency tends to wane, or even die out, as schooling progresses. The rigidity of the 'school form' is largely responsible for this, and the voices of the great educational thinkers have so far had great difficulty penetrating the formal education system (RIES, 2020).

This is a major challenge for the future, as highlighted by the various attempts by organisations such as the OECD to imagine future scenarios (in 2002) or more recently (18 June 2021) in "Scenarios for the World of 2035". They show that we are inevitably moving towards forms of hybridisation of learning and training paths.

. Developing the concern and capacity to collaborate within the framework of a partnership ethic

Since dealing with pernicious problems, which are multiplying and will continue to multiply, involves the three components set out above (as a reminder: (i) identifying the parameters of the problem with the actors; (ii) identifying the different options with the actors; (iii) initiating a cycle of action - evaluation of effects - new action with the actors), it seems essential to develop the concern and capacity to collaborate.

Studied by a group of experts in the framework of an ERASMUS+23 project, this transversal competence is developed, on the one hand, thanks to the quantity, quality, variety and complexity of the situations and contexts encountered, and, on the other hand, to the degree of autonomy and responsibility left or/and taken on by the person. The formal and informal learning processes of this transversal competence make it possible to distinguish several levels of mastery (in accordance with the work of the EQF).

23 This is the RECTEC+ project, the work of which will be made public at the end of this year 2021

- First level : identify the ways in which a team functions.

- Second level : situate the role of the participants and one's own role in the team.
- Level 3 : making proposals and taking into account the opinions of team members.
- Level 4 : Leading, varying one's place and role in the team.
- Fifth level : encourage individual involvement in the service of the work group.
- Sixth level : ensuring cooperation between several teams and helping to distribute roles.
- Level seven : co-constructing methodologies to improve collaborative arrangements.
- Step 8 : Create strategies to promote cooperation between internal and external networks.

In order to cope with societal change and the increasingly pernicious problems it brings, leaders are expected to have high levels of mastery of this cross-cutting skill. It is therefore necessary to develop it from the earliest age, to adapt the school form to this learning and to be concerned to develop it throughout life, in the spirit of an ethic of partnership, not competition. It is a question of working together (not alone) on a common goal in a climate of trust, which implies working and understanding a context, a situation in all its complexity, in order to better act responsibly.

. Develop each person's distinctive capacity AND (as an indispensable condition) put it at the service of the group

Following the changes in society, the 2000s saw the emergence of a literature with pessimistic titles : *"The decline of the institution"* (Dubet), *"The crisis of values"* (Borgetto), *"The crisis of the suburbs"* (Stébé), *"The age of emptiness"* (Lipovetski), *"Democratic incompetence"* (Breton), *"Democracy against itself"* (Gauchet) ... From their analyses emerges the need to "rediscover the link between democracy and education", according to Marcel Gauchet's expression.

Recovering the link between democracy and education implies resolving a number of paradoxes and tensions between the durability of society and the development of the individual (Durkheim), between the space of socialisation and the space of individuation (Gauchet). This is what John Dewey set out to do in terms of both ideas and practices. It is not by chance that this work, although already old, is so much taken up nowadays. This is particularly true of two major texts: Democracy and Education (1916) and Experience and Education (1938) which have just been translated, collected and published by Armand Colin in 2011. John Dewey has an original formula to express what democracy is. It is "the universalization of distinction " 24, Meaning that every human being is likely to be the best at achieving a specific goal and, in so doing, enriches the community by developing his or her distinctive capacities. Convinced that the pupil will not live in a society that is not yet there and that there is a growing gap between the evolution of society and the knowledge transmitted by the school25 , Dewey believes that the priority is to install a desire in the young person to progress continuously and to provide the means to progress. 26

How can this be achieved ? Dewey sets out several conditions :
- Installing a belief in the equal right to develop one's distinctive gifts and abilities in all students (this means that there are differences in gifts at the start and different po- tentialities developed at the end), as these differences serve the community and future ;

24 We are therefore in a paradigm of excellence, but it is not an elitist (and ultimately very normative) excellence reserved for the few, but an excellence for all (ultimately very differentiated), i.e. where each person has the opportunity to develop his or her own pole of excellence. This is in line with Durkheim's thinking, who set the goal of education as enabling each person to occupy the place most appropriate to his or her personality.

25 In his book on "John Dewey. Démocratie et éducation", Thierry Dejean (2011) puts as an exergue this magnificent quote from Dewey: "Democracy must be born anew in every generation and education is its midwife".

26 This is the spirit in which the consensus conference organised by the CNESCO in Paris on the theme of educational differentiation took place, whether, for example, on aspects of the management of pathways within a school (cf. Gather-Thurler's intervention) or the didactic management of a learning task (cf. André Tricot's intervention). See the CNESCO website.

- Focusing on the needs and opportunities of the immediate present; and thus providing, in the environment and without discrimination, the resources and opportunities to learn and develop each individual's distinctive abilities;
- To give priority to practical experience over immediate formal transmission and theoretical reasoning;
- Involving the student with other students in practical experiences and learning (one does not learn alone);
- Accompanying pupils to make them aware of the learning achieved through their experiences, in particular the knowledge produced and the skills developed, which will be useful for further learning (here we find the current concepts of social knowledge and skills) the current concepts of core knowledge and skills, as well as those of action, thought and attitude patterns) ;
- Do not freeze the work of the student and the teacher;
- Consider that a work group (even a temporary one), a class, a school or a school establishment ... are temporary associations of people (Dewey calls them "societies") which form links for certain purposes and interests and make it possible in practice to learn how to live in society; but these associations must be creative, otherwise they become mortified and do not make it possible to develop people's distinctive abilities.

The vision developed so far focuses on the individual student in interaction with peers and teachers. But it can be extended to all the actors in the education system, conceived as a set of systems with more or less close links. In order to enable pupils to develop their distinctive capacities for their own benefit and for the benefit of their immediate environment and their future integration, should we not also ensure that, in their immediate working environment, the various actors (teachers, parents, various interfaces - such as advisors or inspectors or trainers -, local, regional and national officials) of the education system27 are able to develop their distinctive capacities and thus serve the community to which they belong? Within this vision, each actor pursues his or her own unique professional development (Jorro & De Ketele, 2011 and 2013, speak of 'emergent professionalism') and participates in a 'learning organisation'. This can only be done together with the other actors in their daily working environment. But for the education system as a whole (which is not just the school) to become a learning organisation, the different organisations within it must themselves be learning organisations, not isolating themselves and building links with neighbouring organisations. Developing the distinctive abilities of each person and putting them at the service of the group in which they are integrated means creating collective intelligence to deal with wicked problems.

. Developing lifelong critical thinking through formative encounters with diversity

In order to face and prepare to face wicked problems, it is necessary to develop critical thinking, which implies going out of one's own world and encountering the diversity of human ideas, ways of knowing, social and cultural habits (Marginson, 2021[28]). No country, no culture, no institution, no group, no person has all the answers and we have to learn from everyone of them. This is therefore an awareness to develop a relevant critical reflective capacity. This is developed throughout life, from a very young age (progressive discovery of the extent of one's environment with key periods in the development of socialisation, such as starting school for example) and through changes in environment and experiences of physical and virtual mobility.

27 The education system is to be understood in a broad sense and therefore includes the political sphere (e.g. city policy), leisure time (e.g. the importance of culture, sports, media). The example of Finland is eloquent in this respect.

28 Marginson, Simon (2021), Globalisation in Higher Education: the good, the bad and the ugly, sixth annual conference of the Centre for Global Higher Education held online on 11 & 12 May 2021.

These are all opportunities to learn; they are all opportunities to be confronted with the Other (the Other is not me, the Other does not think like me, the Other does not do like me, the Other does not live like me ... and I am another for him).

Confrontation means conflict. The Chinese concept of conflict manifests itself in an ideogram of two superimposed signals, one signifying danger and the other opportunity. Conflict can be destructive when it leads to ruptures, withdrawal, loss of energy, absence or ineffectiveness of solutions. On the contrary, conflict is productive because it is a necessary condition for learning (building knowledge) and socialising (building with and through others).

When information is perceived as incompatible with the cognitive structure in place, the subject is led to seek a new balance by adjusting his or her cognitive structure or, if necessary, to develop a new cognitive structure compatible with the disturbing information (Piaget).

And we learn above all through socio-cognitive conflict, i.e. conflict brought about by others (peers or experts). It leads to an awareness of the existence of several points of view (cognitive decentration), an analysis of these and the possible search for a recomposed point of view. Reflection becomes "critical" and "constructive"; conflict is no longer a "danger" but a positive opportunity to learn and to build social citizenship.

For there to be a real socio-cognitive conflict, it is not enough for the other person to simply transmit new information or information that contradicts the one I have. I can receive it and even possibly reproduce it faithfully without having constructed new knowledge. This happens very often in the classroom or in other contexts. The following banal example illustrates this: a pupil thinks that if a small quantity of water at 10°C is mixed with a large quantity of water at 30°C, this will give water at 20°C; the teacher gives a fine presentation on energy exchanges, but we can see that many pupils still have their initial conception. The same is true of our patterns of action (our usual ways of acting when faced with a class of situations) and our habits (our usual ways of behaving and being). For example, Peter and Paul on their way home have a habit of drinking a soda; Paul takes the trouble to find a rubbish bin to throw his empty can into; Peter throws it on the side of the road. Both, however, have listened to the same environmental messages. It is not enough to have listened to a message, or even to see a behaviour other than one's own. This may help, but what else is needed to construct knowledge (which is much more than assimilating information), a pattern of effective action to deal with situations, a habit to live as a responsible citizen ?

The presence of the Other who brings different information or acts differently is a necessary but not sufficient condition for learning. A real "encounter" (a battle is not an encounter) enables learning, i.e. building knowledge and transforming patterns of action. It implies that people go towards the Other, become aware of the point of view (way of thinking or acting) of the other, try to understand the meaning (what founds, justifies) of the other's point of view and conduct a reflexive return on what could found or modify their own point of view. By moving towards the other and reflecting on meaning, the 'encounter' thus thought of is a recognition of the Other (and therefore a construction of the self) and makes 'society' in the sense evoked above by Dewey. As it is too often known, the 'school form' does not favour the 'encounter': the management of space and time is much more a juxtaposition of people, of transmission and reception actions, of competitive behaviours which do not make society, which do not prepare to face pernicious problems.

The school form and, more broadly, the scenarios of education must be rethought in order to create opportunities to learn together, to encourage the emergence of constructive conflict in a climate of psychological security where each person feels recognised by the Other and learns thanks to the Other. Conflict is natural, inherent to life and a source of learning. It should therefore not be avoided or suppressed, but managed effectively in order to be overcome.

. Consequences and recommendations for institutions

Analysing the consequences of the pandemic crisis, the report by Van der Graaf, Dunaieva, Siarova and Bankauskaite (2021)29 concluded with the need to build resilient education systems, i.e. "that can adapt and transform itself in the face of adversity". In other words, the challenge for education systems is to learn to cope with wicked problems; this is a process that will always remain unfinished and to be continued in a world where change is accelerating and requires us to learn to manage uncertainty. In the above, we have identified a set of capacities to be developed throughout life by individuals. But institutions must not only enable this (which requires transformation on their part), but must themselves be resilient learning organisations: able to mobilise the opportunities for learning offered by change; able to build collaborative and partnership relationships between the components of the education system; able to recognise, facilitate and mobilise the distinctive capacities of partners to address wicked problems; able to be open to the experiences of other education systems in order to carry out a formative critical reflection on its own practices and the way in which it faces up to societal changes and challenges30.

. Mobilising narratives rather than reforms

In order to cope with the acceleration of the various changes affecting our societies and the pernicious problems that are occurring at a rapid pace, the reforms prescribed by the noosphere have shown their limits. As Charbonnier and Gouëdard (2020) 31 point out, the 550 educational reforms that have been launched since the 2000s in the OECD countries have not made it possible to change the practices of the actors in the field in a sufficiently profound manner and to achieve the priority objectives targeted, including equity and quality of learning. On the basis of this diagnosis, Antonio Novoa (2020)32 notes that it is not the reforms that change the school, but the school that changes the reforms, by taking what suits it and diverting what is harmful to its stability. More than ever, in the face of our accelerating world, it is above all an appropriation (including diversions) by the various actors in society (not only in schools) of what gives meaning to action, commitment and the chain of acts to produce added value in favour of a common good. In a word, these actors need "mobilising narratives", rather than prescriptions.

Paul Ricoeur[33] is interested in narratives because they have the power to arrange, reflect and give meaning to time, that elusive reality. For the recipient, the narrative is thought-provoking and has a particular meaning for him or her, offering an opening towards essential considerations, both in the articulation of past events and in the understanding of the present.

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29 Van der Graaf, L., Dunajeva, J., Siarova, H., Bankauskaite, R., Research for CULT Committee - Education and Youth in Post-COVID-19 Europe - Crisis Effects and Policy Recommendations, European Parliament, Policy Department for Structural and Cohesion Policies. Brussels: EC, 2021.

30 A recent report by the International Institute for Educational Planning recommends "societal engagement", i.e. "mutually beneficial engagement that promotes and embeds partnerships with the community, industry and government, in co-production of knowledge, because complex problems require collaborative solutions" (p.70), in: Uvalic-Trumbic, S. & Martin, M. (2021). A New Generation of External Quality Assurance. Dynamics of change and innovative approaches. Paris: IIEP.

31 Charbonnier, E. & Gouëdard, P., Les réformes à l'horizon 2030 dans les pays de l'OCDE, Revue internationale d'éducation de Sèvres, N°83, 131-141, 2020.

32 Novoa, A., La notion de réforme en éducation est-elle encore pertinente aujourd'hui, Revue internationale d'éducation de Sèvres, N°83, 23-32, 2020.

33 The notion of narrative appears in several of Ricoeur's works:
RICŒUR, Paul (1980), "Pour une théorie du discours narratif" in La Narrativité, Paris, Éditions du CNRS. RICŒUR, Paul (1983), Temps et récit I: L'intrigue et le récit historique, Paris, Seuil, Coll. "Points".
RICŒUR, Paul (1984), Temps et récit II : La configuration dans le récit de fiction, Paris, Seuil, Coll. " Points ".
RICŒUR, Paul (1985), Temps et récit III : Le temps raconté, Paris, Seuil, Coll. " Points ".
RICŒUR, Paul (1986), Du texte à l'action. Essais d'herméneutique II, Paris, Seuil, Coll. "Esprit".
RICŒUR, Paul (1988), "L'identité narrative" in La N arration. Quand le récit devient communication, Geneva/Neuchâtel, Labor et Fides.

The narrative becomes 'mobilising', it pushes to act according to the meaning given. It is the meaning given by the actor to the narrative that will orientate him in the maze of opportunities that will be offered to him. We have always needed mobilising narratives, but these become all the more essential in times of turbulence or major change. Such narratives are needed at several levels: at the level of large regions because, as the pandemic has again shown, the problems cannot be solved by countries alone; at the national or federated entity level, because the contexts are specific at several levels; at the local level, because it is the local actors who are confronted with the specific needs and constraints of their terrain.

We will come back later (section "Creating a collaborative network within the education system") to the need for mobilising narratives at national, intermediate and local levels. Here, we will simply refer to the growing importance of the need for mobilising narratives at wider levels. Let us give two examples: one for Europe, the other for Africa.

As far as Europe is concerned, two documents (among others) bear witness to this: the European Economic and Social Committee's resolution of 22 April 2021, entitled "A new narrative for Europe"; the European Commission's press release of 30 September 2020 on "Establishing a European education area by 2025 and redefining education and training for the digital age". Both documents contain within them the elements for a European narrative, both in terms of socio-political and educational vision (both being closely linked). After being devastated by war, Europe is, says the first document, "a land where it is good to live and prosper"; "it plays a fundamental role in finding solutions to the common challenges facing Europe"; it is aware of "the need to complete the dual ecological and digital transition, as well as the longer-term structural changes brought about by the pandemic"; it "respects and promotes diversity, gender equality, fundamental rights, democracy, social dialogue and inclusive governance"; "the key to the EU's socio-economic renewal and reconstruction will be to ensure that all parts of society are effectively involved"... The second document specifies the importance of defining "a vision of the European education area to be established by 2025", as "education is one of the foundations of our European way of life". This "is based on six dimensions: quality, inclusion and equality between men and women, ecological and digital transitions, teachers, higher education, a stronger Europe in the world".

To this end, "two long-term strategic priorities are identified In the long term: i) fostering the development of a high-performing digital education eco-system and ii) enhancing digital skills for digital transformation... in order to strengthen cooperation and exchange in the field of digital education at EU level". These documents are consistent with each other and with documents from other multilateral organisations, such as UNESCO with its priority given to inclusive education or UNICEF with its priority given to the right to education. However, if the elements set out are essential to create a mobilising narrative, the documents in which they are included ("resolution", press release") cannot hope to form a mobilising narrative on their own; there is still a great deal of work to be done to reach all the actors, to arouse real support and to provoke real commitment. The mobility and Erasmus+ programmes, which are one of the most important weapons for creating a "European Education Area", and the "Framework Programme for Research and Innovation, Horizon-Europe" of 28 April 2021, which aims to obtain the commitment and participation of all the actors in society around three key mobilising concepts, namely "open science", "open innovation" and "openness to the world "[35], are examples of this.

34 2021/C 286/01 Resolution of the European Economic and Social Committee on "A new narrative for Europe - EESC Resolution on the Conference on the future of Europe" in OJ EU C286 of 16 07 2021 https://eur-lex.europa.eu/legal-content/FR/TXT/PDF/?uri=OJ:C:2021:286:FULL&from=FR

35 Regulation EU 2021/695 concerning the research and education framework programme Horizon Europe in OJ EU L 170 of 12 May 2021 page 2.

The second example of a mobilising narrative to be constructed concerns Africa, a continent that deserves our attention, because lagging development is unacceptable for the people who live there, but has multiple implications for all other regions of the world. A report commissioned by the African Union36 starts with the idea that continental unity is a necessity for Africa's development in the face of major global economic blocs. "An integrated, prosperous and peaceful Africa" is the vision for the continent that the Heads of State and Government of the African Union want to share with all Africans. This is why it seems essential to promote the historical awareness of a common past and the objectives of mutual knowledge, inter-understanding, mutual trust, peaceful cohabitation, willingness to cooperate and solidarity between peoples in order to give a strong impetus to the construction of African integration. The integration of African general history (AGH) as one of the most fundamental disciplines (along with mathematics and language learning) in all curricula (from primary to higher education) and in all African countries is the basis for the mobilising narrative: (i) generate attachment to the common historical and cultural heritage as well as to the shared values of rootedness (languages, cultures, history, dialogue, solidarity, sharing, integration into the community) and to the dynamic values of heritage (human rights, social cohesion and human development); (ii) articulate the history of the continent with that of the regions and countries that make it up and form conscious, responsible, active and demanding pan-Africanists; (iii) lay down a common foundation of

It is a story about the development of knowledge and skills, values and attitudes, which enable young people to develop critical thinking skills and, building on historical achievements, to commit themselves to meeting the challenges facing the continent. This is a mobilising narrative (not just a reform) that is long-term and school-based.

Transnational, these two mobilising narratives have been forged thanks to a long process of work by the countries, both on the conception and the validation of the narrative concerned. It is up to each country, according to its specific characteristics, strengths and challenges, to translate it into a national mobilising narrative. It is up to each local authority to do the same, because within a single country the contexts can be very diverse.

. The education system is much more than the school system

Representations of education and the education system are still too often narrow and reductionist: The Minister of Education is the Minister of teaching (not to say instruction); the teacher must confine or confine his role to the classroom and considers that what happens there is his own business; parents do not have the capacity to teach what they consider to be the sole responsibility of those who are paid to do so; school heads have to "run the school", not to worry about what happens outside the school walls; teacher trainers have to transmit the knowledge produced by their disciplines or by educational research without worrying about the future of the people they have trained; the inspectors' only function is to look ('spectare') at the conformity of practices with the prescriptions; the leaders of civil society can be summed up as organising the life of the citizen; the role of the media is to inform and entertain... Reductionist representations can thus be multiplied, contributing to the creation of compartmentalisation. The pandemic crisis and other emerging crises show that these conceptions no longer hold water.

There are many places and times for learning, educating and being educated, and they need to be articulated as much as possible in order to respond to the many challenges and pernicious problems that already exist and those that await us.

36 The author of this report, Mamadou Ndoye, former Minister of Education of Senegal and a great international expert, did us the honour of re-reading this report before its official publication. We can pinpoint a few elements, as they serve the objective pursued by the African Union.

. This implies that the Minister of Education is not simply the Minister of Education

The Minister of 'Education' and establishes collaborations with other ministries. This implies that the Minister of Education is not simply the Minister of Education, but the Minister of "Education" and establishes collaborations with other Ministers whose actions have or could or should have an educational function.

While no one questions the essential role of the school, which consists of teaching the fundamentals in order to continue learning throughout life, there is already a great deal more inertia when it comes to developing the now essential skills we mentioned in the first part of this chapter. Moreover, if these can be developed in the learning carried out within the classroom, they also require that the school be organised as a place of life offering many opportunities to learn, through the opportunities for learning, through the management of space and time, as well as the organisation of activities that develop the body, the mind and socialisation. In 2013, a dozen authors from several regions of the world wrote a dossier "In 2020, the Dossiers et veilles de l'IFé de Lyon, written by Catherine Reverdy, again took stock of the issue[37] , showing all the effects that the organisation of school space, which varies greatly from one place to another, has on the life of the child, the professional practices of teachers and other internal actors, and the relations between the school and the family as well as with the local community. Much more than in the classroom, she says, it is in all school spaces (school entrance, playground, spaces dedicated to certain activities, offices, corridors, wall cladding, etc.) that the social life of pupils takes place, that there is a need to listen to them, that school codes and norms are forged, at the same time as the learning of knowledge and skills, among peers. The surveys conducted during the pandemic showed the importance of these time-spaces, not only physical but also virtual.

Around the school, learning spaces have multiplied with professionals whose expertise is of very high quality and who address both young people and adults with talent. We are thinking of museums, cultural centres, nature centres, thematic circles, sports centres, pilot farms, science days, etc. In spite of the services offered by these, schools have often shunned them, closing themselves off, using (sometimes with good reason) numerous bureaucratic pretexts to avoid dealing with them. Some schools, usually on the initiative of one or other highly motivated teacher, have succeeded in establishing partnerships with one or other of these organisations, to the great satisfaction of all concerned (pupils in the first place, teachers and the leaders of these organisations[38]). Around the school, many opportunities exist and should be seized. Each school should (i) be aware of the opportunities that exist in its out-of-school environment (ii) examine with the actors concerned the degree of accessibility (physical and virtual) of such resources, (iii) analyse their value for the training and development of different groups of young people and/or educators, (iv) establish partnerships with such organisations on the mobilisation of such resources, (v) accompany the mobilisation of such resources by making links with learning activities within the school.

Both at school level and within the Ministry of Education, it is necessary to modify the school form, which is too often thought of and experienced as a school administration or bureaucracy (or even a teaching factory, as some say), and which is increasingly called upon to become an "education system" in which partnership relations are established between the various stakeholders.

37 This report is freely available at the following link http://veille-et-analyses.ens-lyon.fr/DA/detailsDossier.php?parent=accueil&dossier=136&lang=fr

38 The author of these lines was able to see this on several occasions. As chairman of the jury of the Queen Paola Foundation, which rewards innovative schools and teaching teams in Belgium, he has seen initiatives rewarded every year for having established such partnerships. He has also seen such initiatives with the Paris Opera, the Amsterdam Opera and the Opéra de La Monnaie in Brussels. The Les Savanturier project and the CRI (Centre de Recherche Interdisciplinaire), led by François Taddei in France, are also along these lines. One could multiply the examples in very diverse fields and in many countries.

We need to work together with different organisations to develop projects that will enable us to face up to pernicious problems and prepare us to confront societal challenges.

. Working with each category of actors, not without them, nor against them, nor even for them

While the discourse is constantly proclaiming "the student at the centre of the teaching-learning process", it is curious to note that in reality the emphasis is on what the adult expects of him or her and on what is good for him or her. If pupils have considerable power of inertia when they are placed in a situation of being subjected, they can develop considerable energy when they are put in a position to develop their potential. Kids can is the lesson learned from many of the case studies analysed by international experts (see RIES, No. 83, 2020).
Alone in their classrooms, teachers too often feel that reforms and decisions are made without them (and against them, they often think) by a circle of officials and experts, when they rightly claim specific expertise. The pandemic has made it abundantly clear that the school system has for too long worked without parents, and often even against them, by making a priori judgements without any knowledge of the context of their lives. Many pernicious problems, including those created by the pandemic but many others, can only be addressed with them.
The same crisis has reinforced the findings of studies[39] which show that schools are a key unit for studying changes in education systems and that the leadership of the head teacher plays a central role. The transition from face-to-face to distance or hybrid arrangements has shown the need to work with schools; headteachers have played a major role in more or less successful transitions.
Successful transitions were often observed when school actors worked with local communities. Many of the pernicious problems, especially those related to situations in disadvantaged contexts, cannot be addressed and managed without the resources and expertise present in the local community[40].
Training institutions are too often 'solitary', in many cases ignoring even the reforms in the making, training future teachers with reference to the prescriptions of previous reforms. Very often, too, they form islands cut off from the mainland where the teachers they have trained are working. During some placement visits, academic tutors place themselves or are placed in the position of "knowers" opposite placement teachers who place themselves or are placed in terms of "doers" in a context of constraints.
And this is often the case with other interface institutions (such as inspectorates or other advisory institutions) whose actors should adopt a posture of "accompaniers" (etymologically: who share the bread, pane, or the path, camino) and not of "knowers" (they cannot claim to have the solution to pernicious problems).

This is all too often the case with researchers who work alone, without any connection to the problems posed by policy-makers and actors on the ground, especially when the pressure to publish or perish is strong for the development of their academic careers. As shown in a review of educational research around the world[41], educational research, conducted as much as possible with experimental paradigms and quantitative data, produces disembodied knowledge that is not directly transferable to the field.

39 For example, the review by Xavier Dumay and Vincent Dupriez (2009), L'Efficacité dans l'enseignement. Promesses et zones d'ombre, Louvain-la-Neuve: De Boeck Université.

40 The above-mentioned issue 83 of the Revue internationale d'éducation de Sèvres presents a whole series of case studies in which successful projects are based on collaborative work with local communities, for example: literacy projects for the Inuit in Canada, the integration of the wave of migrants into all the schools in Catalonia in consultation with all the schools in order to avoid ghettoisation, etc.

41 Coordinated by Jean-Marie De Ketele, the state of educational research was carried out by African, Chinese, French, Mexican, Middle Eastern, Russian, Swedish, British, Canadian and Belgian researchers. All regions of the world are covered. Reference: Sèvres International Review of Education (2020). Educational Research, No. 83 (www.france-education-interntional.fr).

Research for education conducted in collaboration with field actors is needed to improve practice in context by embodying and articulating the diverse knowledge produced by a body of educational research[42].

Societal problems have become so complex and interdependent that they cannot be fully addressed and resolved by local actors alone. International organisations such as the European Union, NAFTA in North America, Mercosur in South America, ASEAN in South-East Asia, the African Union... have become increasingly important, not only economically and politically, but also culturally and educationally, to the extent that they are often accused of being instruments of globalisation43. In addition to these regional organisations, there are numerous multilateral organisations whose actions influence education systems, for example: the OECD with Pisa and Talis, the OIF with Pasec, Confemen with the meeting of the Ministers of Education of the Francophonie, UNESCO with the MDGs, UNICEF with the Rights of the Child, the World Bank and other bodies with their funding... It is difficult for each of them not to impose their vision. It is difficult for each of them not to impose their vision. Rather than entering into a territorial struggle, each one having an often irreplaceable expertise, it is imperative to face the wicked

The French language distinguishes between globalisation (the multiplication of exchanges and interdependence) and globalisation (pressure to align national systems towards a single system).
Faced with societal changes and the difficulties encountered by categories of the population who feel abandoned, an increasing number of civil society associations have emerged to deal with them or to develop capacities neglected by the school system. The Talis reports of 2008, 2013 and 2018 show that these institutions work in isolation and have difficulty imagining creative solutions that allow them to work together.

While no transformation of the education system can be achieved without the commitment of the actors on the ground, the authorities have considerable power to facilitate (notably by making resources of various kinds available) or inhibit this commitment (notably by prescriptions that will not be appropriated or that follow one another at an unsustainable pace). A company director, who was recently awarded the best manager prize, said that the job of the person in authority is to align energies, and not to decide every detail in every field.

There are many actors in education, and they are not only to be found within the school system. At the international symposium "Reforming Education", held in Sèvres from 12 to 14 June 2019, the Minister of South Korea said that he had understood that he was not the Minister of school education and teachers but the Minister of Education, responsible for creating synergies between the different worlds, and their actors, of youth, families, school, culture, media, leisure, sports and health. All too often, the Ministry of Education bears its name badly.

. Creating a collaborative network within the education system

From these remarks, it follows that in order to deal with the pernicious problems that will multiply as a result of the acceleration of changes of various kinds, it is necessary to create a collaborative network within the "education system": to create a system and develop our "connections" with other actors in order to create collective intelligence, as Edgar Morin repeats at will.

42 The Carnegie Foundation has understood this and has decided to fund research for education (see Gomez, Bryk and Bohannon, 2020, in the above-mentioned N°83 of the International Review of Education).

43 The French language distinguishes between globalisation (the multiplication of exchanges and interdependencies) and globalisation (the pressure to align national systems towards a single system).

The education system is too often reduced to an organisational chart where relationships are transmissive and top-down. In order to form a system, the actors and institutions cannot remain solitary but must work together (working "with" and not without, nor against), like a tapestry whose elements are brought together by and for an overall intention (a "mobilising narrative"). Therefore, we will speak of the meshes and strata of the education system. The meshes are the relationships that are woven between the actors and the institutions in the vicinity. Beyond the meshes, we find 'strata' (a term we prefer to that of 'levels'): in geology, strata are superimposed on each other but also act on each other in various ways. Within the education system, we can distinguish four strata which behave in this way and within which a collaborative network must be created between its members.

With all due respect, let us start with the "stratum of local learning communities", since we know from meta-analyses[44] that students' progress depends above all on the expectations, capacities and commitment of the actors on the ground. At the heart of this layer: the pupil, the teacher, the parents, the head teacher. Will they create collective intelligence? Under what conditions ?

A first condition is to restrict the dual relationships between actors, which are a source of tension between a dominant actor who tends to position himself as a "knower" and another as a "receiver" and/or a "receiver". "On the contrary, it is necessary to multiply triangular relationships, where each actor in turn plays the role of mediator, making it possible to triangulate the ways of seeing problems and, with the others, contributing to dealing with them. We can thus distinguish

We can thus distinguish "major triangulations": (i) pupil/teacher/parent; (ii) pupil/teacher/head teacher; (iii) pupil/parent/head teacher. But within these major triangulations, the aim is to multiply the "small triangulations", to get each actor out of his or her "solitude" and create "solidarity": authorise and accustom pupils to work together on a problem or task (the teacher's role); promote and facilitate (the headteacher's role) time for exchanges and work between teachers (this implies changes in the management of time and space); create a network of coordinating collaborators around the headteacher. This implies moving from representations (still too frequent) in which the other is an "adversary" or an "obstacle to going in circles" to a representation in which "I learn from the other" and "the other teaches me".

Closely linked to the previous one, other conditions are both the basis and the effects of these triangulations. These presuppose 'postures'[45] of respect for the other, recognition of his or her 'distinctive abilities' as Dewey puts it, valuing what one knows and what one knows how to do with it (Eyoyang and Mennin, 2019), 'situational awareness' (Gomez, Bryk and Bohannon, 2020), contextualised reaction and action... In this way, a local learning community and a local mobilising narrative is built step by step, a narrative that is enriched and adjusted in the course of action and reflection, especially if it is supported by the stratum of 'governance of the environment'.

44 The best known is that of John Hattie, who has listed more than 50,000 research reports worldwide and is published by Routledge (London & New York, several editions) under the title "Visible learning. A synthesis of over 800 meta-analyses relating to achievement". Other meta-analyses have followed which confirm the conclusions drawn.

45 The concept of posture is essential in the human professions. Originating in medicine, then taken up in the field of sculpture (Myron's Discobolus or Rodin's Thinker spring to mind), posture in the field of education translates, in other words, a set of indices, the movement of the being (its knowledge-being) towards the Other. The type of postures is decisive in the educational relationship (cf pr example: Jorron Anne, De Ketele, Jean-Marie & Merhan, France (dir.) (2017). Les apprentissages professionnels accompagnés. Louvain-la-Neuve: De Boeck Université).

The term 'Leading from the Middle' is due to Hargreaves. The actors are the head teacher (essential node in the network), the school principal and the head teacher.
between the two strata), the trainer (personal and institutional actor), the local community and the interface actors (inspector, adviser, various coordinators, seconded,...). Here again, the aim is to reduce the proportion of solitary work and dual relationships in order to multiply not only the small internal triangulations, but also the large triangulations which characterise Leading from the Middle: (i) head teacher / trainer / teacher; (ii) head teacher / interface / teacher; (iii) head teacher / local territorial community / teacher; (iv) head teacher / local territorial community / parent. These triangulations help to create 'cultures of collaborative professionalism' (Hargreaves, 2020), 'networked communities of improvement' with strong 'situational awareness' and 'local governance' (Gomez, Bryk & Bohannon, 2020) through the interactions between actors in both strata. Here again, the question of postures is essential to take advantage of the opportunities present in the environments and to allow 'encounters of emerging professionalities' (De Ketele, 2014).

Governance by the environment evolves between the stratum of local learning communities and the stratum we call 'The stratum of the educational vision'. The latter is indeed the primary function of a ministry of education, with the regulatory and resource functions supposedly secondary and subordinate to the former. The elaboration of the vision, a 'mobilising narrative', presupposes not only a rigorous identification of the existing situation, with its results, its level of development, its needs and expectations (the interface actors constitute a node between the stratum of governance of the environment and the stratum of the educational vision), but also a taking into account of societal mutations, of the pernicious problems that they bring and therefore of the societal stakes (which comes under the stratum of the socio-political vision, which we will discuss later).

As Meuret (2020) points out, the elaboration of the educational vision poses a crucial problem of legitimation and legitimacy. The following major triangulations are necessary for the legitimation process: (i) minister of education/interface/researcher-expert to draw arguments from scientifically verified experimental knowledge and collaborative research with field actors; (ii) minister/interface/civil society to introduce the democratic dimension to the legitimation process; (iii) minister/civil society/researcher-expert to contribute to the denial of false beliefs or to foil the traps of the imaginary or ideology. In addition to these three triangulations, two triangulations must be added to ensure the 'link' between the stratum of governance of the environment and the stratum of the educational vision in the system. The first is in line with the axis of expertise, the collaborative work between researcher-expert / trainer / interface. The second concerns the axis of democracy, the collaborative work between civil society / local territorial community / interface.

Thus, in order to create a system, the major triangulations must work from close to close, without losing sight of the need to circulate the educational vision and its contextual variations in the different directions. This implies that the secondary functions of regulation and allocation of resources must be thought out in such a way as to allow the out so that networking and collaborative learning in triangulation from one person to another are possible and effective. This presupposes in particular the provision (an aspect that is too often neglected) of spaces (physical and virtual) and times that allow this.

As has been repeated many times in the preceding analyses, we are indeed in an era in which the apprehension of time is made all the more difficult, and even distressing in the eyes of some, by the accelerating pace of change. We are in a time when it is important to think about the future in order to understand the present (Novoa, 2020). The educational vision cannot be built without a mobilising collective narrative. It is the role of the "Socio-political vision stratum" to answer such fundamental questions as: Who are we? What are we becoming? What values do we want to believe in? What do we decide in order to live better together? These four questions refer respectively to history, to societal changes, to the meaning of the socio-political project and to acting together.

Answering such questions in order to construct a collective mobilising narrative (a socio-political vision) requires triangulations to avoid the pitfalls of dualisation. The following three main triangulations can be identified first: (i) policy maker / minister of education / parliament, because the educational vision is deduced from and serves the socio-political vision that emerges from the apprehension patterns of the different ministries and parliamentary work: (ii) policy maker/parliament/multilateral organisations, the latter contribute to opening up the representations of the former and make available databases and study reports that complement those available at national or local level (behind the alignment of figures lies a diversity of people and contexts); (iii) policy makers / ministers of education / multilateral organisations, with recent history demonstrating the role of the latter in the evolution of educational visions (numerous examples such as the European ERASMUS+ programmes, the OECD PISA or TALIS reports, UNICEF's Rights of the Child, UNESCO's inclusive education).

Here again, two major triangulations must be added to form a system between the two strata of the educational vision and the socio-political vision. The first is again along the axis of expertise: researcher-expert/multilateral organisation/Minister of Education. The second concerns the democratic axis: civil society representative / parliament / minister of education.
It is through this close-knit network that the understanding of the different categories of actors can be brought together to call for 'a polyphonic reformulation of the common good', according to Rumpala's beautiful expression (2010)[46].

. Conclusions

History teaches us that 'crises' (etymologically: both a violent manifestation and an opportunity for decision and action) are accelerators of development. Over the centuries, the time between two crises has gradually decreased. Today, as a result of increasingly rapid societal and technological change, this requires organisations to adapt more and more frequently. With the Covid-19 pandemic, we have seen the need to multiply forms of hybridisation in the different sectors of life. For example, the world of work, with teleworking. For example, the world of education, which is no longer limited to the walls of the school, but penetrates other places and involves other actors.

Hybridization processes will be increasingly rapid in the future. They require and will require "agile governance" which implies a de-bureaucratisation of social and educational systems. In order to cope with the 'wicked problems' that follow one another in rapid succession, collaborative networking of organisations and collaborative working between actors (in solidarity, not solitude) become absolutely necessary. But paradoxically, this rapid adaptation will only be possible if there is long-term work, both for institutions and for individuals.

For the former, it is a question of developing mobilising narratives on the basis of joint reflection and articulating them in their development from the global to the local level and from the local to the global level (not only "thinking global to act local", but "acting local to think global").
For individuals, adaptation requires the development of certain priority skills throughout life, i.e. learning and continuing to learn (raising the level of mastery) to (i) identify and mobilise the opportunities offered by life environments; (ii) work collaboratively in an ethos of partnership; (iii) develop one's own distinctive capacities and put them at the service of the group and the common; (iv) reflect critically through formative encounters with diversity.

We must "learn to live with uncertainty", says Edgar Morin. Living with uncertainty paradoxically requires combining, at both institutional and personal levels, short and long time, local and global, history and becoming.

46 Rumpala, Yannick (2010), "Développement durable": du récit d'un projet commun à une nouvelle forme de futurisme?", A contrario, N°14(2), p. 111-132.

. ANNEXES

Voluntary personal contributions

ANNEX 1

. Digital education, a challenge for the 2020-2030 decade in Morocco

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Introduction

Digital education is a national commitment for most developing countries. In Morocco, for example, the digital turnaround is part of the Education Reform (2015-2030)[48], which is a strategic vision of the State covering fifteen years, integrating both present and future cohorts (four classes). Its purpose is to evaluate, measure the achievement of objectives and make the necessary corrections if necessary. As an official text, it proposes a pedagogical and training model based on diversity, openness, appropriateness and innovation. Among its institutional mechanisms, the strengthening of the integration of educational technologies through the elaboration of a national strategy for the quality of learning at the level of curricula, programmes and training from the first school years. The use of different digital media, interactive programmes and networks are its watchwords.

As a reminder, the Kingdom had introduced NICTs to develop the education sector thanks to the contributions of economic partners such as SERFIGROUP[49] , Orange Morocco[50] and the OFPPT51 , but also thanks to French partners such as ESSEC, EM Lyon, Ecole Centrale, Dauphine and many other companies.

The political basis of digital education

The political will to digitalise education is very much in evidence, notably in a number of institutional texts :

● *The 2011 Constitution*[52] which formalised the creation of new bodies to promote human and sustainable development and participatory democracy :

I.1 The Higher Council of Education, Training and Scientific Research (Article 168) is responsible for issuing its opinion on public policies concerning education and evaluating those in progress.
I.2 *The Consultative Council for the Family and* Children (Article 169), which is responsible for monitoring the situation of the family and children.
I.3 *The Council on Youth and Voluntary Action* (Article 170), which is responsible for formulating proposals on all economic, social and cultural issues relating to young people and voluntary action in order to provide Moroccan youth with a spirit of responsible citizenship.

47 Contact: h.lahmami@umi.ac.ma
48 https://www.csefrs.ma/wp-content/uploads/2017/09/Vision_VF_Fr_-Resume.pdf [accessed on 13 June 2021]
49 https://www.serfigroupmaroc.com/ [accessed on 14 June 2021]
50 https://corporate.orange.ma/Bien-Vivre-Le-Digital/Inclusion-numerique/L-acces-au-monde-numerique- for-all [accessed on 14 June 2021]
51 https://www.ofppt.ma/fr/formation-hybride [accessed on 14 June 2021]
52 http://www.sgg.gov.ma/Portals/0/constitution/constitution_2011_Fr.pdf [accessed on 13 June]

- *Digital Morocco 2020 Plan*[53] , which aims to make Morocco a regional digital hub, one of the best performing countries in the MENA zone in terms of Datacom and business environment. It thus aims to double the number of trained digital professionals, so as to reach 30,000 per year in 2020.
- *The Digital Development Agency (DDA)*[54] , created by virtue of Law No. 61.16 published in the Official Gazette No. 6604 of 14 September 2017, is a strategic public establishment under the supervision of the MICEVN (Ministry of Industry, Trade and the Green and Digital Economy). The Agency is responsible for the development of digital and the dissemination of digital tools to citizens. Among the objectives that the ADD has set for itself to achieve by 2025: to put digital at the service of a more inclusive and egalitarian society, to reduce the digital divide, to train a new generation of 50,000 employable young people and to develop more initiatives in the sectors of Education, Health, Agriculture and Crafts.
- *Framework Law 51-17* adopted by the House of Representatives on 22 July 2019 is ins- crite in the continuation of the Reform. It aims to: fight against school wastage schooling, schooling of girls in rural areas, reintegration of the unschooled by ensuring their professional integration, access of students to digital resources and technological means, and strengthening the inclusion of children with special needs.

The Covid-19 pandemic, an exceptional time

The Covid19[55] White Paper shows that the 'school outside the walls' that learners attended during the Covid-19 health crisis became a school of circumstance with a teacher teaching an 'invisible crowd'. Because of the restrictive aspect of confinement, the symbolic aspect relating to the sacredness of the place and the human relations fundamental to living together that have always prevailed in schools - as physical spaces - have completely disappeared.

In Morocco, a pedagogical continuity plan has been launched since 16 March 2020, the first day of the country's confinement: a period of experimentation with several pedagogical scenarios for education sector officials. The so-called traditional education system has demonstrated its limits, and was deemed obsolete during the health crisis. Learners from precarious backgrounds were forced to take school holidays. Digital education was a necessary step during the crisis. It is expected to be a long-term process, while ensuring that the school remains inclusive.

The ministerial department in charge of digital education needs to be bolstered. The ministry in charge continues to work hard to digitalise the education sector. The steps taken are numerous, but are subject to great controversy between supporters and detractors. It was therefore decided to :

- Devote a large state budget to providing all learners with gadgets, which is likely to be costly and therefore expensive.

- Multiply initial and ongoing training in the use of digital technology for all educational partners. Some consider this step to be a diversion from the primary function of the school: devoting a lot of time and energy to computerising the sector would be to the detriment of learning and the development of skills.

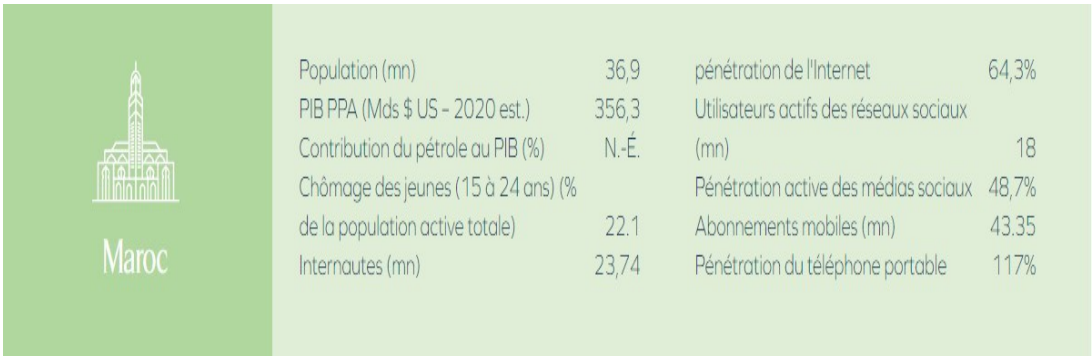
53 https://en.unesco.org/creativity/policy-monitoring-platform/strategie-maroc-digital-2020 [accessed 12 June 2021]
54 https://add.gov.ma/storage/pdf/Avril_NOG_ADD_fr_SITE_VF.pdf [accessed on 13 June]
55 https://www.autonome-solidarite.fr/media/2020/11/ASL-LIVRE-BLANC-COVID19.pdf [accessed 13 June]

Digital technology in the service of education

.1.1 Status of digital use in Morocco

According to a survey conducted by PSB[56] covering 17 states and territories in the Middle East and North Africa (Bahrain, Kuwait, Oman, Saudi Arabia, United Arab Emirates, Algeria, Egypt, Libya, Morocco, Sudan, Tunisia, Jordan, Iraq, Lebanon, Palestinian Territories, Syria and Yemen) conducted in 2020, a survey was conducted targeting Arab youth and aimed at providing valuable factual information on what defines the region and especially its youth population.

As for Morocco, this survey revealed the enthusiasm of Moroccan youth for digital. The figures below speak for themselves :



Screenshot taken from : **https://www.arabyouthsurvey.com/about_the_survey.html**

3.2 As an educational tool

Digital technology is not sufficiently exploited in education, even in developed countries, due to its evolving nature. The report published in 2019 of the PROFETIC survey which began in 2011 under the aegis of the French Ministry of Education and Youth, for example, shows that the use of digital technology as a pedagogical tool is reserved "for simple classroom functions by almost two thirds of the teachers surveyed. It is only a preparation tool for 22% of teachers. It is fully integrated into practices for only 2% of teachers". The state of play seems to be the same for several countries, regardless of their GDP.
Morocco is preparing for Education 4.0 and is trying to join countries such as Saudi Arabia and Germany, which have very advanced digital strategies and have set themselves the dates of 2030 to move to AI, and 2025 to become leaders in Industry 4.0. The digital school is a construction site in full swing in the Kingdom and the integration of ICT and their consolidation in the education sector enables the country to optimise the employability of its young graduates by improving their professional performance.

3.3 As a means of socialisation

According to the same PROFETIC report, "more than a third of teachers say they use social networks in the professional context. Social networks are mainly used by teachers to communicate or share with other teachers (28%), to find out about news related to national education (20%) and to share articles or other news related to the teaching subject (15%) "[58].

56 "A global insights and analysis consultancy that has been in practice for over 40 years providing actionable information and advice to business, government and public sector clients in over 100 countries. PSB is a member of the BCW Group of companies, part of WPP (NYSE:WPP), a creative transformation company" www.psbinsights.com. https://www.arabyouthsurvey.com/about_the_survey.html [accessed 15 June 2021]
57 https://eduscol.education.fr/document/4301/download [accessed on 12 June 2021]
58 https://eduscol.education.fr/document/4301/download [accessed 12 June 2021]

The digital world gives schools new reasons to rethink and recreate themselves. The socialisation that was the hallmark of schools as physical spaces has become the preserve of social networks. This situation can be explained by the very constitution of today's society, which functions in networks and needs computers to communicate at a distance.

However, the risk of infodemia[59] is still very present, especially as "young people in the Middle East and North Africa (MENA) region now get their information from YouTube, Instagram and Facebook "[60]. Distinguishing reliable information from fake news is not obvious for these young people. The 12th edition of the annual ASDA'A BCW survey on Arab youth, which is one of the most important research studies produced in the MENA region, informs us about the attitudes and aspirations of a population numbering in the millions, i.e. almost 200 million young Arabs, by revealing their hopes, fears and aspirations, hence the need for a strong awareness of the risks of misinformation as well as the risk of fraudulent use of private data.

The Moroccan school is aware of the interest in exploiting social networks. To this end, three ideas seem essential: having a personal and connected smart device, being sure that one's private data is secure, and ensuring that a cross-curricular module on computer science is introduced in all courses, from primary school to higher education, and in continuing education for all adults.

Preservation of personal data

The privacy of Moroccan Internet users and their personal data are the responsibility of the General Directorate for Information Systems Security (DGSSI). Law No. 05.2061 on cybersecurity, promulgated on 25 July 2020 and published in the Official Bulletin on 06 August 2020, aims to establish a legal framework in the form of rules and security measures. The aim is to ensure the reliability and resilience of information systems. Through this law, the DGSSI seeks to install and develop a feeling of digital confidence among individuals and institutions alike. The digitalisation of the economy and the continuity of economic and societal activities depend on it. As a country aspiring to be an African leader in digital matters, Morocco is in the process of installing a national cybersecurity ecosystem.

The adoption by parliament of law 43.20 was intended to consolidate digital trust in electronic transactions by institutionalising electronic signatures, electronic stamps, electronic time stamps, secure electronic transmission services and website verification.

The DGSSI offers several guides62 to users to counter the resurgence of cyber threats. The implementation of security rules and measures guarantees the organisation's needs in terms of confidentiality and integrity. As far as social networks are concerned, "logging In the case of social networks, "logging" seems to be a mechanism for information security control and analysis in case of an incident, which allows a given network to be monitored while keeping track of the activity logs.

59 https://ifex.org/mena-region-battles-the-infodemic-from-fake-news-to-hashtag-washing-in-the-regions-on-information-wars/ [accessed 15 June 2021]

60 https://en.unesco.org/courier/2021-2/growing-age-fake-news [accessed 15 June 2021]

61 https://www.dgssi.gov.ma/sites/default/files/attached_files/loi_n-05.20_version_francaise.pdf [accessed on 15 June 2021]

Recommendations for Morocco and similar countries

• The digitalisation of educational resources and the adoption of Blended Learning can only be an asset if it emanates from and is directed towards society.

• The institutionalisation of digital could be accompanied by certain measures such as rethinking the function of the school, its pedagogies and contents while ensuring respect for the principles of equal opportunities, decentralisation at the level of governance and the adaptation of curricula to the needs of the labour market.

• Reduce the size of groups of students in class.

• Provide training in the pedagogical use of digital technology.

• Equip classrooms with the necessary equipment and rejuvenate the stock of those already equipped with more efficient devices.

• Increase investment in the digitalisation of education to increase the country's GDP by 1%.[64]

• Initiate a societal debate on ethical behaviour in the digital world.

• Take into account the ecological consequences of the massive use of digital technology.

• Consider the educational continuity between the different spheres that contribute to the development of the child and his or her environment in order to include the school in a sustainable development dynamic.

62 https://www.dgssi.gov.ma/fr/guides.html [accessed on 15 June 2021]
63 https://www.dgssi.gov.ma/sites/default/files/attached_files/guide_reseaux_v04-11-2015.pdf [consulted on 15 June 2021]
64 Chakib Achour, Marketing Director of Huawei Morocco, https://www.lopinion.ma/Education-numerique-Le- Maroc-terrain-propice-pour-une-education-4-0_a14831.html [accessed on 13 June 2021]

ANNEX 2

. Citizen Science for Tomorrow: Composition for a Mobilizing Narrative

By Armand BEUF
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This expert report, which is the result of the collaborative work of my expert colleagues, comes at the right time to examine the possibilities for the emergence of new human sciences and their future scope in lifelong learning strategies.
In the light of the pandemic crisis, which has shaken the organisation of our production systems, revealed the fragility of the health systems of the world's states, and put the education systems to the test, with the consequences of pupils dropping out of school on a massive scale and thousands of students dropping out of university, the various actors concerned - states, companies, associations and individuals - are obliged to take part in this questioning.

While we are aware of the epistemological questions raised by the discussions on these citizen or participatory sciences[66] , in order to build this new scientific universe[67] , which is a citizen faced with the hypercomplexity of the 'multiverse'[68] described by astrophysicists[69] , we need to go beyond the established divisions between specialities[70] , to strengthen the foundations of the scientific community and to make it more effective.

This science policy option is in line with the principle of open science[71] for the benefit of every potential learner, whatever their individual educational pathway, be it school, university, entrepreneurial or self-study, and at any age.

This science policy option is currently and decisively in line with the approaches of international organisations such as UNESCO, CERN, WHO and the HCDN [72] and the European Union, which defines open science as 'an approach to the scientific process based on open collaborative work and tools and disseminating knowledge'[73] that citizens can nurture and enhance through their engagement.

65 My writings do not engage the responsibility of the European Union, for which I worked as an official of the European Commission, nor of the group of experts whose work I coordinated.
66 Jean-Paul Billaud, Bernard Hubert and Franck-Dominique Vivien, Les recherches participatives: plus de science ou une autre science? In Natures Sciences Sociétés 25, 4, 325-326 (2017)
67 Georges GUSDORF, Passé, présent et avenir de la recherche interdisciplinaires in Interdisciplinarité et sciences humaines, UNESCO Paris 1983 isbn 92 3 201988 4 pp31-52; the author stresses: 'A true science, whatever it may be, cannot constitute itself in isolation and maintain itself in an epistemological egoism, outside the interdisciplinary community of knowledge and action' page 33); G. De LANDSHEERE, La recherche expérimentale en éducation Bureau international de l'éducation, Editions Delachaux et Niestlé 1982 isbn 2 603 00468 9 Lausanne p.92
68 Concept put forward by astrophysicists to explain the hypercomplex state of our universe and on which the anthropic principle is grafted
69 David DEUTSCH, The fabric of reality :the science of parallel universes and its implications, Penguin 1997 isbn 071 399 06 19
70 Jan Amos Komensky (Comenius) already strongly denounced the fragmentation of knowledge into unrelated disciplines (dilacerio scientiarum).
71 Regulation 2021/695 of the European Parliament and of the Council of 28/04/2021 concerning the framework programme for research and innovation "Horizon Europe" in OJEU L170 of 12 May 2021 p.2.
72 https://fr.unesco.org/news/appel-conjoint-science-ouverte-unesco-oms-hcdn-cern
73 Articles 2 and 14 of Regulation (EU) 2021/695 of the European Parliament and of the Council of 28 April 2021 concerning the framework programme for research and innovation 'Horizon Europe' (2021-2027) in Official Journal of the European Union L170 pp15 and 21-22.

Like new argonauts, we need to map out our paths of knowledge and praxis in the midst of uncertainty and with the lingering realization of 'wicked problems'[74].
We need to (re)discover the founding spirit of 'universal' scientific pioneers such as Goetlieb Leibniz, pioneer of the scientific academies, the core of the scientific centres of modern Europe[75] , master of interdisciplinary knowledge in Europe in his time, that of Alexander von Humbolt, a tireless observer-explorer of tropical biodiversity[76] in the company of the botanist Alexandre Goujaud, but who was also a 'committed' observer of the economic and social environment of the indigenous populations he encountered during his travels[77] ;

We must also (re)affirm the importance of the progressiveness of education and the quality of the educational field in order to achieve a harmonious development of the learner, as supported by philosophers and practitioners of education who have worked in different cultures to

In this respect, it is worth noting that many of the authors of the book, such as John Dewey [78] or Ibn Khaldun[79], were from different periods, but their writings underline the modernity of their approaches more than six centuries apart.

The construction of science is strengthened by the commitment of its multiple actors grouped in networks[80] to form 'scientific communities'[81] and knowledge and innovation communities.
These communities, which bring together large and small companies, research organisations, higher education institutions, and populations of researchers and engineers, participate widely in a 'bottom-up' strategy to spread knowledge and practice across a range of sectors by forming dynamic partnerships and creating favourable environments for finding appropriate solutions[82].
The European Union has thus decided since 2010 to create 8 innovation communities for climate, digital, food, health, energy, manufacturing, raw materials and urban mobility[83]. They have made a major contribution to strengthening international multidisciplinary networks in which citizens can take participatory action.
We must emphasise that in this global network built up over time, the approach and recognition of the achievements of citizen initiatives rooted in their local cultural melting pot are increasingly gaining legitimacy in academic circles and in the circles of international organisations.

For several decades, the maturing of democratisation processes and the strengthening of citizen participation in the various development programmes have been experimentally achieved on a global scale[84] and have paved the way for the deepening of participatory approaches of a citizen nature in relation to science.

74 Eyogang and Menning Association for medical education (AMEE) quoted by J-M.De ketele ed, Reforming education, RIES n°83 2020.
75 René SIGRIST, Eric WIDMER Wladimir BERELOWITCH, Les lieux de science de l'Europe moderne in Stella GHERVAS and François ROSSET, Lieux d'Europe, Editions de la maison des Sciences de l'homme, Paris.
76 Andrea WULF, The invention of nature The adventures of Alexander von Humbolt ,John Murray publishers London 2015 isbn 978 1 84854 900 5.
77 Alexander von Humbolt, Essai politique sur le royaume de la Nouvelle-Espagne du Mexique, Editions Utz Paris 1997 isbn 2 909365 12 3 (unabridged version of the 1811 original).
78 John DEWEY, Democracy and Education, op.cit.
79 Ibn KHALDOUN, Le Livre des exemples, Editions Gallimard Paris 2002 pages 1067-1069 excerpts: 'The teaching of science is only profitable if it is carried out progressively and step by step...In this way, the student acquires a habitus in this discipline'.
80 Michel CALLON (dir), La Science et ses réseaux genèse et et circulation des faits scientifiques, Editons La découverte, Paris 19 isbn 9 782 707 118080 ; Jean-Pierre chrétien-gouni and Raphaël Lellouche Qu'est-ce que la communauté scientifique in Cahiers STS Légitimité et légitimation de la science Editions du CNRS Paris 1984 isbn 2-222-03511-2 pp.45-60.
81 Mark N.FRANKLIN, The Community of science, Gower editions, London isbn 0 566 05632 1.
82 https://eit.europa.eu/our-communities/eit-innovation-communities
83 https://www.s4d4c.eu/knowledge_resource/eit-kic/
84 Marisol ESTRALLA and others, Learning from change, isbn 0 88936 895 3 London 2000.

Indeed, the potential wealth of the digital instrument is shared by citizens to serve the observation of territorial or oceanic climate change[85] through networks of observer-actors - otherwise known as 'social sensors'. And the data collected through their so-called 'smart' connected devices[86] can be added to experimental data provided by physical or virtual research infrastructures, thus enhancing the capacity to collect real-time data that is often valuable for rapid decision-making in natural risk management or for creating new research programmes.

The increasingly refined practices of these networks, which are likely to lead to the emergence of a new path of scientific progress through the appropriation of parametric data by these hybrid communities, demonstrate their capacity to innovate in terms of the generation and conduct of change observation protocols.

There is an urgent need to find orderly ways of coordinating education policies and scientific and technical policies in depth. The idea is certainly not new[87] , but the scale of the current societal problems posed on a global scale - such as the promotion of well-being and health, the safeguarding of the environment under strong anthropic pressure combined with that of natural phenomena and confronted with the butterfly effect described by Edward Lorenz, These large-scale literacy programmes have been developed in the context of the European Union's education policy, and are now being implemented by the European Commission in the context of the European Union's education policy.

These major literacy and acculturation programmes for the new constituent subjects (life sciences, climate sciences, ocean sciences, etc.) of the new citizen science universe under construction will have to be enriched by the existing state of the sciences and developed within the framework of freely negotiated co-creation processes between research institutions and groups of voluntary citizens capable of generating frugal innovations, participating in the observation of our surrounding environment and thus contributing to the safeguarding of our environment, which is now seriously degraded.

As a contemporary large-scale example, we are currently witnessing the rapid rise of this federative movement in the design and also the programming of actions. We also see this coordinated evolution of the United Nations Decade of Ocean Sciences for Sustainable Development and its implementation[89] by a very large number of communities involved.

85 Adaptation to climate change is presented by many authors as a pernicious problem; see for example Duncan Russel and others, Analyzing the Policy framework for climate change adaptation in Adapting to climate change in Europe, Elsevier Publishing 2018 pp.273-313.

86 The key aspect of citizen observatories is the direct involvement of users in the data collection process as 'social sensors'; this is the case of the Wesenselt project funded by UNESCO and the European Commission under FP7 contract no. 308429.

87 Bulletin of the International Bureau of Education April-June 1988 devoted to this theme.

88 Pierre Bourdieu and Loïc Wacquant, An invitation to reflexive sociology, University of Chicago press 1992 p.119; Pierre Bourdieu in Critical theorists and international relations, Routledge London isbn 978 0 415 47466 5 p.111.

89 UNESCO https://fr.unesco.org/ocean-decade

We also see this development coordinated at European level: the support of the first programmes[90] initiated by the European Communities and the diversified European projects following calls for proposals from research institutions drawn up to study the phenomena of climate change from the 1990s onwards, has enabled the development of alliance strategies at European level for the fight against climate change through the creation of a Global Climate Change Alliance[91] in 2008, which to date brings together more than 80 support programmes across the planet[92] with the involvement of local communities.

This flagship initiative of the European Union, by developing a strong capacity building component for organisations and individuals, has enabled the ani- mation of an innovative online platform for exchanging data and good practices[93] on a large scale.

The same applies to the control of an infectious disease caused by the arbovirus 'zika' [94]. The European Union has decided to lead and fund a global alliance of 54 partners against zika through the ZIKAlliance project (2016-2021) [95] with the participation of hundreds of cohorts of volunteer citizens without whom progress could not be made.

We can mention the beneficial effects of Europe's pioneering environmental policy with the creation and launch of the first general environmental programme in 1973, the eighth of which is currently being discussed by the European institutions [96] and formally recognises in its statement the necessary participation of individual citizens alongside regions, cities, social partners and civil society organisations. We can also highlight the creation of the LIFE instrument in 1992[97] and its numerous results obtained over a period of almost thirty years in the field of conservation of areas protected thanks to the concerted action of the Member States with numerous groups of citizens who have helped to shape it, notably through the creation of Natura 2000 sites[98].

In the light of the upheavals created by climate change, we need to strengthen the environmental economy - remembering the etymology of the word 'eikos' meaning home - by reinforcing the role of citizen science in the development of strategies for environmental protection and natural resource management.

For example, this economic sector occupied 4.1 million full-time jobs in the EU-28 in 2015, an increase of 47.3% compared to the situation in 2000[99] . Its share in total employment also increased over the same period from 1.3 to 1.8%. In a perspective of lifelong learning of the value-added chains in the environmental sectors, citizens employed by companies in the environmental sector should themselves initiate and/or integrate training courses on the circular economy, giving priority to short circuits.

90 Proposal for a Council Decision adopting multiannual research and development programmes in the field of the environment (1986-1990) in Official Journal of the European Communities C301 of 25/11/1985; the content of the first research and development programme on climatology is set out on pages 35 to 44.

91 From local action to climate budget support Experiences from the global climate change alliance+ isbn 978-92- 79-43933-9 Brussels 2014.

92 https://www.gcca.eu/stories/gcca-factsheet-building-climate-resilience-most-vulnerable-countries

93 European Commission 2016 annual report on the implementation of the European instruments for financing external actions in 2015 staff working document Brussels isbn 978-92-79-65891-4 p.114.

94 The zika arbovirus was found in the zika forest in Uganda in 1947. It is highly virulent and causes innumerable pathologies including abnormalities in brain development in children.

95 https://cordis.europa.eu/project/id/734548

96 https://ec.europa.eu/environment/pdf/8EAP/2020/10/8EAP-draft.pdf

97https://www.europarl.europa.eu/RegData/etudes/BRIE/2018/628294/EPRS_BRI(2018)628294_EN.pdf

98 Eurostat sustainable development in the European Union monitoring report on progress towards the sdgs in an eu context 2018 p.290.

99 Key figures on Europe eurostat editions 2018 p.63.

Should we not undertake a genuine 'revolution' - in the etymological sense of the term - in the approach to life sciences combining human, animal and environmental health, from the perspective of citizen science ?

Is it absurd in a time of pandemic[100] to consider that each human being, thanks to the current debates caused by a coronavirus, may fundamentally wish to master the knowledge of his or her own body universe confronted with parasitism? Shouldn't we (re)understand the basic metabolic mechanisms of our organism, such as the krebs cycle relating to pyruvic acid[101] which constitutes the ferment of all the energetic engineering of the body cells of all the eukaryotes of which we humans are a part ?

Can we not seek to share philosophically with as many of our fellow human beings an understanding of the rules of operation of the self-replicating systems[102] of our organisms, which are made up of molecular structures capable of replication, such as RNA and DNA, endowed with mutability (of errors in the copies of our genes) and a metabolism (of

What is the role of microparasitism (e.g., in the case of a microparasite) in the context of allowing everyone to discover the complexity of living organisms[103] and to question the management of cooperation within biological systems[104] ?

Is it not right to allow each citizen to be equipped to understand the meaning of Manfred Eigen's 'hypercycles' in order to grasp their significance and scope in the organisation of living organisms over a long period of time, and for this material to be dealt with by specialists in human evolution, but also to be apprehended, popularised and disseminated by open science portals ?[105] Similarly, at the level of education, is it not right to allow each citizen to be equipped to understand the meaning of Manfred Eigen's Similarly, in terms of the development of EU health policy at the embryonic stage and in a context that will remain marked by this pandemic for several years, we call for a citizen science approach to resolutely support the development of the autonomous EU4Health programme that the European Union has just created[106].

Consequently, in view of the societal problems raised, we formulate a number of practical recommendations to facilitate the development of these sciences at the global level and in the European research, education and training area under construction.

100 Pierre VIDAL and Jean-Pierre GONZALEZ in Développement durable ? Doctrines, pratiques et évaluations, IRD éditions Paris 2002 isbn 2 7099 1502 2 pp243-264 'Microparasitism can be a serious impediment to sustainable development' say these two researchers.

101 https://pdb101.rcsb.org/motm/154 https://www.news-medical.net/life-sciences/Krebs-Cycle-Overview-(English).aspx

102 Claude DEBRU, Le Jeu des possibles structure de la raison et sciences de la vie in Revue internationale de philosophie n°4/2000 pp 673-700 Presses universitaires de France.

103 Gilbert LECHERMEIER, Definition of life and emergence of life, 2015 https://tel.archives-ouvertes.fr/tel-01403361/document

104 Eric MURAILLE, La gestion de la coopération au sein des systèmes biologiques, in Revue des questions scientifiques 2021 7 188(3) pp331-372 .

105 As an example, the 'OpenEdition' infrastructure promoted by Marin Dacos and which brings together 4 different portals: Revues.org, Hypothèses.org, Openeditionbooks and Calenda.

106 Regulation 2021/522 of 23 March 2021 published in OJ L107 of 24/3/2021 pp.1-23. https://eur-lex.europa.eu/legal-content/FR/TXT/PDF/?uri=CELEX:32021R0522&from=F

107 https://ecsa.citizen-science.net/wp-content/uploads/2020/02/ditos-policybrief3-20180208-citizen_science_and_open_science_synergies_and_future_areas_of_work.pdf

Starting from the fact that the contributions of these citizen sciences make the disciplinary fields themselves evolve and enrich by their practices and that they have become in-fluent actors in the educational field :

- Supporting citizen science associations worldwide with appropriate funding[107] through the development of seed fund mechanisms to supplement the associations' own funds or those raised through crowdfunding and intended for their launch. Such support is already provided in some federal systems, such as the US federal system.[108]

- Encourage these associations to be stakeholders themselves in wider communities of knowledge and innovation to enable the reception and/or dissemination of ideas and promote the multiplier effect of their frugal and/or technological innovations

- By building on the drastic transformation of the modes of production of partnership research at European and global level for the fight against covid, organise global meetings of citizen or participatory research capable of inspiring and proposing new advances in the treatment of so-called 'pernicious' problems.

- Within international organisations, particularly those of the UN system such as the UNES-CO, strengthen the presence of citizen science in their major education programmes and in all areas of application, particularly through the implementation of emblematic projects[109]

- Recommend that participatory science associations disseminate the results of their projects within national academies and international academic federations or unions,

- Within regional organisations such as the European Union, recommend the evolution of the legislative arsenal by the adoption of a directive of the Council of Ministers of Education and Training on the same subject in order to amplify the impact of the present resolution published in February 2021 on a strategic framework for European cooperation in education and training, in the perspective of the European Education Area and beyond (2021-2030) stressing the need to make lifelong learning and mobility a reality for all110 while recalling the spirit of the co-creation of this strategic framework.

- In view of the urgent need to 'promote environmental sustainability perspectives in education and training programmes at all levels of education and in an interdisciplinary approach, as well as pedagogical concepts, such as education for sustainable development and global citizenship education'[111] , to empower citizens to contribute to sustainable development', advocate that provisions for the development of citizen science be included in forthcoming legislative proposals, and that this topic be put on the agenda of future 'citizens' dialogues'[112] that the European institutions organise in the EU Member States.

108 https://www.citizenscience.gov/#

109 CLIMWAR project https://en.unesco.org/climwar/citizen-science

110 Resolution of the Council of Education Ministers on a strategic framework for European cooperation in education and training in C66 of 26/02/2021 p.1-21.

111 The historian Joseph Ki-Zerbo says that education is 'the mainframe software that programs the future of our societies'.

112 'Citizens' Dialogues' organised by the European institutions since 2012: https://ec.europa.eu/info/about-european-commission/get-involved/citizens-dialogues_fr

In terms of the operational implementation of the European research and innovation framework programme 'Horizon Europe' (2021-2027) :

- that the allocation of partnerships and missions newly stimulated by the new EU research and innovation framework programme 'Horizon Europe' (2021-2027)[113] may facilitate the extension of the scope of our citizen sciences by better taking into account the needs formulated by citizens during public consultations [114] launched by the European institutions and the work of the conference on the future of Europe currently being organised.[115] This could be the case of studies and pilot projects to be carried out in mid-2007.

Open' educational venues with direct participation of citizens on cross-cutting 'integrative' themes such as climate, health, food and environmental security.

In 1992, Professor Bernd Hamm, in an issue specially devoted to European integration of the international review of social sciences published by UNESCO, wrote: "Peace, development and the protection of the natural environment constitute the triangle of global problems. Only global solidarity can guarantee the survival of humanity. Environmental risks, migration flows and violence are global phenomena.... He continues : "There is no "STRONG EUROPE" - the expression is in capitals in the published article - that will be able to stop climate change on the continent. We must understand that a new world order must be built above all on new principles of universal responsibility and solidarity "[116].

The acuity of his words, added to the prospective analysis of our expert colleagues in their present report recommending a rethinking of knowledge, skills and pedagogy in the light of current societal, health and economic challenges, makes us emphasise the central importance of education and training in the development of citizen sciences as a privileged way of implementing our principles of universal responsibility and solidarity.

113 Articles 8 and 10 of Regulation 2020/695 of the Parliament and the Council of 28/4/2021 OJ L170 of 12/5/2021.

114 The results of the present public consultation on environmental sustainability https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12985-Environmental-sustainability-education-and-training/public-consultation_en launched from June 2021 to September 2021 could be used to inform debates on the development of citizen science during the ongoing conference on the future of Europe.

115 Future of Europe Conference: https://ec.europa.eu/info/strategy/priorities-2019-2024/new-push- european-democracy/conference-future-europe.fr

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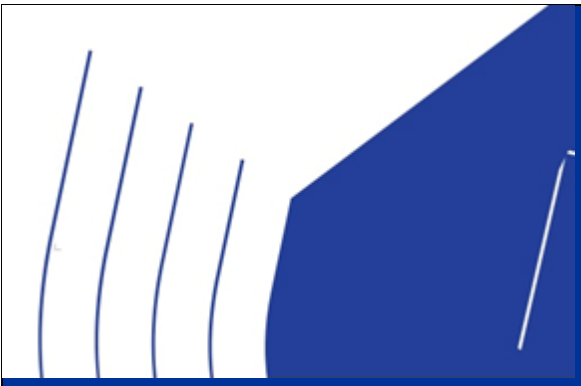


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