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A Further Lesson: the Covid syndemic and education

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ABSTRACT – A Further Lesson: the Covid syndemic and education. This article articulates the developments of the crises generated by the COVID-19 pandemic with the deficiencies of school education in Brazil. It argues that a school marked by inequalities, exclusions, elitism, facilitation and superficiality has generated large contingents of fools and people refractory to scientific guidance for prevention and control of the pandemic. This situation is made worse by the political governing classes, whose leaders are followers of negationism, political and religious fundamentalism, anti-scientificism and conspiracy theories. A few guiding principles are proposed for scientific education emphasizing the gnoseological and formative dimensions. The nomenclature used in studies on pandemics is reviewed.
Keywords: **Pandemic. Covid Syndemic. Curriculum and Scientific Education. Governmentality. Stupidity.**

RESUMO – Mais uma Lição: sindemia covídica e educação. Este artigo articula os desdobramentos das crises geradas pela pandemia da COVID-19, com as deficiências da educação escolar, no Brasil. Argumenta que uma escola marcada por desigualdades, exclusões, elitismo, facilitação e superficialidade vem gerando amplos contingentes de estultos e refratários às orientações científicas de prevenção à pandemia e seu controle. Tal situação é agravada por parte das classes políticas dirigentes, cujos líderes são fiéis adeptos do negacionismo, fundamentalismo político e religioso, anticientificismo e conspiracionismo. Propõem-se alguns princípios norteadores para a educação científica com ênfase nas dimensões gnosiológica e formativa. É feita uma revisão da nomenclatura usada pelos estudos sobre pandemias.
Palavras-chave: **Pandemia. Sindemia Covídica. Currículo e Educação Científica. Governamentalidade. Estultice.**

> *Lesson*: Something to be learned. The act or an instance of instructing (The American Heritage Dictionary, 2000).

We begin with the well-known comment by Hanna Arendt (2011) about crises: every crisis also opens a door to creation and innovation. Thinking about the possibility of peeking through the door of the current pandemic crisis, in recent months, I began to think and write about the somber Covid times in which we are living in 2020, especially its effect on Education. This is a further text gestated during the COVID-19[1] crisis and born during the course of the perplexities that we experience daily. Astonished – like many others[2] – at so much bad news, irrational behaviors, cockamamie statements and bizarre interpretations, I have thematized and problematized the roots, developments and consequences of the current pandemic. And, thinking about the comment by Hannah Arendt, I have made an effort to draw a few lessons for Education and very especially for scientific education[3] from our difficult and unbreathable present.

Now I intend to provide a further contribution – focused and specific – in the sense that, peeking through the cracks in the door opened by the pandemic crisis, a better understanding is gained regarding a few factors that sustain the complicated and toxic social, political and discursive atmosphere that surrounds us in Brazil today. I have no doubt that the more we understand where this toxic atmosphere comes from and how it feeds, the better we shall be able to deal with the ill-weather and the more we shall be prepared to protect ourselves from all this, and also to take preventive measures over the medium and long term.

When I refer to *cracks*, I point to the fact that I do not intend to open wide the door of the crisis; I am not even competent to do so. I only intend to spy through the slits and, as much as possible, glimpse and discuss where the mismatches and mistakes come from in the discussion regarding the current pandemic, and what is being done about it in our country. This discussion will be developed in the next section. Based on this, in the last section I shall provide a very brief list of a few suggestions for Education, especially as regards the subject of the curriculum.

Here I do not actually create or innovate. My objectives are rather more modest: I only wish to consider a few educational measures that will be useful to deal with situations similar to the present one and that, unfortunately, may occur henceforward. Thus, I acknowledge that this text has a limited reach, as the reach and results of any suggestions and operations of social and in our case educational engineering always are. After all, there are no simple solutions to complicated problems. In addition, there is the fact that one cannot confound need with sufficiency, in other words, one cannot take automatically as sufficient even the best-elaborated solution that presents itself as inescapably necessary[4]. Lastly, one must always recognize the limits of any proposal.

What follows below is divided into two asymmetrical sections. The first section – *Diagnosis* – has a diagnostic, methodological and de-

scriptive tone. There I will develop discussions that contribute to the characterization of the current pandemic crisis. The second section – *Propositions* – is shorter, it has a propositive tone, and concerns the field of Curriculum Studies.

I justify the asymmetry between the two sections: before we begin the tasks of proposing corrections to what is there or preventing it from returning, it is essential to know what is there. It is necessary to map the terrain, to describe the obstacles ahead, to evaluate the difficulties that prevent us from going on. Knowing the problems in detail is the necessary condition to solve them, alleviate them, circumvent them or overcome them. Thus, even before we talk about solutions and overcoming them, it is necessary to know what, in fact, we want to actually solve and overcome...

Diagnosis (with methodological precautions)

> *Two things are infinite: the Universe and human stupidity. And I am not sure about the Universe* (Albert Einstein, physicist).

In order to make it quite clear from where I am speaking and how I speak, I begin by explaining the points whence I begin and the path that I will take.

If we understand *method* as the path to achieve one or more objectives, it can be said say that in this section I deal with a few methodological precautions[5]. Now, thinking about the method and problematizing it implies knowing and mapping the terrain in which we move, and, in a way, it also implies already making a diagnosis of what we have in the surrounding landscape and the difficulties that we will encounter.

I will begin with the *vocabulary*; then I will comment on the *complexity* with which the pandemics generally present, and more especially the current Covid pandemic.

The Vocabulary

I do not intend to establish *meanings* and *senses* of the words and expressions, but I consider it important to recall them and explain how they are used in this text[6]. In an effort to reduce ambiguity, I always follow the words of Antoine Arnauld. This exponent of the *Logique de Port Royal*, in his famous debate with Nicolas Malebranche, asked: "Is not the first rule of an adequate treatment in science to define its main terms, to establish the corresponding notion as having a single meaning, even if there are few reasons to fear that it will be understood in different manners?" (Arnauld, 1780, p. 296; *in* Dascal, 2006, p. 309).

I recognize the impossibility of establishing a single meaning for any word, concept, enunciation, etc. Even so, it is always worthwhile to make an effort to encircle the polysemies and reduce the ambiguity of discourses as much as possible[7].

First of all, the words *endemic, epidemic and pandemic*. It is well known that if a disease is *endemic* it occurs in a population, over a long period. The word *epidemic* designates a generally contagious disease with a transient character, which simultaneously attacks a large number of individuals in a limited geographic space. The word *pandemic* is used to designate an epidemic on a worldwide scale.

Secondly, the word *syndemic*. It contains the concept created by the North American anthropologist-physician, Merrill Singer, in the 1990s, to designate the synergistic combinations between the health of a population and the respective social, economic and cultural contexts, including the resources available (hospitals, outpatient clinics, medications, specialists, etc.).

Recently, a committee established by *The Lancet*, a scientific periodical, used this neologism to refer to the association, on a worldwide scale, between obesity, malnutrition and climate changes (Swinburn et al, 2019, p. 1):

> The report of *The Lancet* Committee shows that the pandemics of obesity, malnutrition and climate change are the main challenge to people, the environment and the planet. As described below, these three pandemics together represent the Global Syndemic, with underlying common determinants in the food, transportation, urbanism and land use systems.

This is a very useful neologism to refer to the combination and potentiation of problems in the *sanitary, sociocultural* and *environmental* spheres. Hence, this includes mainly the *sanitary* sphere: issues of individual and collective health, pathogeny and transmissibility of certain diseases, prevention and treatments, etc.; in the *sociocultural* sphere habits, beliefs, values, cultural practices, education, population structure – in demographics, age, economic, migration terms, etc.; in the *environmental* sphere: pollution, depletion of natural resources, climate change, etc. Given that in the COVID-19 pandemic these three spheres are combined, the word *syndemic* also began to be used to designate it.

When discussing the severity of COVID-19 and the situations of comorbidity that it involves, the chief editor of *The Lancet* said the following in September 2020 (Horton, 2020, p. 874):

> The aggregation of these diseases on a background of social and economic disparity exacerbates the adverse effects of each separate disease. COVID-19 is not a pandemic. It is a syndemic. The syndemic nature of the threat we face means that a more nuanced approach is needed if we are to protect the health of our communities.

The creation of this neologism not only means a specificity or greater appropriateness between the technical terminology and the new phenomena set en route by the COVID-19 pandemic. It means much more. This new word contains a powerful concept for a broader, more

refined understanding of the problem created by the new virus and, consequently, to deal more effectively with these problems in terms of redirecting both the traditional approaches and procedures of clinical medicine and the traditional collective health programs. In brief, it is useful, important and powerful to refer to the Covid pandemic as a syndemic, insofar as it underscores its extremely polymorphic and complex character. Thus, henceforward I will refer to the current COVID-19 pandemic using the term *Covid syndemic*.

In the abovementioned sociocultural sphere, there is a further complicating factor: in a world that is increasingly connected, permeable and open to the free circulation of information of all kinds, good and bad news and advice – in the form of *break news*, *good news*, *fake news*, *cheat news*[8] and even the crudest of lies – are widely, uncritically and equally disseminated[9]. If this is on the part of emission and dissemination, one must also consider what happens on the part of reception. Partly as a result of the saturation of information to which we are all subjected, and partly as a result of the ill-prepared and mostly uncritical profile of great numbers of information consumers, the content of what is seen, read and heard is not very differentiated. There appears to be a tendency to absorb everything as though, *a priori*, everything were true; or to deny everything as though, *a priori*, everything were a lie[10].

To make things worse, a treacherous characteristic of *fake news* and *cheat news* is that many of them are well elaborated, presenting themselves in a palatable, plausible and generally simple form, which makes them supposedly true. This works very well, mainly for those who are not sufficiently equipped to think critically.

Complexity and (Consequent) Irreducibility

Considering a pandemic as an extremely complex sanitary, sociocultural and environmental phenomenon, mutable and located on an epistemological level above the roots that are at its origin and feed it, it is irreducible to any of the many variables that participate in it. In order to clarify this complexity, I have used a kaleidoscope as a rather powerful metaphor to refer to the phenomena we are experiencing today.

It is known that a kaleidoscope consists of a dark cylindrical tube, and at its bottom there is a chamber, a space limited by two walls of white, translucent, milky glass; inside this chamber, there are small loose pieces of multicolored glass. At the other end of the cylinder, there is an orifice through which one observes what occurs inside the tube. The inner walls of the tube are lined with a longitudinal, mirrored triangular prism, whose purpose is to multiply the images observed. Since the small pieces of colored glass are mobile, every time the tube is rotated, they change places inside the chamber, so that their multiple reflexes on the longitudinal walls of the mirrored prism form infinitely varied images against the white, translucent, milky background. Although it is very simply constructed, the kaleidoscope produces beautiful, changing effects.

Aside from the esthetic effect obtained every time the cylinder is rotated, for all else the kaleidoscope can be used as a metaphor for pandemics. Let us see why.

Since a kaleidoscope is a reflective and multifaceted artifact, the images observed inside it are only representations – indirect and inverted, because they are reflective – of phenomena and dispositions that occur inside the milky chamber. Thus, every time the artifact is rotated, what we see does not correspond precisely to what happens inside it. Like in a *gestaltic* game, to move ahead of – or overcome the – immediate impression of the images that we see, our imagination has to constantly oscillating between what we see or perceive, and what we think (because we already know) about the physical-constructive structure of the kaleidoscope. In other words, what we see *is not really there*, but presents to us *as though it really were there*.

In order to understand what is *really* happening inside the kaleidoscope, it is necessary to perform a mental exercise that will articulate observation and perception with prior knowledge and abstraction. And even if there are no great requirements, it is extraordinary how many people find it difficult to understand the phenomena involved in forming the images in the kaleidoscopes. The same happens with pandemics in general. The difficulties in understanding are a result of the varied degree of stupidity or foolishness[11] and of the mental paralysis of each person. Be it due to deficient or non-existent schooling, or to a lack of early stimulation of the *psy* activities, or even due to some insufficiency of and in the cerebral cortex circuits, many people do not manage to perform the mental operations that require some cognitive mobility. In letter n. 52 from Seneca to Lucilius, the former asks the latter:

> What tendency is this, Lucilius, which deviates us from the intended direction that pushes us to the point from which we intend to leave? [...] We wander aimlessly between contrary resolutions: we do not manage to remain faithful to a free, absolute, constant will (Seneca, 2014, p. 176).

A fool may even change his mind; but when this happens, it is due to external influence, and not to some self-reflection. Therefore, he wanders aimlessly, presenting erratic, unpredictable behaviors.

The findings above do not, in themselves, carry any *a priori* judgement of value. They begin with empirical, simple and direct verifications. I believe that they must be discussed, insofar as they help us to understand – and when appropriate, to defuse – the points of support on which the immense disagreements between discourses and the different social representations are sustained that among us are attributed to the Covid syndemic. Moreover, to defuse, also in each of us, the foolish or even criminal representations on the Covid syndemic that broad sectors of the government circulate constantly in our country.

In the same sense, and due to a matter of similarity with what is observed in handling the Covid syndemic in Brazil, it is worthwhile to open a first parenthesis here, to recall how Hannah Arendt understands

stupidity, when she describes Adolf Eichmann, the Nazi, at his 1961 trial in Jerusalem. In the words of Gros (2018, p. 122), according to the philosopher "[…] stupidity is to think in clichés, in generalities. This is what Arendt calls stupidity: the automatic speech, the ready thinking about the elements of language [...] it is the absence of common sense". Based on this characterization of stupidity, Arendt creates the expression *banality of evil* to designate "[…] active, deliberate, conscious stupidity. This capacity of rendering oneself blind and stupid, this stubbornness of not wanting to know" (Gros, 2018, p. 129).

Now I open a second parenthesis to characterize each of those points of support mentioned further above: negationism, flat-earth theory, conspiracy theory, fundamentalism, anti-scientificism, tribalism and refractoriness. Let us look at each of them very briefly.

The word *negationism* denotes the practice of systematically denying realities or truths that, although they may be obvious, cause some fear or discomfort. Generally, negationism reveals a difficulty in dealing with problems that, to be understood and solved, require using some rationality that is beyond the reach of fools. Arrogance, intellectual poverty, fundamentalism, anti-scientificism and conspiracy theory reinforce negationist behaviors.

Flat-earth theory is the name given to the archaic, fanciful and profoundly conservative doctrine according to which the Earth is a disk floating in space, and not a sphere, as had already been demonstrated in Antiquity by Pythagoras and Aristotle, among others.

Conspiracy theory designates a way of seeing conspiracies everywhere and engendered by malignant agents – people, organizations or spirits – working calculatedly and secretly against us. *Reptilianism*, for instance, is a modality of conspiracy theory: groups of humanoid reptiles are thought to have invaded Earth – coming from space or from the interior of the planet – and living mixed among the population, aiming to destroy us.

In general terms, *fundamentalism* is the attitude of unnegotiable faithfulness to a foundational, unifying and transcendental principle, which is therefore placed above any understanding, interpretation or worldview (*weltanschauung*). Insofar as it functions as an anchor or hook in the Heavens (Rorty, 1988), the dogmatic thinking of the fundamentalists reduces their fears concerning the mysteries of existence, and thus for them it works as a safety or lifeline. Among us, political fundamentalism appears to be more visible than the religious one.

Anti-scientificism refers to the attitude against Science – its methods, practices, principles. The anti-vaccine movements, for instance, are imbricated in *anti-scientificism*, and often also in the *conspiracy theory*.

Tribalism designates the adherence to a given social group that is more or less autonomous and keep itself very much to itself the tribe whose members share the same basic principles and the same ideals.

In traditional societies, the tribe has – or thinks that it has – a common familial ancestry.

I use r*efractoriness* to designate resistance to accepting *a priori* the evidence of the facts and their interpretations given even by common sense. *Refractoriness* is partly confused with *negationism* and *anti-scientificism*. Beyond these, however, *refractoriness* covers also *stubbornness*, *blindness*, *arrogance* of someone who thinks that they know all and *lack of sensitivity* to other peoples' problems and to social ills.

All of them are *–isms* that, in a sense play with each other and articulate with each other, forming something similar to a coherent, firm, conservative and self-justified network. In a correlation with the game of infinite images that we see in the kaleidoscope, the articulation between these *–isms* results in a mutual reinforcement that ultimately leads many to see, understand and advocate them as natural and unquestionable truths. But it should not be forgotten that all of them are surface manifestations; like sad and dangerous icebergs, all these beliefs and principles have, beneath themselves, a considerable mass of fantasies and disinformation, naiveté and counter information, nonsense and pure imagination, arrogance and lack of sensitivity. And, tying all this together, are goodish doses of foolishness.

Obviously, feeding and reinforcing the circulation of a considerable mass of fantasies and counter information, besides the foolishness, many shady interests may be at play in these *–isms*. Their promoters sometimes think of increasing their political capital over their sympathizers, voters and supporters, all of them also foolish and or ill intentioned. At other times, they want to consolidate their public and political positions attained at the cost of disseminating contempt toward others and hatred toward their adversaries, generally seen as enemies; at yet other times they are afraid that possible changes will place their comfortable, although questionable privileges at risk.

Let us continue to explore the metaphor. Every time the kaleidoscope rotates, the image observed changes; but this change does not necessarily obey the range or speed of the movement that we have made. The relationship between a movement and its visible result is not of restricted causality but of complex causality, with the possible intervention of certain conditions of possibility. The movements intervene, but the results are always random, since other variables and conditions of possibility come into play over which one does not have *a priori* control. And to further complicate things, stochastic processes almost always also come into play, whose *a priori* determination is actually impossible. In the kaleidoscope, one never has direct control much less deterministic control – over the movements of the colored pieces of glass and over the positions they take at every movement we make with the artifact. Everything occurs as in a game of dice.Now, let us transfer from the kaleidoscope to pandemics in general, and in our case to the Covid syndemic. Now, the situation is much more complicated, but in general term we can still use a metaphor. On the one hand, it is necessary to

understand at the same time the multifactorial nature of the phenomena that occur in both, and their non-necessitarian character – but contingent, indeterministic and even stochastic. On the other hand – and it is never too much to insist on this point – it is necessary to consider that a pandemic is the articulated manifestation of *natural phenomena* – biomedical and geographic (climatic, orographic, hydrographic, atmospheric, etc.) – combined with *social phenomena* – populational (demographic, migratory, etc.) and cultural (habits, beliefs and myths, discursive and non-discursive practices, etc.). And to further complicate things, this articulation not only occurs as a simple sum total of the phenomena involved, but rather as interactions that are sometimes synergistic, sometime antagonistic; in other words, interactions whose results are sometimes greater than the sum of parts, and sometimes are smaller or nil, i.e., the parts annul each other when combined.

It is seen, thus, that understanding how pandemics function – and how we can approach them and even rid ourselves of them – requires many surveys, elaborate analyses, statistical calculations and several mental operations whose complexity and abstraction are placed well beyond the immediate and concrete evidence *of* reality or *what* is considered to be reality. Multifactorialness, contingency, indetermination and complex interactions institute what might be called a pandemic rationale; it is situated on a plane that resists any reductionist simplification. All this shows, once again, the appropriateness of the neologism *syndemic*.

And there is more: it is necessary to understand, also, that both the kaleidoscope and the pandemics articulate spatial variables with temporal variables, so that any analysis we wish to perform of both involves certain images, restricted to a given space and in a given time. Besides, the images change as a function of spatial and theoretical angles and position – in the sense of *weltanschauung* (worldview) – taken by the observer. Neither the kaleidoscope nor the pandemics are stable; their configurations do not remain patiently in wait of our observations, descriptions and solutions[12].

It is obvious that, even when confronted by such difficulties, we can minimally conduct or predict – with some degree of approximation and occasional success, but never certainty – the images in the kaleidoscope, before, making a movement with it. The same happens with the results that we expect to obtain when dealing with pandemics, be it in their evaluation and follow up, be it in preventing and solving them. Nevertheless, we will always be attached to the sequences that are typical of experimental sciences: attempts ——> many errors ——> new attempts ——> new errors and few successes ——> new attempts ——> many successes and few errors, and so on. Thus, even though we never have the logical certainty of attaining full success in what we predicted would happen, it is necessary to go on, and, believing in the Baconian induction, increase the probability that the events will occur as we have predicted[13].

Everything that was discussed above points to an imperative need to approach the Covid syndemic armed with a thinking that is sufficiently able to deal with the description, the understanding and the control of extremely complex phenomena. This is a complexity that goes largely beyond the facilities promised by common sense, practiced by magic thinking, by the imperatives formulated based on crude fundamentalisms and by the certainties and hopes based only on what we desire, favors us and calms us down.

To end this section, a few more words about the syndemic scenario that how surrounds and asphyxiates us.

It is easy to see that the current syndemic brought to the surface and amplified a varied set of crises worldwide. In Brazil, today, for instance, it is no exaggeration to identify at least five types of crisis that combine, interpenetrate and reinforce themselves mutually: Covidian, economic, political, ethical and foolish[14]. Thus, the picture that presents is extremely complex and cannot be apprehended by a reductionist analysis, and also, for this reason, incomprehensible to broad contingents of the population, as well as to a significant proportion of the leading classes.

Since it is acknowledged that there are difficulties in changing this *status quo*, there are major investments in massive publicity campaigns, interviews and public discussions with specialists, defusing counter information, etc. All of this with the intention of clarifying and neutralizing the lies and fantasies of *fake news* and *cheat news*. Nevertheless, possibly the greatest obstacle currently encountered by these efforts – that try to *defuse* the counter information and *encourage* the good well-founded sanitary measures that can alleviate the set of crises that plagues us – is presented by the population targeted by these movements. It appears that mostly people become tired of adopting the sanitary measures that go against their deeply rooted collective cultural habits. At other times, the reception and processing of the good information are simply blocked, *ab principium*, due to one or more of the *-isms* which I have already mentioned. After all, tenacity regarding magic thinking, fantasy, imagination, fiction, eccentricity really appears indestructible, unless very early and by education it is possible to teach children and young people whose *substratum mentis* is able to hold and develop a minimally critical and consequent rationality. It is at this point to we begin the next and last section.

Propositions

> *A jackass can kick a barn down, but it takes a carpenter to build one* (Samuel Rayburn, US Congressman).

In a very brief summary of the discussions presented so far, and now focusing on education, my argument points to the imperativeness and urgency of carrying out broad – but simple and low cost – changes in the emphases of the curriculum, highlighting scientific education.

There I see a good opportunity to diminish part of the historical deficiencies in school education in Brazil. The formation of a large number of people familiar with scientific thinking also means forming a citizenry without parochialisms, but with a more open mind, and a broader view of the world. Understanding the importance of science in the world of today is already a good beginning for less silly behaviors that do not submit to magical and dogmatic thinking. As I begin to discuss propositions, two warnings:

First of all, it is not a matter of adhering automatically to *catastrophism* and to *promisianism*, which I consider to be two among the many plagues of modern Pedagogy. We are not about to see the end of the world. And I insist: pedagogical measures are necessary, but by themselves they are not going to save us, nor solve all social deficiencies and problems that afflict us.

The deficiency to which I refer is due to and the result of the fact that school education in our country has accumulated a centuries – old tradition of structural inequalities, exclusions of all kinds, barefaced elitism, facilitation, slackness and curricular superficiality. Even the broad social sectors included in the school mostly find curriculums there in terms of contents and teaching practices – that are so poor and ill-managed that they create increasing contingents of individualized individuals[15], stranded in the *doxa*[16], and not very accustomed to systematized knowledge and to the mobilization of logical reasoning, no matter how simple these are.

Notable effects of all this are manifested at the level of politics with an articulation in which on the one hand foolish and/or ill-intentioned people govern, and on the other, a broad contingent of people, mostly uninformed and uninterested, are governed. The situation occurs very often and is well known: scandalously, the political classes exploit the weak schooling of broad sections of the populations – and their correlated poverty and illiteracy (which is also political) so that they set en route populism[17], fundamentalism, conspiracy theory, etc. and thus form castes and family dynasties, and also perpetuate themselves in power.

It thus appears imperative to aim at strengthening a school education turned toward diminishing or even solving these problems. However, in simple terms, the sentence is no more than a cliché. Therefore, we have to get far ahead of commonplace expressions. The complicated issue is: what measures can one take, especially in the short term?

Secondly, what follows in this section does not claim to be original. Much of this had already been said and advocated, for a long time, by many pedagogical currents. Nevertheless, I suggest a few curricular paths and emphasize them insofar as I consider them appropriate and urgent, in the face of calamitous situations that the Covid syndemic is precisely bringing to the fore.

As regards the curricular suggestions discussed here, there are two main dimensions to be considered: *gnoseological* and *formative*.

Certainly, there is no clear line of separation between both and they are even interdependent.

In the *gnoseological dimension* are the so-called curricular contents, i.e., the information and knowledge to be taught and learned[18]. A point to be underlined is the fact that the contents should not remain at the simple level of information. No matter how current, important and interesting are the information and knowledge, in themselves they are of little value if they do not accomplish two functions; to broaden the repertoire in an articulate manner and, mainly, to allow developing an increasing number of integrating, elaborate and complex mental operations. Combining and articulating the contents amongst themselves, challenging each other, distinguishing what is important from what is an accessory, grouping them into distinct categories, sequencing them, establishing the hierarchies and identifying the possible causal nexuses amongst them are procedures that promote and exercise logical reasoning. This elevates the integration and mental elaboration to increasingly advanced levels.

In the *formative dimension* are learning and practicing ethical conducts, according to principles and social codes historically established by a given culture and shared within it, so as to promote "[…] a collective, inclusive life, respecting the other and differences, and for this very reason, attentive to what is common" (Veiga-Neto, 2020, sp). It is important to include joint activities in the curriculum – such as field-work, practical laboratory classes, collective projects, etc. – which will exercise mutual collaboration, obedience to routines and protocols, and the use of models such as controlled reproduction or representation of natural and social phenomena. All these are activities that are important both for themselves and as means to learn, exercise and promote the (above mentioned) values of a collective life.

In this dimension, a *first point* to consider is the fact that attention to what is common implies understanding the importance of singularities and, at the same time, the limits to be obeyed in interpersonal relations. Thus, for instance, as regards individual freedom, it is always imperative to maintain a balance between the interests and rights of each person and the interests and rights of the community in which each person is inserted.[19] This balance is, in itself, an imperative that is situated above what many consider the transcendentality of the (so-called) imperative of freedoms and individual rights[20].

A *second point* to consider regarding the formative dimension refers to what is called *capacity to listen*. This capacity implies respect for the other, resulting from the acknowledgement of their authority, insofar as their history and the position the other occupies in a given social network. As clearly pointed out by Virilio (1995), in a world that is constantly accelerating, *presentism* advances – which is seen as the social contraction of time, reduced and collapsed to the *now*. Presentism blocks the memory of the past and makes it wane and, consequently, the value of history and tradition. As the past sinks and the value of history

and tradition consequently fades away, this corresponds to the feeling that the world is created at every moment; consequently, the notions of author, authorship and authority tend to become weaker or disappear.

Still within the sphere of the formative dimension, a *third point* to be considered is attention to the *principle of charity*. This principle, which has no religious or humanitarian connotation and is based on the initial proposal by Neil Wilson, and then further developed by Donald Davidson, is considered as the duty – in any communication, explanation, dialogue or controversy – "[…] that one assigns to the other the best of intentions and the best possible understanding" (Dascal, 2006, p. 309). Thus, one goes beyond listening as simple listening. The principle of charity requires that listening be qualified, since it is assumed and it is required that all interlocutors assume – the presumption and ethical commitment that everything that is at play in the communication must, necessarily, be in *truth*[21].

A *fourth point* to be considered involves the formation of what Foucault (2008) called *governmentality*. Here it is time for a digression.

Of the four concepts that the philosopher attributed to this word, I shall use that which is of most interest here; namely, governmentality as the meeting or surface of contact between the governance that someone exerts on himself, the governance that he exerts on others and the governance that these others exert on that someone (Foucault, 2001). Insofar as governmentality connects the governance of oneself to the governance of others, it is situated in the circuit of those that we call the *third foucauldian domain*, the domain of a person over himself. In other words, it is how someone becomes a subject based on actions on themselves, but without forgetting that in this process there is always the intervention of another (other) subject(s). The result is the well-known Stoic maxim: only those who govern themselves well govern other well.

It can thus be deduced that the formative dimension of the curriculum is immanent to governmentality. But besides this, they maintain a relationship of causality between themselves, of the kind that Deleuze (1991) described as immanent, i.e., they actualize each other mutually as cause and effect[22]. Thus, on emphasizing the formative dimension in scientific education, one is not only preparing rational subjects who are able to exercise logical reasoning better and understand how science works. All this is important, especially if we add the functions of forming future advocates of science, and even possible future scientists. However, I go beyond this: it is important, also, because one is working in favor of forming subjectivities that are better able to self-govern and govern others well. It should be recalled that, this being so, scientific education takes on an importance that extrapolates by far the traditional allegations that advocate it in the name of training specialized labor fit for technical-scientific work.

Regarding the former, a second digression is warranted. The displacement that Foucault performs, in the third domain, of the use of *power* by *government* has a lot in common with the processes of sub-

jectivation, and through this means, with the formative dimension of the curriculum. As we well know, *exercising power* and *governing* refer to the actions that some exercise over the actions of others; but these two words hold slightly but decisively different meanings. Besides other details that are not to be discussed here, I recall that the *power*, being able to do something, derives from the Indo-European radical *poti-* (powerful, master, the one who is above and gives the orders), through Vulgar Latin *potēre*. *Power* is in the same semantic field as *poderio* (mightiness), *potestade* (power, the person who gives the orders), *potente (*powerful*)*, *potência*, (power, as in world powers) *déspota (*despot), etc.; this is a semantic field that points to a difference in level, taken as natural and, basically, unnegotiable. On the other hand, the word *governar* (to govern) derives from the Greek verb κυβερνώ (kyvernó), whose meaning is very close to taking the other with the acquiescence of this other and even at his own will. In the case of governing, one does not take by force, nor by lying, nor concealing motives; on the contrary, to govern implies leading by the truth, by the acknowledgment of the one who is taken with regard to the one who takes him[23]. In the government of some over others, there is a rationality involved in an economy of exchanges, implicit agreements, advantages and mutual recognition[24].

This digression may appear to be a mere detail. Nevertheless, it is important insofar as it makes us understand that the formative dimension of the curriculum also involves teaching and learning ways to govern oneself and govern others. Thus, on emphasizing the formative dimension of the curriculum, one is promoting not only the creation of subjects with more elaborate worldviews, but also participants in more intelligent, ethical and human forms of life, capable of good self-government and, consequently, of governing others well. And this goes, of course, both for scientific education and for musical, literary, artistic, humanistic education, etc.

Even if one sees that Scientific Education can be extremely rich to respond to and achieve the gnoseological and formative dimensions discussed above, it is necessary to be cautious. I refer to the historicity of science. Although the information and specific knowledge about theories, laws, principles, nomenclatures, formulas and scientific concepts are very important, they must always be related to the processes, agreements and historical clashes in which they were gestated, developed and established firmly. Instead of simply reducing scientific education to the teaching of sciences, it is necessary to emphasize the historical-social, approximative, relational, provisional and fallible character of the practices and correlated scientific theorizations. This emphasis is determinant for a strict scientific learning that ultimately shows the profound, close relationship between the world of science and the world of everyday life. At the same time, it mobilizes ways of being in the world and thinking, that can neutralize the undesirable *–isms* discussed in the previous section.

The same is happening with the problematization of relations between the observational facts and the construction of theories that

try to explain them. It is necessary to work against conventional wisdom and not consider knowledge, wisdom, practices and scientific advances as givens, as though they have been there forever, finished and waiting to be discovered. In addition, they should also not be seen as divine revelations and immediate results achieved by genial and diligent scientists. It will never be too much to emphasize the temporal, social, collective and collaborative character of the discoveries and inventions of science — with all its convergences and divergences, agreements and disagreements, advances and setbacks, comings and goings. In this way, the *topoi* that combined characterize science become clear, as in the case, especially of *skepticism*[25], *empirical verification*[26], *open debate*[27], *fallibilism*[28] and *falsification theory*[29].

Constantly using these *topoi* makes scientific education an excellent instrument to create and develop sensitivities, and worldviews that are non-dogmatic, non-fundamentalist, non-negationist, non-tribalist and non-refractory. These sensitivities and worldviews would promote mindsets that are able to get away from the parochialisms, to understand and assume the historicity and provisionality of human knowledge in general, including scientific knowledge. To accept improvement, revision and the rejection of notions that had been considered up to a certain time as basic, and at the same time exercising self-criticism and acceptance of dialogue, for other-ness and for difference are pragmatic imperatives that are essential to create more cautious, socratically humble people, and thus able to deal better with the current syndemic.

At first sight, my position on the powers of scientific education may appear excessively optimistic. However, I have no doubts about its force to enter the circuit to fight and neutralize the foolishness which, running loose in our country, serves as amalgam and fuel for the damage caused by the Covid syndemic. Again, it is important to distinguish between the necessary condition and the sufficient condition.

In tune with the Canadian psychologist and essayist Steven Pinker (2018), I believe that scientific education can promote the *rational humanism* that it advocates. Betting on science, he goes against the many critics who see, in science, the origins and motor of the main ills of Modernity.

Pinker lists those, which for him are the four fundamental themes to improve our understanding of Contemporaneity: reason, science, humanism and progress. Moreover, he considers reason as the main and most important theme:

> If there was ever anything that the thinkers of the Enlightenment had in common, it was the requirement that one would vigorously apply the criterion of reason to understand the world, instead of having recourse to generators of illusion such as faith, dogma, revelation, authority, charisma, mysticism, prophetism, visions, intuitions or interpretative analysis of holy texts (Pinker, 2018, p. 26).

In this context, then, he underscores the role of science as the "[…] refining of reason in order to understand the world" (Pinker, 2018, p. 27). In addition, he continues: "For the thinkers of the Enlightenment, the freedom from ignorance and superstition showed how mistaken our conventional wisdom can be and how the methods of science [...] are a paradigm of how to attain reliable knowledge" (Pinker, 2018, p. 28).

Finally, I insist that my propositions are nothing very new in the field in which Curriculum Studies deal with scientific education, nor do I claim to suggest radical, immediate, expensive and effective measures for problems whose full solutions are well beyond the reach of scientific education. After all, there are no magic solutions and miracle drugs to handle the enormous, intricate problems that have been accumulating in our country for centuries.

As a result of this disturbing syndemic crisis, these problems – as I have already mentioned – become increasingly obvious, combine and potentiate, giving rise to extremely worrying and socially degenerative situations. I tried to make clear, that what I attempted to do was to work with these combinations and potentiations to enumerate a few simple curricular measures that would be inexpensive and feasible over the short term. These measures may empower us a bit further to deal with these situations that have made our world so somber.

Notes

1 COVID-19 is the name given to the SARS-CoV-2 virus that originated in China at the end of 2019.

2 For broader and more detailed approaches, see mainly Loureiro; Lopes (2020).

3 I use scientific education as a synonym for *Education in and for Science*.

4 It is worthwhile calling attention to a logical confusion that is quite common in the field of education: to be under the illusion that it is possible to solve a social problem by appealing to an action that is known to be necessary, but insufficient.

5 It is never too much to recall that *method* derives from the junction between the Greek forms *metá* (ahead, through) and *hodós* (path).

6 Following Wittgenstein (1987), I make a distinction between *meaning* (*Bedeutung*) and *sense* (*sinn*).

7 To use the known formulation of the Second Wittgenstein (1979, § 38, p. 27), "[...] philosophical problems arise when language goes on holiday".

8 I have proposed the word *cheat news* to designate the mixed counter information, i.e., whose parts, taken separately, are not false, but are organized and presented in a way to deceive, falsify and induce to error. From the English to *cheat* (fraud, swindle). Half-truths, for instance, fit into the category of *cheat news*.

9 Let us not forget that, very often, they are also maliciously disseminated.

10 *Algorithmic information bubbles* are the immaterial materiality itself, because it is virtual, around which are grouped the sympathizers, followers or absorbers of this or that version of the information.

11 Characteristic or attribute of fools, i.e., of those who, do not have common sense and a good discernment, and are stupid, cretinous or, in popular language, *burros* (donkeys, a word that I prefer not to use, in order not to offend mules). Derived from the Indo-European radicals *stā-* (standing and remaining motionless) and *stel-* (placing oneself), the word *estulto* (fool), in Portuguese, is located in the same semantic field as the words *estábulo* (stable), *estático* (static), *apóstolo* (apostle), *estátua* (statue), *obstinado* (obstinate), *estar* (to be, to stay), *poste* (pole), *pedestal* (pedestal), *estupor* (stupor), *estado* (state)and their derivatives. For details on the word *estultice* (foolishness) from the stoics, see: class of January, 27, 1982, at Collège de France — *A hermenêutica do sujeito* (Foucault, 2004). See, also: McGushin (2007).

12 In practical terms, one usually likens the difficulties of analyzing pandemics and intervening in them to the difficulties in changing a tire of a race car, while the car is moving...

13 After all, as David Hume argued, induction does not sustain itself in logic, but involves elements that are on the order of psychology and empiricism (Marques, 2011).

14 Even though it has not been included in a Portuguese language dictionary, I use the word *estúltica* (foolish, stupid) to qualify the behaviors or quality of the foolish or stupid individuals, so as to mark a clear difference in relation to the substantive *estulto* (stupid, fool, also foolish).

15 In this apparent pleonasm, I follow Beck (2010), according to whom most of the contemporary processes involved in forming individualities are not for individuation, but for individualization, generating political voids and leading to a society of *individualistic individuals*.

16 I am using *doxa* in the trivial sense of *opinion* or judgment that, elaborated in a historical moment, claims to be true, but is no more than a naive, false and misleading belief. Thus, *doxa* must be overcome by knowledges and wisdoms that are well founded and clearly articulated.

17 Acknowledging the polysemy of this word, I explain that I am using *populism* as the political practice turned toward capturing popular sympathy and adherence because it says that it is the advocate for the interests of the classes with less economic power.

18 For a strong distinction in the field of Curriculum Studies, among information, knowledge and wisdom, see Veiga-Neto; Noguera (2010).

19 The acceptance (or refusal) of collective and individual precautionary measures to deal with the Covid syndemic, are excellent examples of this attention (or lack of it).

20 Again, certain situations while dealing with the Covid syndemic give us excellent — but sad — examples of this confusion between, on the one hand, an individual and absolute freedom, and on the other a socially informed freedom. Amongst others, this is the case of the insistent disobedience to the technical recommendations that forbid free circulation and occupation of public spaces. Those who disobey allege that they are free to exercise their individual right to

freedom of movement. Not understanding or not wanting to understand the difference between freedom connected to a transcendental universal right — as is the right to life, for instance — and freedom depending on a circumstantial right is foolishness, to say the least.

21 I take this term as a loan word from Michel Foucault (2018).

22 I resort to Deleuze (1991, p. 46), for whom the immanent cause is that which "[…] updates its own effect. In other words, the immanent cause is that whose effect actualizes, integrates and differentiates [if there is] a correlation, reciprocal presupposition between cause and effect, between the abstract machine and the concrete negotiations".

23 The Latin verb *conducĕre* (*cum* + *ducĕre*) from which the verb *conduzir*, meaning to conduct in Portuguese, derives, has the same meaning: when one conducts, one does not use force, but takes (*ducĕre*) the other *with* the other, *with* the acquiescence of the other, *with* the will of the other.

24 Thence comes the well-known phrase by Foucault: "[…] one only governs free men".

25 *Skepticism* is the doctrine according to which one can never achieve unquestionable certainty about anything taken as true; it implies a permanent doubt and recognizes the human incapacity to reach absolute understanding of what one considers to *be reality*.

26 The *tópos* of *empirical verification* can be understood as the principle according to which the enunciations must correspond unequivocally to the empirical observations. It is not confounded with the *verificationism* proposed by the Vienna Circle (Wittgenstein, 1987).

27 The *tópos* of *open debate* is seen as the free exposition and circulation of ideas, propositions and theories.

28 *Fallibilism* is considered the general principle that any proposition, theory or enunciation is always fallible, namely, it is always subject to being, theoretically or empirically, proved false. Thus, fallibilism goes counter to dogma and ultimate certainties. It is almost synonymous with the principle of *falsification theory* proposed by Karl Popper (Blay, 2007).

29 *Falsification theory* is the principle created by William Whewell and Charles Peirce, but widely developed and utilized by Karl Popper to distinguish science from pseudosciences. According to this principle, the merit of the enunciations and scientific theories is not in their verification, but in the possibility of their being falsified and thus refuted.

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