Centro Sur Vol. 6 No. 1 - January - March - Centro Sur Magazine - eISSN: 2600-5743

http://centrosureditorial.com/index.php/revista

Learning to live better by transforming the self

Aprendiendo a vivir mejor transformando el ser

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Abstract

The purpose of this study is to explore the different trends revealed in recent times about human learning linked to life and being from the role of science education and its mission in the 21st century. A bibliographic review of specialized literature was carried out, identifying and describing five trends regarding the conception of science education: pluralistic epistemology or epistemological anarchy, inter- and multicultural science education, science education from its relationship with environmental education, science education from the perspective of citizenship and science education from the perspective of new trends in education. Each of the trends was described, identifying its key aspects, to then contrast them according to the following criteria: the need to review and transform science education, the very conception of science and finally, the linkage and effects of science education with respect to society; to finally conclude with respect to the linkage of science education, in this case science education, with learning to live. As a conclusion, it is assumed that

https://doi.org/10.37955/cs.v6i1.224
Received May 12, 2021 / Approved September, 13 2021 Pages: 48-67
eISSN: 2600-5743

learning to live is seen in different ways by the studied tendencies, but they tend to coincide in the vindication of respect by the hegemonic positivist official science towards knowledge, values, beliefs, experiences, cosmovisions that are different, as well as the incorporation of ethical and political judgments in scientific learning that result in learning to live together and to live together in true freedom.

Resumen

El presente estudio tiene el propósito de explorar las diferentes tendencias reveladas en los últimos tiempos acerca del aprendizaje humano vinculado con la vida y el ser desde el papel de la educación científica y su misión en el siglo XXI. Se realizó una revisión bibliográfica en literatura especializada, logrando identificar y describir cinco tendencias en cuanto a la concepción de la enseñanza científica: la epistemología pluralista o anarquía epistemológica, la educación científica inter y multicultural, la educación científica desde su relación con la educación ambiental, la educación científica desde la perspectiva de la ciudadanía y la educación científica desde la perspectiva de las nuevas tendencias de la educación. Se describió cada una de las tendencias identificando sus aspectos clave, para luego contrastarlas en atención a los siguientes criterios: necesidad de revisar y transformar la educación científica, la concepción misma de la ciencia y finalmente, la vinculación y efectos de la enseñanza de las ciencias respecto a la sociedad; para finalmente concluir respecto a la vinculación de la enseñanza, en este caso de las ciencias, con el aprender a vivir. Como conclusion se asume que el aprender a vivir es visto de manera diversa por las tendencias estudiadas pero tienden a coincidir en la reivindicación respeto por parte de la ciencia oficial hegemónicamente positivista hacia los saberes, valores, creencias, experiencias, cosmovisiones que le son diferentes, así como la incorporación juicios etico polìticos en aprendizaje científico que redunden en aprender a convivir y a vivir juntos en la verdadera libertad.

Palabras clave/ Keywords

Learning, Science education, Living

Aprendizaje, Educación científica, Vivir

Received May 12, 2021 / Approved September, 13 2021 Pages: 48-67
eISSN: 2600-5743

Introduction

More and more authors are recognizing the growing complexity of the world that recent generations have had to live in. For those who lived through the Middle Ages, certainty was given by the sacred scriptures that prescribed earthly life as only a prelude to eternal life. With the advent of capitalism, the product of the transformation processes led by the bourgeoisie, among them the scientific revolution and the enlightenment, imposed on modern society the hegemony of certainty based on reason, order and progress. The meaning of life became the faith in the human capacity to dominate nature and transcend needs and deprivations, given the infinite capacity of scientific and technological progress to lead human beings to a life full of comfort. This was the illusion that led to the identification of happiness with abundant consumption and thus social happiness with economic growth. In this context, education tended to reinforce the idea that success in life is expressed in the capacity to consume, i.e., the more you have the happier you should be.

Since the last decades of the 20th century, in line with the discovery that progress based on very high rates of consumption was unsustainable, given the finite nature of non-renewable and renewable natural resources, the ideology of progress began to be questioned.

The destruction of natural wealth, in attention to the portentous increase of material production, entailed the irrational destruction of the natural basis of society and compromised even the survival of the human species (Amin, 1999) . Economic growth would then increasingly occur "through plunder, over-utilization of natural resources, unequal exchange in global markets through price formation controlled by transnational corporations and, above all, through the global financial system"..

In accordance with the situation described here, there is a growing need to change the way of teaching, changing to one in which the environment that surrounds us is considered as the main element, as that interaction that exists between man-nature. That is to say, the human being exists in unity with the world, he is immersed in his vital surroundings, in which he relates with others, among others with his family, with his community; man builds his spiritual and symbolic world, becomes familiar and empathizes with the environment cementing knowledge that he expresses with his own language. (Linares, 2008) .

From this perspective it is established that the being is there, acting and learning in a pragmatic way, because he relates differently with the world,

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eISSN: 2600-5743

and discerning what is useful and what is not, because the being seeks from the use for what is useful to know, from the experience (Linares, 2008) .

In this order of ideas Heidegger (1999), quoted by (Linares, 2008) explains the origin and meaning of the category occupation, which would come from the Greek "prágmata" which consists of the praxis of occupation when it uses and manipulates the entities that are found within the world, so that the theoretical world is not useful. He discovers in a pragmatic way when he captures something of his interest, for some useful purpose in the world that exists, and identifies what that something is for, to which he will give meaning, to then give it a use that will complete his task, which will finally be linked in a specific context of use.

From this point of view that Linares (2008) proposes, the human being in his learning makes an image of the world, and pretends to be aware of the thing that is in front of him, because the subject lives the experience. The problem arises from the danger of instrumentalist reduction, because from it he is absobated by technological development, which has caused humanity to be submerged in technical subjectivity. Man, consequently, is exposed to the technical essence, becoming only a human resource, given this instrumental dominion to which humanity is exposed. (Heidegger, 1999, p. 218) . This situation amanes man in his essence, and subjects him to the danger that, from the technical production, the world is ordered, making him lose his freedom, understood as letting be, because the technical impulse ends up dominating the world and submits it to the will of power, causing a domination of nature, culture and society, since the technique is the predominant mode of human relationship with the modern world. (Heidegger, 1999) .

For Heidegger (1999), man is the shepherd of being and not the master of being, because he is controlled by technique, which hinders other ways of unveiling the real, restricting the human relationship of being. The lack of presence of the being with the world makes man have a spatial and temporal absence, makes it truly dangerous, because it has led the subjects not to identify with their own places and not to feel rooted. This means that the being must be taught to open himself to the understanding of the essence of technique, so that he can rediscover himself and rediscover his own essence.

In this sense, the new ways of learning should be directed, as Heidegger (1999), quoted by Linares (2008), to a conversion towards being, that is, learning to build, to inhabit, to think; starting from the idea that humanity must rescue the world it inhabited, because man belongs to the Earth as a mortal and that means "inhabiting" based on the principle of protecting or caring.

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eISSN: 2600-5743

For his part, González (2020) considers that until today, human learning arises from the domain of social articulation in coexistence, therefore much of the learning is given by the socialization that occurs in communities, families or school, which can also have access to knowledge that is produced by him, because he is able to do it by himself, building his language to explain what he has learned; he also learns to survive or autonomously, because man has the ability to obtain information and build it into new knowledge, which will allow him to change or transform his environment. In this sense, learning should consist of man assimilating and developing skills to apply what he has learned (González, 2020).

In this context in which learning is related to one of its main expressions which is knowledge or knowledge about being, the present study set out as a central purpose to explore the different trends that have emerged in recent times about human learning linked to life and being from the role of science education and its mission in the twenty-first century. Such a linkage would arise precisely from the identification by scholars of the advent of an epochal change from modernity, dominated by instrumental reason, positivist epistemology and the consequent scientism, annullers of subjectivity and being in terms of objectivity and of the human being as an object separated from nature.

Materials and Methods

Hence, a bibliographic review of the subject was carried out, which led to a classification of different views on the relationship between scientific education and the transformation of the human being in the context of the transition from modernity to a new era that has been characterized by some as postmodernity, others as post-industrialism, post-capitalism, and others as liquid modernity, among other categories that intersect with those more specific such as the era of globalization, knowledge society, among others.

This leads to the identification of at least five trends, which tend to coincide in some of their key aspects, but differ in others.

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Figure 1 Trends in Science Education. Own elaboration

Results

Pluralist epistemology or anarchism of science. The first trend examined is the one attributed to Paul Feyerabend, who was an Austrian epistemologist, said to have been influenced by Wittgenstein as well as by Popper. His starting point is a radical critique of the positivist thinking hegemonic in the sciences for much of the 20th century, attributing to the traditional scientific method a violent character, characterized by the imposition on the subjects of scientific work, i.e. on the producers of knowledge, of excessively rigid norms to which the validity of knowledge is tied. (Ruiza, Fernandez, & Tamayo, 2004) . Under the label of epistemological anarchism, this tendency of epistemology, which has correlates in the teaching of science and also in the very conception of being, proposes a revision of the very category of knowledge and knowledge, based on the procedures through which it is validated, which in turn will have effects on the view of the relationship of scientific knowledge with human social life itself. Thus, he emphatically criticizes the simplification that has been constructed as an account of the construction of scientific knowledge, which disguises it as objective and a product of the rigorousness of preconceived rules. On the contrary, he vindicates the fact that science and its product, scientific knowledge, are a

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eISSN: 2600-5743

human creation, definitely contextualized in a moment of life of concrete living agents that possess values, judgments, beliefs. (Facuse, 2003) . But with the hegemonic positivist tendency it would have become an instrument of political domination that would express the alliances of a scientific elite with a political elite, which in the common sense is represented as the most reliable, valid and accurate explanation of the existing phenomena, as opposed to the alleged falsehoods, half-truths and pseudo-explanations coming from spaces and beliefs alien to science and disqualified by the latter. (Camejo, 2015) . Consequently, and with its own expression in science education, science is attributed a double authority, i.e. legitimate power, one of a theoretical nature and the other of a social nature, the latter whose role would be the reproduction of a logic of domination over human beings in general, constituting a denial of the freedom of being, since it would subject them to power relations that privilege scientific knowledge over any other way of knowing, which directly affects daily existence. The proposal of this perspective, also known as pluralist, is the social acceptance of plural mixtures of perspectives and approaches to knowledge, or rather of knowledge, consequently incorporating a multiplicity of particularities, with their own criteria of validity, defined in the praxis of research itself, in what was described as a proliferation of methods. (Facuse, 2003) . This position in turn would have consequences in the ethical-political sphere as pluralism in the relations between power and science, but also in the daily life itself of concrete persons, since theoretically each person could decide to place himself between extreme situations, or along a continuum between an extreme of subjection to scientific rationality as a guide to the form or modality of life, passing through the multiple combinations between the so-called scientific rationality and other modalities of knowing reality, defining in it life itself; or at the other extreme, not accepting any modality of knowledge whatsoever. (Facuse, 2003) . This position of pluralism with respect to the sciences would be a proposal for the democratization of scientific knowledge, but also a door to the co-responsibility of the basic subjects of each society, who should not leave in the exclusive hands of the scientific elite certain decisions that technocracy tends to reserve for the "experts or adacemics", because of the serious consequences that such decisions have on all aspects of human life. It is here that this tendency calls for the fact that, just as the State as an institution was separated from ecclesiastical power, the former should be separated from science as such, assuming that it is an ideology like any other, but that the State legitimizes it with its privileged relations. (Camejo, 2015) . This perspective highlights the openness to subjectivity as a possibility given the recognition that by nature the construction of scientific knowledge is the product of conditioning and determinations of elements of a contextual and historical nature, but also

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subject to decisions of the subjects who carry out the referred construction. Thus, epistemological prejudices, as well as interests and inevitable errors and inaccuracies, give scientific thought a margin of ambiguity and contingency, while frequent contributions of extra-scientific elements are identified, which legitimizes, according to this current of thought, subjectivity as one of the factors present in the construction of knowledge. Finally, it is recorded that the author strengthens his position of the close link between epistemology and ethics, from which would derive the importance of his critical way of assessing how science is done, how it is taught, how it is learned and how it is understood in terms of the specific way in which an image of the world and the specific way in which it exists is constructed as common sense, with the realistic possibility of modifying on the one hand the dominant conceptions about the relations between knowledge and power, and therefore the probability of valuing socially alternative knowledge and power from intersubjectivities, which could finally result in improvements in the lives and existences of concrete men and women, from a more humanistic view of science and its subjects. (Facuse, 2003) . Going into the subject of science education, this tendency suggests that at present it has a markedly dogmatic character, based on assumptions of verified and therefore validated, immutable facts. In view of this, it proposes a science education that invites the participation of the various social subjects in the decisions that affect the field of science and technology, from a critical thinking that demystifies the representation of the scientific world as something essentially good, universal and socially useful. It should generate an attitude and disposition of the subjects, who should value the impacts of science and technology in their concrete lives, appropriating both science and scientific knowledge as tools that may possibly be useful for the resolution of general and concrete problems of the reality of people's lives. For this reason, this trend advocates the full dissemination of scientific knowledge, as well as its effects and impacts on people's lives, resulting in the formation of a solid scientific culture that allows grassroots citizens to exercise some control over the production, financing, use, effects and impacts of scientific knowledge. In order to cultivate the necessary competencies, training processes should be promoted, aimed at freeing the subjects of the communities from their ignorance about the most relevant topics. (Camejo, 2015) .

Intercultural and multicultural science education. Inspired by sociocultural approaches to learning, it is proposed that science education should be a sociocultural action specifically located in a given space and in a given sociohistorical context, which values the multiplicity of values, needs and problems of institutions; recognizing that the living of human subjects is a cultural fact in which their relationships and social practices are circumscribed. This current is inspired by the integrating proposal presented

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by Delors in 1994 and assumed by the United Nations Educational and Cultural Organization UNESCO, of the four modalities of knowledge favored by education: The knowledge related to science and technology, the knowledge to do, the knowledge to value and the knowledge to live and live together. In such a way that interculturality claims the close link between the first and the fourth of knowledge. For the first, scientific education which, linked to the fourth, leads to learning to live together, in coexistence with others, without hateful discrimination and respecting ethnic differences, gender or traditions and customs. The aim is to vindicate those minorities, mainly of some other ethnic origin, especially the native peoples, against the majorities that occupy a territory (Valladares, 2011). Thus, the praxis of education must explicitly incorporate sociocultural contexts, which are marked by the diversity of values, beliefs, relational practices, traditions, ancestral knowledge, all of which claim and deserve the recognition of validity together with those coming from practice and scientific knowledge, for the achievement of improvements in the quality of life of human beings in their social context. The view that defends this tendency rejects the pretensions of assimilation by modern urban society with respect to the members of socioculturally differentiated communities, especially with respect to the imposition of the official language, which in practice promotes the disappearance of multiple native languages and cosmovisions. This trend advocates that the intercultural perspective be explicitly incorporated in the curricula of the different educational levels, as well as in the training of teachers and professors and in instructional resources, from a pluralistic perspective of knowledge. The traditional position of scientists, and in this case of social scientists, of trying to explain, from the frame of reference of scientistic universalism, the knowledge and traditions framed in the great diversity of worldviews that coexist in today's world, is rejected. In this sense, the dialogic posture pretends to be a relationship of equals that vindicates humans coming from other cultures in their right to Be from their own worldview, even when they participate in the common life with the majority groups integrated to the culture imposed by the colonizers. The legitimacy and rationality of ancestral traditional knowledge and practices is thus vindicated at the same level of valuation as that of those coming from the modernizing scientific tradition. Beyond this, it even proposes a productive dialogue among the diversity of knowledge, for which it is necessary to open the spaces dominated by scientistic rationality to the study, from a pluralistic epistemology, of the knowledge shared by the diverse socio-cultural communities. This would undoubtedly contribute greatly to learning to live well in coexistence, without any human being feeling marginalized and devalued, for which the learning processes, educational practices play a stellar role if they associate the multicultural perspective. This is intended to heal

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the historical and cultural wounds derived from the organic segregation towards native human beings that is experienced in the school, conditioning the very existence and learning to live. (Chadwick & Bonan, 2018) .

Science education and environmental education: It raises the need for integration between the two educational modalities: science education and environmental education, considering them complementary in terms of their ways of questioning science in its relationship with the world. From this perspective, science education highlights the path progressively taken by the epistemology of science in order to revise the positivist hegemony of science, revaluing uncertainty as opposed to the certainties claimed by traditional positivist science. It aims at rescuing a look from the humility of science in its relationship with the world, recognizing its complexity from its rigorous and demanding essence. It also tends to be assumed more clearly that scientific knowledge is not the only way of knowing, which generates ample possibilities of complementation with views and trends that are positioned from creativity and intuition, while the sacrosanct principle of scientific objectivity is questioned and the role of subjectivity and its validity as a relational construction of the scientific is increasingly accepted. The data, the evidence, the facts "objectively" taken by the scientist are also questioned and relativized, within the framework of a thought that is assumed to be "interobjective", historically contextualized, which significantly impacts the mentality of the agent of science: the scientist. One of the most striking aspects would be those that incorporate ethical and political concerns, which places at the center of the debate and of the evaluation of scientific activity the problem of its social relevance, as well as the quality of the relationship between science and technology. Finally, scientism as a deviation of overvaluation and positivist hegemony of scientific knowledge has become evident, especially with regard to its validity criteria (replicability and generalization), so that the validity of other ways of knowing the world, such as experience, tradition or common sense, tends to be recognized. He mentions that recently there have been important curricular reforms in terms of the conception of science that would reflect what is stated here. An integrative perspective of multiple currents would be the one proposed by Bader & Sauvé (2011) who values the intersection between the three currents mentioned in the socioecological theme. The latter author would then propose a kind of synthesis between health education, environmental education and education for citizenship, which she labels as "citizen science education", which she considers to be the most attractive point for students in terms of their scientific training. (Bader & Sauvé, 2011) . However, an intersection between science education and environmental education would be possible by examining the multiplicity of the very notion of environment. Thus, its role in the apprehension of the growing complexity of socioecological

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eISSN: 2600-5743

realities increases exponentially, even more so when incorporating critical views such as that of Enrique Leff, who attributes to current environmental studies a radical questioning of hegemonic rationality, with its logocentric and atomizing scientism, which from environmental education would be a driving force for social transformation. (Sauvé, 2013) . In this context we find the intersection of extremely relevant issues such as human health (livelihoods) with the biophysical and technological manifestations of social realities, where science would play a stellar role in decoding the environmental elements of everyday life, with its objects and phenomena, as well as with the socio-political expressions of the environment that would claim citizen commitment, with whose knowledge people are enabled for their participation in citizen political diatribes. While the priority of science education focuses on the training of future science professionals, it is intended that, by incorporating environmental knowledge, they become sensitive to living beings and therefore value ecologically friendly socio-productive systems, or address interdisciplinary socio-ecological issues, for which it would be essential to build a professional profile of flexible, humble, cooperative beings, open to the diversity of approaches. However, this author claims that the present reality is rather one of opposition, given the enormous resistance presented by those in charge of science education, who would adduce certain incompatibilities based on a vision of Science Education as a cultivator of traditional positivist scientificity as qualities derived from the characteristics of the scientific method, while Environmental Education would focus on attitudinal changes in the face of environmental realities.

Science education and citizenship: This trend has been officially assumed by UNESC; in such a way that its motivation is framed in the objectives of the United Nations expressed in the 2030 Agenda for Sustainable Development, which places at the center of its intentionality the actions to overcome poverty (Macedoi, 2016) . It is based on a diagnostic position that states that in the Latin American and Caribbean region, quality education, which is one of the goals of science education, is predominantly absent, from which it would follow that there is very little interest on the part of young people to be trained in the scientific area. Evidence of this would be the results published in the PISA reports, in which Latin American and Caribbean youth are classified as undertrained in scientific and technological subjects. It finds its starting point in the realization of the need for scientific and technological literacy of the population as a prerequisite for the country to reach acceptable standards of development, to achieve solutions to the problems felt by the population and for the subjects to reach the full exercise of citizenship. Science education would underpin the formation of a scientific culture, which in turn would lead to greater democratic participation in decision-making on problems of growing scientific and technical complexity. There is evidence of enormous

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eISSN: 2600-5743

obstacles to the achievement of significant goals in scientific learning, since these seem to be closely linked to socioeconomic status, so that people from poor strata of the population would be farther away from reaching the standards of training in the scientific area, which in turn would become a vicious circle of reproduction of poverty and therefore of the worst living conditions, in a context of profound distortions of socioeconomic inequality in these countries. It is understood that underpinning science education from this perspective would be reflected in improvements in the capacities of individuals and human collectives to improve their living conditions and simultaneously be protagonists of fundamental decisions in the democratic management of their societies. On the other hand, this tendency defends the idea that curricular designs in science education would be insufficient in their capacity to promote the changes in society necessary to achieve global development goals. In other words, the vision of scientific literacy should be replaced by a broader vision of scientific culture within the framework of a comprehensive citizenship education, for which the institution would be responsible. (Macedoi, 2016) This would be the responsibility of the school institution, but with links to the world of computer networks in which young people relate to an incalculable amount of information, which leads to the need for greater school innovation. One of the challenges is to overcome the separation between the education system and science education, on the one hand, and on the other to rescue the fundamental right of access to quality education in general and to science education in particular, with a view to the democratization of scientific knowledge. But for this to happen, the obstacles should be removed so that all members of society have access to training in scientific knowledge, with the desire and enthusiasm to learn collaboratively and creatively, which would be a huge challenge for the political, social and institutional elites in the educational area to promote education by and through science. This trend identifies the immediate context as one of consumerist capitalism, and the frustration, discouragement, and lack of enthusiasm to learn collaboratively and creatively. (Macedoi, 2016) and the frustration, demotivation and sense of failure of the majority, the impossibility of satisfying the desires of young people to achieve consumer goals very quickly and with minimal effort, which is in contradiction with the need to mature training in the scientific area, which takes considerable time. He then proposes to reinforce the formative efforts towards the incentive and motivation of creativity, rationality and innovative competences. In its relation to learning to live, this tendency maintains that science education would contribute to learning in the solution of environmental problems such as the adequate and rational use of drinking water, or health problems, contributing to the strengthening of healthy habits and customs of life that would reach from the students to their parents or responsible adults. And seen

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eISSN: 2600-5743

in a larger context, contribute significantly to the achievement of the goals of overcoming poverty in the 2030 agenda.

Figure 2 Problems of Science Education. Own elaboration based on (Macedoi, 2016)

Science education and new trends in education: This trend led by Lemke (2006) shares a series of provocative questions to linked in the first instance to the role of science education in the context of new developments in ICT, in terms of its contribution to students in particular as direct subjects of the educational fact, but also to society in general and to the interests of all people (Lemke, 2006) . In order to answer his questions, he indicates that the fundamental efforts of science didactics, a qualifier equivalent to science education, should be directed to the understanding of four themes that he considers: a) the first of them raises the question of how it would be possible to establish a link between the astonishment that learners of different ages should experience for natural phenomena, with what he calls emotional and intellectual commitment. This is reinforced by other authors (López & Velazco, 2017), who refer to the experience in primary education focused on problems coming from the reality lived by the students, giving special relevance to their emotions in order to awaken the necessary enthusiasm for learning those realted with the view of the world from the scientific perspective. b) the second corresponds to the concern of many intellectuals regarding the ethical problem linked to scientific and technological

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eISSN: 2600-5743

developments in terms of both beneficial and harmful uses, for whose discernment it would be necessary to learn to look critically. What in the experience referred to by López & Velazco (2017) would lead to the strengthening of a universal citizenship sensitive to the ecological limits of economic and social development, the contradictions between the global and the local, projection of the action of the present on uncertain futures from solidarity and cooperative and interdependent relational, from the multicultural. This would link science education with environmental education. This necessarily implies the incorporation of the key elements of reflective and questioning thinking. c) The third is oriented to the effort to tighten the links between the different ways of knowing in their relationship with the so-called scientific knowledge. d) finally, how science education could have a significant impact both on students with respect to their competences in the use of multimodal technologies, but also on those that report critical thinking. (Lemke, 2006) . In order to make possible the necessary transformations in science education so that it can have a significant impact on learning to live, we should start by recognizing that innovative visions have been put forward today that go beyond the old views on the nature of human learning.

Figure 3 New visions about the nature of learning. Own elaboration based on (Lemke, 2006)

This trend also identifies specific social problems in which science education would play a transcendental role in the path to support learning to live: in the

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eISSN: 2600-5743

first instance, it mentions the necessary orientation to the population on how to contribute significantly to the critical global environmental situation, promoting the understanding of the phenomenon as well as the necessary changes in the attitudes and behaviors of human subjects. Secondly, to help understand, manage and transform the growing injustice in the distribution of wealth both at the global level between some countries and others, and at the level of each country between privileged groups that are enriched and the impoverished majorities, benefiting the former from the aforementioned social injustice. The author considers that if the appropriate measures are not taken, the victims of injustice will act with justified anger, undertaking the destabilization of the affluent societies. (Lemke, 2006) . Finally, he identifies another social problem derived from generational conflicts in which power tends to concentrate in the hands of middle-aged population groups to the detriment of other age groups such as the young and the elderly. He believes that science education should contribute to giving greater decision-making capacity to the youngest people who have been trained, thus avoiding the accumulation of social tensions that could lead to rebellion by the youth. Finally, learning for life through science education requires changes both in this branch of education and in the educational system, which must recognize the recently discovered forms of learning and act accordingly, generating more diverse learning spaces in terms of environments, means, times, ages, problems, among other parameters, in such a way that conditions are generated so that learning for life is fostered from lifelong learning.

The bibliographic review has shown the diversity of trends that are currently in force, which reflect on the contribution of education to learning to live, concentrating on science education, given that in modernity the great promise has been that, through scientific and technological developments, the promise of the broadest progress of humankind would be achieved, which would result in the dominion over nature to achieve the full satisfaction of human needs.

The various trends coincide in the need to review and transform science education according to the demands of the new times. Epistemological pluralism calls for a total break with the traditional narrative of science since positivism, a teaching not based on a single and universal method that constrains the researcher on the basis of the old criteria of validity. Therefore, a teaching of science seen as a construction of knowledge from a plurality of methods. This certainly coincides with the inter- and multicultural trend, which claims the legitimacy of ancestral knowledge and traditions shared by aboriginal communities, as well as those coming from other ethnic groups. Thus, science education should not simply reproduce a western instrumental rationality, but should lend itself to the understanding, comprehension and recognition of the validity of knowledge transmitted from generation to

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eISSN: 2600-5743

generation and that responds to other logics and worldviews. Therefore, it must explicitly incorporate socio-cultural contexts to prevent discrimination and marginalization of diverse communities.

The proposal for transformation from environmental education agrees that science education must transcend positivist epistemology, with its atomistic rationality, to advance in the recognition of the growing complexity of the world in the integration of what was seen separately as the natural with respect to the social world, to reintegrate the human being to his nature, understanding him as such in his socio-environmental context, which leads to the synthesis of aspects that are traditionally seen as separate, such as health, environment and citizenship.

On the other hand, the changes suggested by the current of citizenship aim at abandoning curricular policies that promoted scientific and technological literacy towards the promotion of a scientific culture that provides citizens with the knowledge and skills to participate in decision-making, which until now has been the responsibility of science specialists. However, it diagnoses the current situation and limitations of science education, in view of its predominant decontextualization and therefore its remoteness from the daily life of the learners; the lack of training and outdatedness of the educators that reproduce the aforementioned decontextualization. The very lack of significance of science teaching itself, which is enclosed within itself and its super-specialized codes, as well as the predominance of a didactics foreign to scientific and technological production itself, which is also a reflection of the isolation and lack of relations between the scientific community and the educational communities.

This contrasts with a proposal that is based on the incorporation of new visions about the nature of learning, which would promote, in the first instance, the elimination of the classification of learners according to age, and of other segregationist criteria that fortunately have been overcome, such as school separation by gender. In other words, this trend considers that science education, in order to be significant in its effects and impacts, must disrupt the current logics in the organization of learning groups so that learners of different ages, genders, ethnicities, cultures, etc. can teach other diverse learners. Additionally, assuming learning as a lifelong process, in dissimilar time scales, environments and media. It criticizes traditional scientific teaching for its isolation from the interests of the great majority, failing to engage the new members of society in their learning. He agrees with the trend of citizenship in the sense that science education should make an enormous effort to excite, to amaze, to emotionally engage learners, leaving the isolation of classrooms and laboratories towards contact with the natural, social and

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eISSN: 2600-5743

community context, in order to sensitize the student and encourage him/her to be trained in scientific knowledge, reinforcing the corresponding creativity and innovation.

The next element of comparison that stands out has to do with the very conception of science. In this sense, there is a generalized coincidence regarding the limitations of the positive empirical conception of science, which is described as simplifying, falsely objective and the product of rigorous rules that would guarantee the validity of the knowledge produced, and which belittles and despises the knowledge and knowledges that do not pass the filters of the academy, labeling them as superfluous, among other adjectives. Multiculturalism adds the appreciation of science as a hegemonic narrative of the colonial world over the colonized and subjugated, which pretends to explain the world with its alleged universalist rationality, appropriating any possibility of legitimacy of knowledge. The critique from the perspective of environmental education focuses on the issue of the certainties and exactitudes that positivist science attributes to itself, proposing the acceptance of uncertainty as a reality of the world. She also criticizes the super-specialization that separates the knowledge of the natural physical world from the social world when for her it is evident the integration of the human social and cultural world with the natural world. It also criticizes the criterion of validation of knowledge based on objectivism, undervaluing or despising the complementarity of knowledge based on subjectivities and intuition. Thus, for them the traditional conception of science would be a scientistic deviation that evidences the hegemonistic pretensions from the perspective of the social influence of knowledge on the established powers, which coincides with the qualification of "ideology" made from the pluralist and anarchist perspective of epistemology.

The tendency that most assimilates the tradition of science as it is currently presented is that of citizenship, which does not question it, and on the contrary vindicates its vision of rationality, locating the problematic situation rather in other spheres such as that of the scarce scientific training, in traditional terms, of the great majority of the impoverished population of Latin America and the Caribbean.

The linkage and effects of science education with respect to society is an obvious criterion for comparison. From the point of view of epistemological anarchism, the link with society begins with the notion of domination, denouncing the double authority and therefore legitimate domination in Webri's terms on the part of science, as theoretical authority and as social authority denying the freedom of the Being, which would be subject to knowledge of scientific origin. His proposal has expressions in the ethical-

Received May 12, 2021 / Approved September, 13 2021 Pages: 48-67
eISSN: 2600-5743

political field, claiming epistemological pluralism, betting on the co-responsibility of social subjects in the face of the monopoly of power exercised by experts in science and technology, legitimized by the modern State. For its part, the multiculturalist tendency tends to coincide with the previous one in terms of denouncing the discriminatory social power of science against other knowledge, which is shared and reproduced by the traditions of communities of diverse ethnic origins, especially the native aborigines of our America. For its part, the trend of environmental education privileges the relationship between science and society through the interest in the integration of three pillars of education, such as health, environmental and citizenship education, to address the growing socio-environmental complexity with its biophysical, technological and socio-political expressions with serious effects on people's daily lives. The citizen trend emphasizes the relationship in the possibilities of enhancing citizen participation in terms of a scientific culture for the resolution by democratic means of problems arising from extreme inequality and poverty in Latin America and the Caribbean. While the last of the trends claims the need to link science with the daily experiences of the population, but also promoting the capacity of discernment of the population with respect to ethical issues related to the positive but also negative effects of the application of science and technology in society.

Conclusions

The present study, which started from the central purpose of exploring the different trends that have emerged in recent times about human learning linked to life and being from the role of science education and its mission in the 21st century, reaches the following conclusions:

Learning to live is seen from different perspectives in each of the tendencies, however, the majority tendency points towards the search for respect by the hegemonic positivist official science towards the knowledge, values, beliefs, experiences, cosmovisions that are different and diverse from the objectivist and instrumental rationality dominant in scientism, since such hegemony tends to translate into domination, exploitation, marginalization of a large number of human subjects who are unable to fully realize themselves in terms of their Being.

The transformation of scientific thought and practices, together with their teachings, are demanded from diverse ethical and political perspectives with the aspiration of conquering the necessary harmony in a complex world, with a revaluation of the unity of diversity and therefore plural, in order to trulylearn to live together in the true freedom that comes from the recognition of the diversity and complementarity of worldviews.

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eISSN: 2600-5743