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Rethinking the Curriculum in the Context of Education for Sustainability: Lessons from the COVID-19 Pandemic

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Abstract: In considering the current COVID-19 pandemic as a moment of reflection on a wide variety of issues, this paper discusses the need to rethink the curriculum, in regard to its priorities and in the context of education for sustainability. It does so by revisiting some ideas that have received, or have begun to receive, attention in the field of education. More specifically, the paper focuses on the development of global awareness as an educational goal, the notion of hope and the future dimension of the curriculum, the value of systems and ecological thinking, as well as the value of decision making and the role that knowledge of the nature of science can play in decision making. Given that the world will most likely face in the future complex global issues and problems, just like the COVID-19 pandemic, all the aforementioned ideas deserve particular attention, especially if the curriculum is to promote and foster the idea of sustainability.

Keywords: sustainability; education; global awareness; hope; future; ecological thinking; systems thinking; nature of science; decision making



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1. Introduction

Even though the notion of sustainability has its origins in Hans Carl von Carlowitz's work about sustainable forestry in the 17th century [1], its mainstream conception can be traced to the well-known Brundtland Report. This report defined sustainable development as "the development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [2]. It is evident that this definition has helped raise our awareness of the relationships and interactions between social, economic, and environmental factors. The recent COVID-19 pandemic and its impact on people has provided a context that made these relationships and interactions even more evident. With respect to education per se, the impact of the pandemic can be seen in a complex network of relationships that includes teachers, students, parents, curricula and teaching models [3]. But while it is true that curriculum leaders' main response to the COVID-19 pandemic was to turn to alternative methods of instruction (e.g., online platforms) in order to keep students safe from being infected, the pandemic and its impact on the world did point to certain implications for the science curriculum, and the curriculum in general, that deserve attention, especially if the latter is supposed to promote the idea of sustainability [4–7].

The idea that the children of today will live tomorrow in a world that will be radically different from the one that their grandparents, or even their parents, lived has become a catchphrase. However, in order for that radically different world to be a better place for children to live in, the idea of sustainability should be, not just seriously considered, but promoted in the context of education. We have to rethink about priorities in the goals and the content of the curriculum. The question "What knowledge is of most worth?" should be revisited now that humanity is changing the global balance of both the natural and biological environments with not just unintended but also unimaginable consequences.

It is true that the pandemic has shocked people into an 'awakening' and made them reflect on a variety of issues and even reconsider what makes a good life [8]. Indeed, despite its toll and cost, the pandemic has made people and scientists alike to respond to a

'shock of awareness', which could be very well considered an opportunity for reflection. As educational philosopher Maxine Greene argued, "A great part of our everyday life is not lived consciously, and since nothing makes an impression, the world seems bland, muffled, and vague. Now and then, however, there are exceptional moments, moments of response to 'shocks of awareness' [9] (p. 185). No doubt, the pandemic has been such an 'exceptional moment' for reflection on a variety of issues and problems. One of them is the school curriculum. What lessons can be really drawn from the pandemic?

In considering the notion sustainability, I will focus on six ideas, namely, global awareness, hope, the dimension of future, systems and ecological thinking, decision making and the nature of science. The reason why those six ideas were selected—and not some other ones—is that the paper focuses on a curriculum that promotes and fosters the idea of sustainability. All six ideas are very relevant to Education for Sustainability—some of them have already received some attention by educators and researchers as discussed in the paper—but the COVID-19 pandemic and the ensuing crisis as well as the prediction by epidemiologists that the world will face other pandemics in the future do point to the need to rethink the curriculum.

All six ideas emerge from a holistic perspective on the world, as they are all interrelated, and thus from a holistic perspective on the curriculum. It should be pointed out though that when one focuses on a holistic treatment of any topic, especially a challenging one, as is always the case with the curriculum, one does not dedicate much space to discuss problems related to those challenges to any extent. Thus, the paper's strength, which precisely lies in its holistic qualities, necessarily and inevitably leads to its limitations of treating certain problems associated with the curriculum 'cryptically'. However, the discussion in the paper can be considered a prerequisite for initiating curriculum reform, if the idea of sustainability is taken seriously in the context of education.

2. Global Awareness as a Significant Educational Goal

It would be a truism to say that the world is getting smaller and smaller. Literally everything moves around the world fast: from images and ideas to currencies and people. The flow of information, in general, takes place in a mind-boggling way, while human societies have become ethnically and culturally diverse. Education is trying to catch up with it, through the implementation of various programs and curricula that promote inclusiveness and an international perspective [10]. The current pandemic, of course, has raised our awareness that we are all connected in multiple ways. However, while this interconnectedness has been a familiar idea over the past decades and many people do know about it, it was the pandemic per se and its impact (i.e., psychological, economic, moral) that made people fully conscious of what interconnectedness really means.

Even though scientists can only make informed guesses about the origin of this pandemic, one thing is certain: the spread of the virus was so fast that made people aware how we are all connected on this planet. While some may still believe that the term "global village" is a figure of speech, the current pandemic has provided support for the fact that we literally live in a "global village". The question though is how well education prepares students to be global citizens. The notion of the "responsible citizen", who thinks critically and creatively, in order to achieve personal and social goals, is a laudable one, but such citizen ought to have also developed a perspective on the world that transcends the boundaries of his/her own local community. Such a wider perspective is not just about the development of a variety of interests and a broadening of students' horizons; it is also about an awareness of the state of the planet, of the interconnection of its various systems and of all people and events [11,12]. The current pandemic has made a wider perspective on issues and problems imperative: to understand it, to see its implications and to do something about it, one has to put into relationships the local and the global—from local and national economies and health care systems to personal decisions that have practical but also psychological, moral and ethical dimensions.

Thus, it is imperative that Hanvey's ideas be revisited [13]. He had pointed out the crucial importance of a "global perspective" that can be cultivated through education. His notion of global perspective is about an awareness that includes five dimensions, namely, "perspective consciousness", "state of the planet awareness", "cross cultural awareness", "knowledge of global dynamics", and "awareness of human choices". Such a notion points to the centrality of a holistic perspective on the school curriculum, and thus to the need to rethink the role of the latter in the context of sustainability. Recent scholarship on the role of science education in fostering sustainable development [14,15] is a case in point. If science education is to make a contribution to sustainable education, the science curriculum should be trans-contextual.

Regardless of whether one agrees with A.N. Whitehead, who is reputed to have said, as James Newman writes in *The World of Mathematics*, that everything of importance has been said before by someone who did not discover it, it seems that in education there are no ground-breaking or innovative ideas. Yet, some ideas need to be revisited for the purpose of reclaiming their value in the context of contemporary reality. Even though the idea of global education had been proposed several decades ago by Hanvey [13], the development of global awareness per se should be seriously considered as a crucially important goal that 21st century schools should achieve. For it is global awareness that can literally open the students' eyes to just how interconnected the world really is. Moreover, global awareness helps create meaning. Whether one reads Stephen Toulmin's *A Return to Cosmology* [16] or Brian Swimme's *The Universe Story* [17], one thing becomes evident: Human beings have always tried to understand their place in the universe as a whole. And such understanding can be associated with what has been called "ontological knowing", that is, "one's feeling for a tentative connection to the larger world" [18] (p. 14).

The science curriculum per se can certainly foster global awareness through the study of socio-scientific issues and an awareness of the state of the planet. Teachers, for example, by using imagery, (i.e., Google Earth), can help their students see a larger picture of certain places on the planet and thus develop a larger perspective of the state of the global environment. The GAIA Project (Global Awareness, Investigation and Action) is also another good example, which aimed to inspire middle and high school students worldwide to become involved with environmental research and collaborate on a local, regional, and global level. The aesthetic appreciation of Nature may also be another good example [19]. Images of the planet taken from observation and environmental satellites can help raise awareness, by presenting the diversity and beauty of the planet, and also by revealing features and patterns, which are not visible to the naked eye. The 2012 NASA "The Earth as Art" collection, consisting of images collected over the last 40 years is a case in point [20].

Global awareness can be achieved by studying not just current events, but by making global events and problems a part of the school curriculum, and this needs to include all curricular subjects (e.g., science, geography, math, language arts, history, art, geography, or language arts lesson). For it is these global events and problems (e.g., overpopulation, ocean pollution, climate change, deforestation) that can raise students' awareness of the fact that what happens far away from them can impact them in their own locality, and that impact can be multidimensional, and also that social responsibility and solidarity become central when we have to respond to those events and problems and do something about them [7,10,11].

It should be noted that it is the larger perspective that also promotes environmental awareness (i.e., an understanding of the fragility of our environment and the importance of its protection). For example, one is more likely to become aware of what deforestation does if one views not just the impact of deforestation on one's local community or even country but its impact due to millions of acres of forest are cut down for industrial benefit, such as large-scale farming, oil mining, and the production of paper goods. Even though students can understand that deforestation causes wildlife and biodiversity extinction (i.e., due to loss of habitat), it is the larger view (e.g., a satellite photo) that really provides a "shock of awareness" of what deforestation has done on the planet. And such awareness, in turn, is

more likely to develop in students a global awareness of the significance of deforestation for the future of the planet.

True, the promise to improve the planet and the lives of its people by 2030 can be considered the ultimate aim of sustainable development, which can be achieved by commitment to seventeen long-term global goals (or sustainable development goals), such as elimination of poverty and hunger, good health and well-being, quality education, affordable and clean energy [21], see also [10,15]. However, as far as the school curriculum is concerned, the development of global awareness is a goal that promotes the idea of sustainability, but which can be achieved in the context of schooling. And such a goal can promote, what Laszlo calls, a planetary consciousness, which, according to him, is “our next evolutionary step and one of the real imperatives of our day” [22].

3. The Dimension of Hope

Fostering sustainability is about hope for a better world in the future, and commitment to sustainability itself is an expression of hope. In the midst of crises, like the one the world has just experienced, and is still experiencing, due to the pandemic, hope becomes perhaps the only means of developing a sustainable world. In fact, sustainability is rooted in hope, which, according to Paulo Freire, is an ontological need [23]. As he argued, “It would be a serious contradiction of what we are, if aware of our unfinishedness, we were not disposed to participate in a constant movement of search, which, in its very nature, is an expression of hope” (p. 69). The pandemic leads to a search and to ‘multiple re-inventions’. And, as a result, many aspects of our personal and social lives as well as sustainable models (e.g., social, economic, corporate/business, environmental) are bound to change. Such change though cannot take place without hope.

Even though the environment is only one of the pillars of sustainable development, environmental engagement is recognized as a crucial factor in sustainable development, and hope can indeed promote such engagement [4]. There is empirical evidence that “Constructive hope had a unique positive influence on pro-environmental behavior”, while “hope based on denial was negatively correlated with pro-environmental behavior” [24]. The important message though from this study is that “hope is not only a pleasant feeling but could also work as a motivational force, if one controls for denial” (p. 625). This message, in fact, is in line with the view that without hope there is no motivation for learning in general, as “the impulse to learn presupposes confidence in the possibility of improving one’s existence” [25] (p. 275). Thus, the notions of ‘hope’, ‘sustainability’ and ‘learning’ are intricately linked. The curriculum, therefore, ought to incorporate the dimension of hope.

Many of us would agree with the Deweyan idea that if democracy is a way of life controlled by a faith in the possibilities of human nature, then education should also presuppose faith in human nature. This faith, apparently, also points to the consideration of optimism as an indispensable dimension of the curriculum. Thus, teachers should try their best “to unveil opportunities for hope, regardless of the obstacles” [23] (p. 9). But because hope must always be rooted in practice—otherwise there is inaction which leads to hopelessness and despair—the notion of praxis becomes crucial. Without hope human beings cannot begin the struggle for change. Students, therefore, should begin at an early age to participate in projects and activities that give them the opportunity not just to inquire, search and imagine, but also to critically act with the aim of changing something in their immediate environment, having as a broader purpose the improvement and betterment of life on the planet. While such purpose—in line with educating for sustainability—requires a shift from a market—place vision, hope is not something that is difficult to incorporate into the curriculum. Hope, as it has been argued, is nothing other than the ability to break up the actual, to “possibilize” it, to transform it mentally [26]. And this is something that students should be taught to do.

In the context of sustainability, hope can be seen as prerequisite to accept responsibility to do something about the ecological crisis, which, apparently, includes the current crisis

due to the pandemic as well as the crisis due to climate change, with all the ensuing problems and their implications. Thus, people need to act, to struggle, not only when they are hopeful, but also, and most importantly, when they do not expect good results or outcomes. “Hope”, it has been argued [27], “is not a conviction that something will turn out, but the certainty that something makes sense regardless of how it turns out” (p. 4).

Such views on the notion hope, and especially in regard to sustainability, echo Nikos Kazantzakis’ view on hope [28]. Whether Kazantzakis believed that we should be hopeful without any expectations at all, or that we should entirely reject hope, is a matter of interpretation. But what is important to point out here is that for Kazantzakis what matters is that we always act and struggle and proceed, not because we expect anything but because such action and struggle give meaning to our life. And such a view concurs with Freire’s view of our ontological need to participate in a constant movement of search, which he calls “an expression of hope” [23].

While Kazantzakis admonishes us to abandon the last temptation of all, that is, hope, he does urge us to find meaning by proceeding without asking where we are going. Even though, he writes, “the goal is to be shipwrecked”, we proceed and we struggle. We work even though there is no master to pay our wages when night falls, and we sing even though there is no ear to hear us [28]. Such views, which express a rejection of hope, do not imply passivity in the least, and are quite timely in the context of the pandemic and sustainability for that matter. People, due to the pandemic and the ensuing problems (e.g., the emergence of new variants, ever increasing numbers of people who test positive despite their having been vaccinated, new measures and restrictions, dismal predictions about the duration of the pandemic) begin to lose hope. But they have to act and proceed because it is the only thing that makes sense. It is such a view of hope that is relevant to the notion of sustainability. And the humanities can play a leading role in promoting it. This, of course, does not imply that images of desirable futures and sources of hope [29,30] lose their value or they should not be included in the curriculum. On the contrary. But the notion of sustainability does point to the value of hope that is based on the “certainty that something makes sense regardless of how it turns out” [27] (p.4).

In talking about hope, however, special attention should be paid to the dimension of the future. It would be a contradiction to expect students to have hopes regarding the betterment of human life and the ‘human condition’, while the primary temporal dimensions of the curriculum are the past and the present. Though knowledge of the past and the present are indeed important factors to consider, it is nevertheless the dimension of the future that is constantly present in any process of improvement or betterment, and it must be addressed in the curriculum. It is this future dimension that also creates meaning in life [31].

4. The Dimension of Future

It is well known that scientists had predicted the COVID-19 pandemic and it is very likely that similar or other pandemics may occur in the future. The whole world was taken by surprise and national health care systems were found unprepared to deal with the pandemic. An important lesson that central governments and other agencies were taught was that citizens should be prepared to respond to the future. As Mackenzie pointed out, “COVID-19 isn’t the first pandemic humanity has faced and it won’t be the last. What has happened offers lessons about how to judge and respond to virus warnings in future” [32]. The notion of ‘preparedness’ refers to the process of raising awareness of the risks faced by local, national, and international communities into actions that help them respond to, and recover from, a pandemic and others natural disasters for that matter.

About half a century ago, Alvin Toffler in his *The Future Shock* had argued for the future orientation of the curriculum [33]. This idea, while simple in its conception, has immense implications for the conception of the curriculum, and education in general, that are beyond the scope of this article. However, the future, as a dimension of the curriculum, is quite crucial and this idea too should be revisited in the context of sustainability. The

inclusion of the dimension of the future in the curriculum is much less radical than a ‘future orientation’ of the curriculum and aligns with the proposal for global education [13]. In fact, images of desirable futures and the identification of sources of hope (e.g., people, places, landscapes, events, ideas) have begun to receive some attention over the last decade since they can help students clarify their visions of a more sustainable society [29,30].

If meaning making is equivalent to the construction of a coherent whole, of which the self as the epistemic subject is a part [34], then the future should be an important factor in this construction process. Though the present and the past are parts of that coherent whole and act as bridges that facilitate, in fact make possible, the understanding and prediction of future situations, the future itself is responsible for the continuation of the process of construction of that whole [31]. In fact, it has been argued that it would be a contradiction to expect students to have hopes regarding the betterment of human life on the planet, while the primary temporal dimensions of the curriculum are the past and the present [31]. This, of course, does not mean that the past and the present are not taken into consideration. For as David Hicks [29] explains, the ‘temporal dimension’ of the curriculum is a futures perspective that “looks at how global issues affect and are affected by interrelationships between past, present and future” (p. 269). Fostering sustainability requires an understanding of such interrelationships, and the COVID-19 pandemic is a case in point. To understand the impact of the pandemic (e.g., on the quality of life, on economic, environmental and political development) in the context of sustainability, one needs to understand how the present situation has been affected by past practices and policies and how the future situation will be affected by the current one.

In regard to the curriculum, future scenarios, such as the prospect of an irreversibly damaged Earth—even inhospitable to humans—by climatic change, a world in which the fascinating and mind-boggling biodiversity will no longer exist, the infection of the planet by a virus from space, need to be discussed as issues/problems that can become not just an unpleasant but a catastrophic truth.

5. Ecological and Systems Thinking

Because a sustainable global future involves a variety of complex interchanges, it is crucial that the content of the curriculum fosters systems thinking, which includes, ecological thinking. While the former refers to the process of understanding how the various components of a system influence one another within a whole, and thus, helps us navigate the complexity of systems (e.g., the Earth’s global climate, living systems, communication systems, social organizations, organisms, ecosystems, the universe), the latter is the manifestation of wholeness in humans and in nature [10,35,36]. Central to both kinds of thinking is the idea of ‘interconnectedness’. It takes systems thinking, for example, to understand how the climatic change, due to a volcanic eruption in AD 535–536, resulted in bubonic plague in Byzantium in AD 541–549, the immigration of Mongolian tribes, as well as the ascent of Islam [37], see also [38]. Apparently, it is systems thinking that helps students understand that all the problems faced by humankind (e.g., hunger, poverty, racism, migration, war, resource distribution and depletion) are all inextricably linked [11]. The COVID-19 pandemic has provided a context that has illustrated multiple links between multiple factors, but also taught us a lesson, as “it has highlighted many distressing aspects of the way our lives are lived normally” (e.g., the fragility of contemporary economics, failing governance institutions, societal inequalities, dislocation from nature) [39].

It should be noted that such multiple links and interconnections align with the British philosopher and mathematician Alfred North Whitehead’s view that every entity in the universe is to be understood in terms of the way it is interwoven with, and interconnected by, the rest of the universe. Whitehead, in fact, had argued that reality is fundamentally constructed by events, which are defined only through their relations to other events. His so-called “process philosophy” is based upon the rejection of independently existing substances, and the world is seen as a web of interrelated events or processes [40]. Thus, “process philosophy” points to the fact that an understanding of ecological sustainability

presupposes an understanding of multiple and interconnected issues and events. Even though learning that promotes sustainability should be inquiry-based, socially grounded and future-oriented, it is crucial that students understand the connections between environmental, social, economic, and even political systems. It is precisely an understanding of these interconnections that promotes sustainability.

It is, therefore, as misleading to understand sustainability in terms of environmental issues as trying to understand, for example, overpopulation in terms of population density. Thus, the school curriculum should help students understand the complexity of the world around them and foster thinking in terms of relationships and connectedness [41]. A good illustration of thinking in terms of relationships has been readily provided by the impact of the COVID-19 pandemic. The lockdown resulted in reduction of pollution but also in an increase of psychological problems, while a change in human behaviour produced a change in the environment. However, in considering the impact of the pandemic, that is, a health-care issue, one can easily see such impact on multiple areas of human life, from education and economy to transportation, entertainment and social behavior. It is these multiple relationships that form the core of systems thinking [38].

The importance of such kind of thinking had been pointed out by Gregory Bateson, who proposed that the idea of 'interrelationship' be introduced even to very young students [42]. In the case of science, for example, an illustration of the idea of 'interrelationship' can be seen in the words of Nobel laureate in physics Richard Feynman, who had eloquently argued that "the whole universe can be found in a glass of wine", by pointing out the complex relationships between the various physical and chemical phenomena taking place on the planet: "[. . .] the twisting liquid which evaporates depending on the wind and weather, the reflections in the glass, and our imagination adds the atoms. The glass is a distillation of the Earth's rocks, and in its composition we see the secrets of the universe's age, and the evolution of stars" [43] (p. 67). Only by being helped to think in terms of relationships, such as those described by Feynman, can students begin to move away from a linear type of thinking.

Perhaps, one of the best illustrations of the dangers and results of linear thinking is what transpired in the 1960's, when American technologists, in their attempt to exterminate the mosquitoes in Malaysia, sprayed forests and swamps with DDT. The result was plague and the destruction of the huts in the nearby villages. And this because the technologists did not consider the various animal species that existed in the environment (e.g., cats, mice, cockroaches, lice), and also the various relationships between the killed mosquitoes and those species [44]. With regard to sustainability per se, a good illustration of the importance of thinking in terms of relationships is provided by Waistell's study: environmental aesthetics promote sustainability only when the former uses insights from both ecology and ethics [45].

As regards curricular opportunities that encourage systems thinking, the consideration of such systemic properties as feedback loops, multiple perspectives, and conflict [46] deserves particular attention. Indeed, a good way to introduce students to systems thinking is to engage them in discussions about issues and problems that involve multiple perspectives and even conflict. In fact, Churchman, one of the most influential contributors to the development of systems thinking, pointed out that, in addition to the inclusion of as many factors as possible to a system under consideration, system thinking involves "a process of looking at things from different viewpoints" [39]. Thus, students, even from a very young age, should be provided with opportunities to consider and discuss various viewpoints and experience conflict during the study of a complex issue or problem (just like the COVID-19 crisis).

Another opportunity for students to move away from linear thinking and start to think in terms of relationships and from a variety of perspectives is to consider how the notion of identity expansion, or what Esbjörn-Hargens [47] calls 'widening of identity', fosters ecological thinking. Because ecological thinking refers to the manifestation of wholeness in the natural world, which includes all life forms, this 'widening of identity' is a process

that includes the transition from egocentric, to sociocentric, ethnocentric, worldcentric, planetcentric and kosmocentric identity [47]. Apparently, the transition from the egocentric identity to identities that include “my group” (ethnocentric), “my country” (sociocentric), to all human beings (planetcentric) and to all of reality (kosmocentric) takes time but it can start early on in children’s education. For it is in line with, and facilitates, the development of a global perspective, which, in turn, promotes the idea of sustainability.

In considering that systems thinking first appeared in its modern form in the 1950s, as a reaction to the limitations imposed by the traditional scientific as well as management methods applied in the case of real-world, complex problems [46], it is evident that systems thinking requires a change in perspective, or what physicist Fritjof Capra called a change in our worldview, from a mechanistic to a holistic/ecological one [35,48]. Central to the holistic/ecological worldview are the ideas of ‘relationship’ and ‘interdependence’, which point to the rejection of such ideas as reductionism, mechanism, subject/object dualism [46].

6. The Issue of Making Informed Decisions and the Role of the Nature of Science

The importance of decision making in the context of socio-scientific issues is well established [49–51]. The COVID-19 pandemic, caused by a mysterious respiratory illness, has illustrated such importance. Indeed, in the context of the pandemic, people have had to make decisions not just about health and safety issues, but also about a variety of everyday activities, like where to eat (e.g., indoors, outdoors), where or whether to travel, even how many times one could do to the bakery or grocery. While such decisions are based on a number of factors (e.g., practical, economic, ideological) as well as age and personal experiences, scientific knowledge (i.e., what the experts say) is, apparently, of crucial importance.

Even though the pandemic has pointed to the central role of science in developing vaccines and other treatments, it is the notion of nature of science that deserves particular attention in the context of decision making. While the pandemic provides, perhaps, the best context illustrating what science is, namely, a human activity involving scientists from a variety of countries in rigorous experimentation and systematic study, Nobel laureate in Physics Richard Feynman’s view of science as “the belief in the ignorance of experts”, is worth noting [52]. The pandemic has shown that scientists do not know everything—especially when they study a new phenomenon or problem—and that scientific knowledge, as Karl Popper pointed out, is uncertain, tentative and provisional, at least, until more data and evidence are produced [53].

And yet, we ‘believe in science’, if we are to consider Feynman’s view, simply because science represents our ‘best’ knowledge so far, in the sense that it is based on rigorous experimentation and, above all, it is based on evidence—and many times on evidence from multiple sources—even though such knowledge may be replaced by new knowledge at some point in the future due to new evidence. The pandemic has shown that new evidence was produced, many times, on a weekly or even on a daily basis. (Here one may want to make a distinction between physical science and medical science, on the grounds that the former produces knowledge which is more durable due to the nature of the field.) In short, we believe in science because, at present, it is our most reliable knowledge. And this is why students should be taught about the nature of scientific knowledge and about the nature of science in general [54,55]. In fact, the importance of teaching the nature of scientific knowledge to students of all grades, from kindergarten through university, has been stressed by Lederman and his colleagues [54]. Such knowledge can be really useful in the context of decision making. The pandemic has provided a context that showed how important it is for people to know what science is and what it is not, and what science can do and what it cannot do.

At the same time though, the pandemic has also shown that the process of decision-making is a very complex and even a very complicated one, given that there are scientists who have disagreed with the scientific community (i.e., in regard to decisions made in order to stop the spread of the virus), and whose views do make sense and are based on

scientific evidence too e.g., [56–58]. For example, John Ioannidis, a leading researcher and professor of epidemiology at Stanford University, one of the most-cited scientists (of any field) in the world, has argued that governments are making decisions without reliable data and that forecasting for COVID-19 has failed. Such views, when they come from a scientist of such high caliber and status, do make people skeptical. Even though Ioannidis' critique of current practices and decision-making (on how to respond to the pandemic) is in line with his general view on medical research, namely, how little trust one should have on published medical research (see his seminal 2005 paper titled "Why Most Published Research Findings Are False"), the evidence he has produced and the arguments he has raised are not to be downplayed [59]. Matters become more complicated, of course, if one also considers "the science of fake news" [60].

How then can one make up one's mind in regard to an issue in the face of competing views (or perhaps competing scientific evidence), that make people skeptical about what to decide to do? This question is not easily answered. But it is here that decision-making skills become of paramount importance. The COVID-19 pandemic has shown that, in order for a decision to be made—even in the absence of more data and specialized knowledge—one has to consider multiple sources and multiple perspectives (e.g., the evidence presented in the daily press, the arguments presented by the wider community, the evidence presented by the scientific community) and critically evaluate all sources of evidence and all arguments. Even conflicting scientific views is also an issue to be considered, as disagreement and controversy are elements of the nature of science itself [53]. But if decision-making is indeed a rational process [61,62], involving the analysis of information and the use of criteria in order to choose "a favoured option or course of action among multiple alternatives" [63], equipping students with skills of decision-making becomes of paramount importance. This is, perhaps, the best lesson that the pandemic has taught us. Thus, while decision-making is an idea that has received attention in the context of the study of socio-scientific issues [50,63], the fact that we have to learn to cope with pandemics in the future [32], makes decision-making a 'survival skill' that needs to be taught. The school curriculum ought to provide opportunities for students to develop it, and the importance of critical thinking [64] as well as argumentation [65] in the process of decision-making needs to be reaffirmed too. In fact, critical thinking and argumentation are perhaps the best, in fact the only, tools for students to deal with complex and with the so-called "wicked problems", just as the COVID-19 crisis [39], and to begin to think systemically and ecologically [66].

7. Summary and Final Comments

This paper used the COVID-19 pandemic as a context for rethinking the school curriculum, if the latter is to promote the notion of sustainability. Six ideas, as the pandemic taught us, namely, global awareness, hope, the dimension of future, systems and ecological thinking, decision making and the nature of science, become crucial and need to be more seriously considered in curriculum design. Such ideas do point to the inclusion of a curriculum strand—regardless of the organization of the curriculum—that provides students with opportunities to study global issues and problems, by drawing on knowledge from all curriculum disciplines. Such a curriculum strand is, in fact, in line with an updated concept of liberal education, which, not only focuses on the traditional disciplines, but also becomes sensitive to human issues and problems, which, in order to be understood (i.e., their multiple aspects and dimensions) call for an integration of science with the humanities [67,68], and for an engagement in critical discourse. It is indeed such discourse that helps students decide what counts as 'knowledge' (i.e., the existence of 'public' criteria help one distinguish between 'true' and false knowledge) [67] and also transcend barriers set up by both physical and cultural distance, as well as by distrust [69]. In short, and in other words, an updated concept of liberal education can provide students with intellectual skills and human qualities that are crucial for dealing with a complex global issue and thus promote a sustainable world.

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