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Technological Rationality, Technological Justice, and Technological Axiogenesis

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Abstract: *In this paper I explore the conceptual relations between technological rationality, technological justice, and identity. I use the concept of technological axiogenesis to analyze the process by which technology not only serves pre-existing values but actively generates new axiological horizons and modalities of being in the world. The analysis transcends traditional critiques of technological rationality by highlighting technology's dual capacity to both erode and generate authentic identities. After exploring the analogy between language as a cognitive tool enabling positive freedom and technology as providing axiological and teleological knowledge (creating new horizons of value and purpose) I focus on an inherent tension: technology simultaneously extends humanity's external capacities while sometimes restricting possibilities for authentic identity development. The research introduces concepts like "axiological alienation" and "axiological sustainability" to assess how technological infrastructures impact value diversity and identity integrity. I advocate for an "axiological impact assessment" framework for technology design that prioritizes reversibility, pluralism, and reflective capacity. The paper concludes that technological justice should be reconceived beyond equitable technological distribution to include axiological justice.*

Keywords: *technological rationality; axiogenesis; identity formation; technological justice; technology assessment; design ethics; philosophy of technology*;

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Introduction

We buy things that we need or passionately desire, we use and consume them, break or forget then in boxes, attics, drawers and garages or we dump them in landfills or scrapyards. Technology seems, at the individual level, to be passive because we just act on it. However, technology is also active: we are drawn by technological products, entertained or bored with and by them, empowered or alienated, hurt or cured by and with them. Not only that our daily activities are sometimes shaped by the advent of new machines, gadgets, appliances or apps. We feel sometimes that our familiar environment, our social and personal relations, and even our identity, are transformed by technology. Our bodies and the way we perceive, our desires and aspirations, our attitudes and values, our vocabularies and practices, our responsibilities and obligations, they all can and sometimes do change via technology or because of it. From a day-to-day perspective, technology is visible as gadgets and devices we want to buy and use or is visible because something in our technological permeated surroundings breaks down and then, suddenly, we are aware of the existence and function of some device or technological network. But technology plays another role, a crucial one, at the macro level of an entire modern society. This vast socio-technical system is like the submerged part of an iceberg: is massive, unseen, and necessary for keeping afloat modern societies, given that it powers our homes with electricity, gives us clean water and medical treatments, delivers food for billions of people, builds megacities, shapes the Earth. From this perspective, technology is not just a set on instruments at our disposal, but a precondition to the modern lifestyle defined by a certain axiological framework.

The modern conception of a dignify life is framed sometimes in terms of rights. The right to food and shelter, work, medical treatment, social security, education, justice, freedom of speech, information, movement, political participation and so on, are all possible to be

fulfilled in large societies, to a certain extent, only if there are met some technological preconditions (Ishay, 2008; see also Winner, 1980, pp. 121-136; Sen, 1999, Glendinning, 1990, Borgmann, 2009, and Verbeek, 2011). If understood as positive rights, then there is a duty of all for all to provide the technological frame necessary to secure the rights specified above. The imperative of technological justice might be formulated also in connection to the notion of sustainable development. Technological justice is a normative framework examining how technology impacts equity, fairness, and human rights (see Costanza-Chock, 2020, Warschauer, 2004.) Thus, we might say that there is an obligation to develop and use technology in such a way as to satisfy the human needs of our generation, but also the and needs of future generations. Human rights and sustainable development are interconnected frameworks that mutually reinforce each other. Human rights provide the ethical foundation and legal mechanisms to ensure that the development processes respect human dignity, while sustainable development offers pathways to progressively realize economic and social rights within ecological boundaries (see Sen, 2013). For the connections between human needs and sustainable development (see Guillen-Royo, 2018).

This second version of technological justice might be viewed as more demanding because it is framed in terms of human basic needs and thus appeals rather to the notion of a human good life, not just to that of dignify life. These notions are different in my interpretation: while a good life is a dignify life, a dignify life is not necessary a good (or fulfilled) life, one in which all our human needs are satisfied. What I will argue is that there is a tension between the imperative of technological justice and the satisfaction of the fundamental human need of identity, since technology characterized by technological rationality displaces values necessary for the development of an authentic identity. This internal contradiction, between the expansion of humanity's external capacities and the restriction of the possibilities for an authentic identity, is an important philosophical challenge. Our central question will be: how can technological rationality be understood as an emerging axiological force, which simultaneously affects the conditions of possibility for social justice and for the development of authentic human identity?

According to our interpretation, technology should be seen as an "axiogenic medium," meaning a framework that not only erodes but also generates value and purpose. Like language, which not only expresses thought, but makes possible the emergence of new forms of thought and new goals, technology can be understood as the medium of a positive axiological and teleological freedom, i.e. the ability to imagine, formulate and desire new values and goals, essential elements for identity. This approach allows us to overcome the fatalistic perspective associated with the classical discourse focused on technological rationality, according to which technology completely colonizes the space of values. We will see that the emancipatory potential of technology lies in its potential to mediate, create and support new ends and values, if and only if its design is oriented towards axiological pluralism and respect for the integrity of authentic identities.

Technological rationality

The philosophical analysis of technological rationality, understood as the instrumental structure of technological practice, has a genealogy that can be traced back to the Greek philosophy. Herbert Marcuse coined the expression "technological rationality" in his essay "Some Social Implications of Modern Technology" (1941), where he contrasted it with "individualistic rationality" (Marcuse, 1998). In his 1964 book *One-Dimensional Man* we can find one of the most well-known critical treatments of technological rationality (Marcuse, 2003; see also Santos, 2024). The Frankfurt School first and second-generation members (as Horkheimer and Habermas) have also explored the idea, Horkheimer contrasting technological rationality (or "subjective rationality") to "objective rationality" (Horkheimer, 2002, 2004), and Habermas to "communicative action" (Habermas, 1987). However, Max Weber is generally acknowledged

as the first who explicitly used this idea in his analysis of modern society. All theories of technological rationality share the same view of technological rationality that he first outlined in his works. According to Weber, we can identify four types of action-patterns in a society, namely one that exhibits instrumental rationality, another that is value-orientated, a third one determined by emotions or feelings, and the fourth one, traditional, where action is determined by ingrained habituation (Weber, 2005, 1968). The modern society is characterized by an ever-growing process of rationalization, meaning that rational principles of organization, production, and decision are applied to different social areas as politics, economics, religion, or culture (Weber studies the process of rationalization even in music; Weber, 1958). Instrumental rationality is centered on finding the most efficient means to achieve a certain end that is taken for granted and not itself the object of instrumental rationality. Thus, the point is to find the best algorithm in order to produce a certain product, service or decision. This type of rationality is currently embodied in different techniques as cost-benefit analysis, risk-benefit analysis, rational choice theory, operations analysis, and in the application of economic models to certain aspects of society. Instrumental rationality is contrasted with value-oriented action, where the actions (and the means to achieve them) are shaped are ethical, aesthetic, or religious values.

Important subsequent philosophical analyses of technological rationality subscribe to the same diagnosis: the problematic process associated with technological rationality is that control and efficacy become the main social compass. We tend to evaluate different activities like nourishment, security, entertainment, communication, health, transportation, or shelter along the hermeneutic grid of instrumental reason.

Marcuse, Heidegger, and Feenberg propose different answers to the challenge raised by technological rationality, each one exploring a different theoretical avenue. For Marcuse, individual autonomy disappears given the effects of the technological apparatus (Marcuse, 1998). The person is reduced to self-interest and is part of a crowd. Truth itself is split in two: technological truth (i.e. what supports the existence of the apparatus) and critical truth, objective and autonomous, a product of critical rationality. The problem, according to Marcuse, is that the technological establishment adopts critical truth and transforms it such as to preserve the status quo (like in the case of the labor movement that in time has become a bureaucracy with business-like interests). Marcuse sees the solution not in a pessimistic attitude towards technology, but in embracing technology as a way of eliminating scarcity and thus liberating the individual for engaging in a process of self-development. Considering the all-encompassing technological rationality, man and nature, Heidegger argued, become in the end just something to be classified, used, manipulated, and controlled, reduced to something that can be part of some actual or potential technique (Heidegger, 1977). The world becomes the sum of resources, materials and system components. What is important here is to note that control and efficiency tend to be, in a highly technological society, meta-values: there is a disposition to give privilege to those ends that are subject to quantification and the possible output of a technological algorithm. Heidegger is pessimistic regarding the future of technological society and is interpreted as having a rather hostile attitude towards technology. He sees modern technology as a mode of while Marcuse associates it with a repressive logic of one-dimensionality. Modern technology is seen as an ontological modification of our relationship with the world. It reduces everything to the status of a resource (*Bestand*), in a process of "provocation" (*Herausfordern*) aimed at maximizing control. A possible conceptual symbiosis would be to say that technological rationality becomes an axiological revelation (*Gestell*), imposing a specific vision of what "value", "freedom", "reality" and, finally, "self" mean. A. Feenberg develops a critical theory based on the thesis of the underdetermination of technology, the idea that technologies do not have a single inevitable form and are underdetermined by their functional requirements (social values, power structures, cultural expectations, and political struggles intervene in the shaping of technological artifacts; Feenberg, 2002). He rejects the idea of autonomous

technology and a process of democratization of technological design is proposes such that informal modes of thought (the partial theoretical equivalent of what Marcuse calls "critical rationality" (Marcuse, 1998, p. 52)) counters formal modes, on the lines of technological rationality and, in a synthesis, bring "the human basis of the society to the surface" (Marcuse, 1998, p. 6). Technology cannot be rejected and, according to Marcuse "[a]nything that promotes the interaction of these divergent ways of understanding the world [i.e. technological and non-technological rationality] is progressive and should be supported." (Marcuse, 1998, p. 56)

Technological rationality and technological axiogenesis

The above remarks support the observation that some of the most important theories of technological rationality share the same idea: technological rationality is dangerous given that prior given ends or values (part of substantive rationality, informal thinking, communicative action, or critical rationality) are reduced through various techniques to something devoid of humanity or authenticity. This is equivalent, I claim, to saying that technology disrupts essential features of our identity, namely autonomy, the internalization of non-technological values, a sense of belonging and the sense of unity of life.

There are several influential accounts of fundamental human needs, like Maslow's pyramid (Maslow 1943), the theory of universal human needs (Doyal and Gough, 1991), and Manfred Max-Neff's Model of Human-Scale Development (Max-Neef, 1991). For the purposes of my analysis, I will focus on the last account. According to Max-Neff, there is small set of universal human needs: subsistence, protection, affection, understanding, participation, leisure, creation, identity, and freedom. While the basic human needs are finite, and classifiable, human desires or wants are infinite and insatiable. Human needs form not a hierarchical system, but one in which complementarity and trade-offs are features of the process of needs satisfaction. Each basic need has four dimensions: being (qualities), having (things), doing (actions), and interacting (settings). Identity can be understood along such coordinates as sense of belonging, self-esteem, consistency (being), as having language, religions, work, customs, values, norms, as getting to know oneself, grow, commit oneself (doing), and interacting in places one belongs to (Max-Neff, 1991, p.33). The satisfiers of human needs are also classified as violators, pseudo-satisfiers, inhibiting satisfiers, singular satisfiers, or synergic satisfiers. Regarding certain technologies, we could characterize technology, framed as the embodiment of technology rationality, as an inhibiting satisfier relative to the need for identity. Technology is, in many instances, a satisfier when it comes to subsistence, protection, and understanding, but it hinders the development of personal and community identity because it displaces rapidly religions, customs, values and norms, authenticity, creativity and critical thinking. While relevant, the approaches that interpret technology essentially through technological rationality share a common assumption: that technology is a reductionist force that eliminates value pluralism. This position loses sight of a crucial aspect: technology is not only an environment of efficiency, but also a normative framework that redefines what matters as value, purpose, or way of life. One could argue that technology is not just a nihilistic force, but one that stimulates the construction and exploration of new ends and values. Thus, we should try to complement the partially legitimate critique central to classical views on technological rationality with an analysis of its axiological function, according to which technology not only serves values and purposes (instrumentally), but shapes, generates and supports new ways being in the world. Technology establishes hierarchies of values (what is "beautiful", "good", "acceptable", "healthy", "true" or "possible to be"), creates behavioral ecologies (what can be done, when, and how) and shapes the criteria of choice (through design, interfaces, algorithms and so on). As such, it is an integral part of the dynamics of the process of structuring our identity.

A parallel with language is illuminating. Language is a tool for getting things done, but also a cognitive technology or instrument for transcending belief frameworks, ends, values and needs. We did not acquire all at once the ends, values and desires we now have. Many of our desires, and even some needs (for education or communication), are dependent on language. It would be impossible to desire to write a poem about love, to make liberal institutions or to discover the laws of nature without being able to conceive their possibility in the first place. Without language that would not be possible. Language gives us a kind "positive freedom" (Brandom, 2000, pp. 156-83), namely effective freedom of doing new thins, things that I could not want because I could not conceive them in the first place. We cannot wish, for example, for a democratic regime without concepts such as "rights", "justice, "vote" (see also Brandom, 2002). Effective or positive freedom can be a matter of doing what one wants but also of being able to want new things (this view overlaps here with some basic assumptions of the capability approach). Technological positive freedom can be thought of as a matter of doing what one wants using technology, but also of being able to want new things, be in a different way or constructing or discovering new values. This opens the possibility to develop a new way of thinking about technological rationality. Technology disrupts the axiological environment, but it also opens the possibility of thinking, valuating, and acting in new ways. Effective freedom has to do with extending the horizon of possible actions or ends, not only with the ability to do the things we value and desire in advance. Besides practical knowledge (knowing the means to achieve a prior given end) there is also the possibility of knowing what I might be able to do and so the possibility of knowing what I might want, desire to do or value, what we might call "teleological knowledge" and "axiological knowledge." Teleological knowledge could be defined as the form of understanding that allows the emergence of new goals by extending the framework of the imaginative and practical possible, and axiological knowledge would be the form of understanding that allows the emergence of new values by expanding the framework of the ethical possible, of rights and obligations, as well as of the internal goods associated with various practices. At least in the case of recent technologies, like the Internet and LLMs, we are faced not just with means to solving some prior problems or satisfying some prior needs. Such technologies are part of the process of making explicit new ends and values. Looking from the present point of view, many technologies appear as disrupting the structure and development of authentic identity. But from the point of view of the accommodated users of new technologies, the new ways of being, talking, doing and thinking might be seen as opportunities of personal transformation. If language can be described as a system of possibilities of thought, technology, at least in part, can be interpreted as a system of possibilities of action *and* valorization. Just as language articulates reflective consciousness, technology can articulate praxeological and axiological consciousness, i.e. consciousness of what is practical and normative possible. Technological rationality, complemented with identity-transformative dimension, exhibits a structure that is not visible in the classical debates from the philosophy of technology. It has the potential, in my opinion, to open new perspectives in the understanding of our technological infused world and, also, the relationship between technological justice and technological rationality.

Access to technology can mean access to new ways of thinking and valuing. Technology, in this perspective, is an extension of cognitive processes that create (or discover) new possibilities for acting and being. The paradoxical structure of technology stands out: technology is simultaneously a means and a medium of transforming identity. It is "world-producing" in the Heideggerian sense: not only that it mediates actions, but configures ways of being-in-the-world. I propose, as a conceptual nucleus for the different possible interpretations of how technology mediates, produces new value-structures involving identity-transformations, the term "technological axiogenesis".

There is a tension between the idea that technology creates new values and a central element of identity, namely axiological autonomy. An authentic identity is related to a set of values that one freely chooses or assumes, it is not imposed and expresses the unique personality of that individual. Technological axiogenesis can be interpreted in two different ways. On the one hand, it can mediate the construction (or discovery of new values, depending on what ontological perspective we have on values, e.g. realist, constructivist and so on). On the other hand, it can impose certain values in a way that is incompatible with autonomy and authenticity.

As argued, new technologies can lead to new theological or axiological knowledge (new values or goals). But it can also be disruptive at the personal identity level (and even at the collective level) because it has a very strong indirect or direct persuasive potential. Curative artificial intelligence, for example, which selects media content for us in order to keep our attention on a certain application, can be indirectly persuasive, while generative AI technologies can be directly persuasive. In this case, we can talk about a direct danger related to identity integrity. We can formulate the following principle to be important in this context: We must design and promote those technologies through which we protect from any external technological interference the values, ends and beliefs (religious, moral, political, philosophical, etc.) through which individuals (or even institutions, regarded as moral entities) identify their essential way of being in the world, ones which, if affected, endanger their personal identity. The danger identified is, partially, that of heteronomy: a change of identity risks being imposed technologically on us from the outside through direct or indirect mediation.

We have here an intrinsic tension to the structure of the socio-technological system. On the one hand, as we initially noted, technology supports large and complex modern societies (through infrastructure), but it can also limit axiological autonomy (through digitized media most often, and more recently through algorithmic mediatization; cf. Han, 2017). At this stage, we may also introduce the concept of "axiological alienation", a phenomenon that arises when the subject is no longer supported, from a normative point of view, by technologies that have been algorithmically shaped without critical reflection. A person may find himself in a situation where he is no longer able to express goals and values he identifies with. A person might be in a position where is unable to find technologies that reflect his own way of being in the world. The technological infrastructure could be one that even imposes certain identity demands. Thus, one can feel alienation given that he no longer controls the framework in which his desires and values are constituted, or he feels a rupture between his inner life and the norms of the digital environment. A teenager, for example, who shapes their emotional life according to the tendencies of an app or its filters, develops a metric-dependent identity that is performative, volatile, and extrinsic. Some technologies can be interpreted as an environment in which not only new goals come into existence, but also new hierarchies of value, ontologies of the possible (what can be done, in what time, with what risks) and axiologies of desire and practice (what is worth wanting, doing, appreciated and so on). They redefine, as such, identity and problematize it: who am I, if the possible goals and values around me are predefined? If technology expands the horizon of the desirable, it can also capture this horizon along predetermined grids. On the one hand, technology can have a creative function, facilitating value and teleological novelty, expanding imaginative capacity and stimulating agency. On the other hand, it can have an engaging function, channeling desire and will towards prefabricated purposes through technological mediation and promotion, restricting the possible to algorithmic metrics, fragmenting autonomy, and instilling authenticity.

The issue of power is relevant in this context, and we can ask: who controls the axiological and practical horizon opened especially by digital technologies? If this horizon is determined by algorithmic power structures (big tech), then technical positive freedom is, actually, the colonization of identity. It is an open question to what extent we are facing this

phenomenon, with a systemic tendency of technology to create attractive but prefabricated identities.

Technological Justice and Axiological Design

Technological justice should, perhaps, be reimagined not only as an equitable distribution of infrastructure, but as an ecology of the axiological possibilities, which implies a reconfiguration of the way technology is designed and evaluated. The biological metaphor is useful in this context: just as biological diversity is crucial for a healthy ecosystem, value diversity is essential for a just society. Technology, through standardization, risks eroding this diversity. But, as we have discussed, it also has the potential to promote and sustain axiological diversity. Exploring this metaphor, we can say that just as organisms modify the ecological niche in which they live, so technology is a builder of axiological niches, shaping what is visible, desired, valuable. Technology as an "axiogenetic niche" can be interpreted as an artificial environment in which new values, norms, ways of life and goals appear, are developed, and sustained, through the interaction between technological infrastructure, needs, imaginative structures, habits, practices, language, desires, etc. According to this view, values do not always precede technology, but often technology precedes and structures the emergence of values, and these values in turn influence the next technological waves (resulting in what we might "axiological feedforward"). As an example, we can think of the fact that the smartphone did not appear to respond to an explicit need for "permanent scrolling", but it generated a value of continuous connectivity, which now structures the design of the future. Just as natural ecosystems are sensitive to disturbances, value ecosystems can be unbalanced by over standardization (given only one acceptable way of life), hyper-acceleration (due to lack of time for reflection), as well as monopolization of meaning (given that dominant values are imposed by technological infrastructure). These risks can be described through another label, that of "axiological sustainability", i.e. the ability of a technological infrastructure to sustain a plurality of valuable life forms in the long term.

Given the dual character of technology, sometimes axiologically alienating other times axiologically supporting and enhancing, we should integrate into the ethics of technology the principle that every technological design should include an assessment of axiological and identity impact, not just ecological and economic. We propose, as well, an axiological assessment of technologies. Such an assessment framework should assess the types of values promoted (What kind of values are encouraged? Efficiency, expressiveness, loyalty, obedience, competition, cooperation?), the degree of axiological pluralism (Does technology provide space for alternative values or impose axiological uni-dimensionality?), the way identity is influenced (What is the effect on the development of a reflective, coherent and autonomous self?), the response to divergence (Can the user refuse or challenge the implicit axiological frameworks of the system?) and value ecology (How do the implicit values of technology interact with those of the cultural communities in which it is implemented?). Given that recent technologies are leading to a new and emerging axiological dynamic and practice, it is imperative to re-examine the ethics of technological design. My suggestion is that this should be done by analyzing the disruptive and augmentative potential technology has in relation to a common good at stake, namely identity integrity and the development of authentic identity. Ignoring this task would mean ignoring the tendency of current technological infrastructures (especially digital and algorithmic ones) to generate apparently spontaneous but structurally shaped normative frameworks based on metrics such as engagement, profit or efficiency (the desire to become an influencer, for example, to "go viral" or to optimize personal productivity, can be seen as algorithmic finalities, identity elements that are not autonomously or authentically chosen).

Finally, we believe that it is fruitful to further explore the issue of transformative technological transformative identity potential using the analogy of ecosystems. In this context,

the following principles of axiological technological systems deserve further expansion: (i) Reversibility: users should have the possibility of exiting a technological value system without structural losses (e.g. the right to disconnect); (2) Projected pluralism: infrastructure design must incorporate the possibility of divergent axiological options, and (3) Access to introspection: technology must support, not suppress, the capacity for personal reflection on values.

Conclusion

In this paper I have explored the dual character of technology, both as a promoter of social justice and as a factor of identity erosion. I argued that we can and should rearticulate the relationship between technological rationality and individual identity. My methodology combined elements of critical and constructive philosophical analysis, interdisciplinary, with references to the ethics of technology and design, philosophical anthropology and the axiology. The essential proposal was related to the reframing of technological rationality as (also) an axiogenetic and teleogenetic environment, one that generates and supports new implicit and explicit values and goals. To this end, we have explored an analogy with language, which is a cognitive tool that gives us practical and cognitive positive freedom. As with language, technology could generate new teleological and axiological knowledge. Technology, as such, can generate new values and purposes, in addition to serving preexisting purposes. The problems identified are related to the danger of axiological alienation and colonization. I hope that the way in which technology inhibits authentic identity development (given standardization, cultural dislocation) will be further analyzed. On the practical side, at the level of the ethics of technological design, I argued for a hermeneutical framework, namely axiological ecology, in which we evaluate various technologies according to the value diversity promoted and the degree of identity integration provided to the users of some specific technologies. It remains for a further study the task of exploring how exactly a tool for determining an axiological impact assessment index (AIA) should be designed. Regarding the ethics of technology, we believe that we should have as an ideal not only infrastructural justice, but also axiological justice, which has to do with the right of access through technology to a diversity of goals and values in a way that respects the ideal of autonomous and authentic identity development. Technology is an environment in which unforeseen axiological niches can appear along with revolutionary technologies. In analogy with ecological values, I believe it is important also to further examine three values related to technological ecology: the integrity of identities (related to the ideal of minimal or positive intervention and minimal technological alteration of some identity ecosystems), the health of identity (the ability to generate/regenerate an ecosystem of authentic identities) and the preservation of cultural identities, especially those that are in danger of extinction (protecting ways of being related to social minorities or indigenous cultures). There are approximately 15,000 cultures still thriving on Earth, but many are facing imminent doom or significant threats. These threats stem from the erosion of cultural integrity, loss of habitat and environmental degradation, and the devastating impact of diseases and socio-economic problems. Most of these cultures are represented by small populations of a few hundred individuals, relying on limited land resources that are increasingly vulnerable to other uses or environmental destruction. The erosion of these cultures would mean the loss of invaluable expertise and wisdom but also of different ways of being in the world, with different values and ends. There is a distinction between personal and collective identity, one that should be explored in relation with the question of technological justice as was formulated, focusing on the axiological and teleological dimensions.

Finally, we should explore the long-term effects of technology on humanity's value ecosystem, especially from the perspective of the fact that active digital technologies often embody, in a non-transparent way, certain substantive values and invisible hierarchies. Thus,

technological artifacts become institutionalized projections of implicit axiologies. In this way, we will make important steps towards technologies that are not just projections of technological rationality that are axiologically corrosive, but that are axiologically cohesive and (re-) generative, promoting the free, plural, reflective and authentic formation and/or strengthening of human values and purposes.

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