

**SEXUAL EDUCATION, ST&i: A BRIEF THEORETICAL STUDY AND A PROPOSAL FOR APPLICATION**

**EDUCAÇÃO SEXUAL, CT&i: UM BREVE ESTUDO TEÓRICO E UMA PROPOSTA DE APLICAÇÃO**

**EDUCACIÓN SEXUAL, CT&i: UN BREVE ESTUDIO TEÓRICO Y UNA PROPUESTA DE APLICACIÓN**

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**ABSTRACT:** The problem of this study, which is still an initial and incipient study, is the possibility of approximating Sexual Education to the assumptions of ST&i. A curriculum is proposed for school education and for non-school spaces that is born not only from research and production in the area of Sexual Education, but that is expanded to reflect and produce theories about the “industry of sexuality”, with innovations and scientific technologies resulting from the advance of computerized information. In this proposal, a provisional concept of “Scientific Sexual Education” (SSE) is elaborated, which, in its initial project, intends to be configured along the lines of Scientific Literacy. With bibliographic based methodology, the research problem is answered on two fronts: the first front, bringing the area of Sexual Education to ST&i from the Epistemology of Science. In the second front, to propose a methodology in the contributions of Scientific Literacy. One of the main results is the field of challenges that open up for a theoretical and methodological SSE project, for example, digisexuality, new “robosexual” technologies, digital sexual platforms, with games and “senses” promoted by the industry, relying on the science of human sexuality and attending to the well-being of its individual and collective users. The main conclusion is the positive (and “risky”) possibility of this approximation of Sexual Education with ST&i, especially in its complementarity with the emancipatory aspect of human sexuality used in Educational Sciences.

**KEYWORDS:** Sexual education. ST&i. Scientific sex education.

**RESUMO:** A problemática deste estudo, apesar ainda inicial e incipiente, é a possibilidade de aproximação da Educação Sexual aos pressupostos da CT&i. Se propõe um currículo para a educação escolar e para os espaços não escolares que nasça não só das pesquisas e produções da área da Educação Sexual, mas que seja expandida para reflexões e produções de teorias sobre a “indústria da sexualidade”, com as inovações e tecnologias científicas fruto do avanço da informação computadorizada. Nessa proposta se elabora um conceito provisório de “Educação Sexual Científica” (ESC) que, em seu projeto inicial, pretende se configurar nos moldes da Alfabetização Científica. Com metodologia de base bibliográfica, a problemática da pesquisa é respondida em duas frentes: a primeira frente, aproximar a área da Educação Sexual à CT&i a partir da Epistemologia da Ciência. Na segunda frente, propor uma

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*metodologia nos aportes da Alfabetização Científica. Um dos principais resultados é o campo de desafios que se abrem para ser pensado um projeto teórico e metodológico de ESC, por exemplo, a digisexualidade, as novas tecnologias “robossexuais”, as plataformas digitais sexuais, com jogos e “sentidos” promovidos pela indústria, apoiando-se na ciência da sexualidade humana e atendendo ao bem-estar de seus usuários(as) individuais e coletivos. A principal conclusão é a possibilidade positiva (e “arriscada”) dessa aproximação da Educação Sexual com a CT&i, sobretudo em sua complementariedade ao aspecto emancipatório da sexualidade humana utilizado nas Ciências da Educação.*

**PALAVRAS-CHAVE:** Educação sexual. CT&i. Educação sexual científica.

**RESUMEN:** *El problema de este estudio, que sigue siendo un estudio inicial e incipiente, es la posibilidad de aproximar la educación sexual a los supuestos de CT & i. Se propone un plan de estudios para la educación escolar y para espacios no escolares que nace no solo de la investigación y producción en el área de Educación Sexual, sino que se expande para reflejar y producir teorías sobre la "industria de la sexualidad", con innovaciones y tecnologías científicas resultantes del avance de la información computarizada. En esta propuesta, se elabora un concepto provisional de "Educación Sexual Científica" (ESC), que, en su proyecto inicial, pretende configurarse en la línea de la Alfabetización Científica. Con una metodología basada en la bibliografía, el problema de investigación se responde en dos frentes: el primero, que lleva el área de Educación Sexual a CT&i desde la Epistemología de la Ciencia. En el segundo frente, proponer una metodología en las aportaciones de la Alfabetización Científica. Uno de los principales resultados es el campo de desafíos que se abren para un proyecto ESC teórico y metodológico, por ejemplo, digisexualidad, nuevas tecnologías "robossexuales", plataformas sexuales digitales, con juegos y "sentidos" promovidos por la industria. , confiando en la ciencia de la sexualidad humana y atendiendo al bienestar de sus usuarios individuales y colectivos. La conclusión principal es la posibilidad positiva (y "arriesgada") de esta aproximación de la educación sexual con CT & i, especialmente en su complementariedad con el aspecto emancipatorio de la sexualidad humana utilizada en las ciencias de la educación.*

**PALABRAS CLAVE:** Educación sexual. CT&i. Educación sexual científica.

## Introduction

This text is a brief theoretical study and a proposal for the application of Sex Education from the perspective of Science, Technology and Innovation, ST&i.

In front of the theoretical study, science is organized as Epistemology of Science, opting for one of the epistemologists, to deal with Sexual Education, but advances in the concept of science, by covering what is and what is not science according to Epistemology of Science (Philosophy of Science) in extension to Technology and Innovation. In this progress, we analyze how the science of sexuality has dialogued with science, technology and innovation in the sense of the individual's well-being, in their sexuality. By emphasizing Sexual Education in this prism of ST&i, it is intended to transpose the bases of the science of sexuality to the

curriculum of school education and to the possible curriculum of social movements or political parties. In this set of productions in ST&i are, for example, sexual applications, “robosex”, in short, everything that translates communication, the internet in relation to sexuality.

On the application front is the proposal to put the possibility of thinking about this Sex Education in ST&i in Scientific Literacy.

With this, it is in this way that the present article is organized, following a bibliographic methodology, according to Sampieri, Collado and Lucio (2006), in which is taken advantage of their statements about the permissibility of bibliographic research to build definitions, concepts and even “almost” theorizations, based on formulations arising from gaps in selected works for the construction of a debate or a speech on a given theme.

It is exactly what is done in this article, having two central sections, on the fronts previously mentioned, to conclude, even if briefly, the possibilities, or not, of a Sexual Education that approaches ST&i, “extrapolating”, thus, the theme of Sexual Education beyond the school, encompassing non-school formative spaces, with emphasis on social movements and political parties, but also “extrapolating” to the relations of the science of sexuality with society, industry, the capital system, the most diverse means of communication, innovation, public policies and the general and broad praxiological social debate that is within the scope of the Philosophy of Science in contemporary times, that is, asking: for whom, for what and at what cost or value are all industrialized production, including sex and sexuality, developed?

### **Science, Technology and Innovation - a brief theoretical study on the science of human sexuality**

The framework for discussing science, in particular, and the articulation of science, technology and innovation is an initial basis in the Epistemology of Science, the Philosophy of Science. Sexual Education is submitted to a specificity of epistemological line in Philosophy of Science: Piaget's genetic epistemology, Foucault's epistemology - this epistemology, very present and well known, among researchers in the field of Sexual Education in Brazil (FOUCAULT, 1988) - epistemologies, in short, that encompass a discussion in science of human sexuality. That, in turn, are and will be transposed to the curriculum of a proposal for Sexual Education, whether for school education or for non-school spaces, especially spaces for social and political empowerment.

From there, progress is made towards the complementarity of aspects of technology and innovation, in which there is no order between them, as they are intrinsically configured,

finding, in the production of science, the landmark of their essence (HALL, 1963; ALVES, 1981; RUSSETT, 1995; ROY; TEICH, 1998; LATOUR, 1996; 2000; 2001; ROGERS, 2003; MORIN, 2005).

The ST&i articulation is evident in Rubem Alves' speech and allows us to think about the common sense issue regarding the use of available technology, which includes products and services in sexuality and sex in the consumer society, in contemporary society.

[...] science is a specialization, a refinement of potentials common to all. Whoever uses a telescope or a microscope sees things that could not be seen with the naked eye. But they are nothing more than *eye extensions*. They are not new organs. These are improvements in the ability to see, common to almost everyone. [...] Science is not a new organ of knowledge [...]. Science learning is a *process of progressive development of common sense* (ALVES, 1981, p. 9, our highlights).<sup>2</sup>

From this problematizing reflection, we find support in Morin (2005), for whom,

[...] from an epistemological point of view, it is impossible to isolate the notion of technology or *téchné*, because we well know that there is a relationship that goes from science to technique, from technique to industry, from industry to society, from society to science etc. And technique appears as a moment in that circuit in which science produces technique, which produces industry, which produces industrial society; circuit in which there is, in effect, a return, and each term retraces the precedent [...] (MORIN, 2005, p. 107, our highlights).<sup>3</sup>

The science of sexuality is present in this circuit that, as stated by Parker and Aggleton (2007), at the beginning of the 21st century, stopped being something biomedical to reach another level in the social and political areas.

The paths indicated by Morin (2005) for an Epistemology of Science, which, therefore, being aligned with the Science of Human Sexuality, implies, in the first place, the raising of critical awareness, regardless of sources and origins. Everything, absolutely everything, from politics, to Epistemology itself, must be put under criticism. This first indicator is decisive for considering the next path, which Morin presents as a second condition: the need to develop a

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<sup>2</sup> [...] a ciência é uma especialização, um refinamento de potenciais comuns a todos. Quem usa um telescópio ou um microscópio vê coisas que não poderiam ser vistas a olho nu. Mas eles nada mais são que *extensões* do olho. Não são órgãos novos. São melhoramentos na capacidade de ver, comum a quase todas as pessoas. [...] A ciência não é um órgão novo de conhecimento [...]. A aprendizagem da ciência é um processo de *desenvolvimento progressivo do senso comum* (ALVES, 1981, p. 9, grifo nosso).

<sup>3</sup> [...] do ponto de vista epistemológico, é impossível isolar a noção de tecnologia ou *téchné*, porque bem sabemos que existe uma relação que vai da ciência à técnica, da técnica à indústria, da indústria à sociedade, da sociedade à ciência etc. E a técnica aparece como um momento nesse circuito em que a ciência produz técnica, que produz a indústria, que produz a sociedade industrial; circuito em que há, efetivamente, um retorno, e cada termo retroage sobre o precedente [...] (MORIN, 2005, p. 107, grifo nosso).

science of science, in our project developed in this article, a science of the science of sexuality, transposed to Sex Education, which convene here, Scientific Sex Education.

The knowledge of scientific knowledge necessarily includes a reflective dimension, which should no longer be referred to philosophy; which must come from within the scientific world [...]. The diverse works of Popper, Kuhn, Feyerabend, Lakatos point out, as a common feature, the fact that they show that scientific theories, like icebergs, have a huge immersed part, **which is not scientific, which is the blind zone of science, indispensable, however, to the development of science.**

We must move towards a more enriched and transformed conception of science (which evolves like all living and human things), in which the communication between object and subject, between anthroposociology and natural sciences is established. One could then try to communicate (not unification) between "facts" and "values"; for such communication to be possible, it is necessary, on the one hand, **a thought capable of reflecting on the facts** and organizing them in order to obtain knowledge not only atomized, but also molar, and, on the other hand, **a thought capable of conceiving the rooting of values in a culture and in a society** (MORIN, 2005, p. 122, our highlights).<sup>4</sup>

Sexual Education will be linked to ST&i (WIEZWNBAUM, 1976; ASIMOV, 2014). The paths of technology and innovation in human sexuality imply the modernity of the media. A path of no return in the contemporary world (SCUTT, 1990; DAVIS-FLOYD; DUMMIT, 1998; BEED, 2014).

Some examples of this necessary expansion or necessary approximation of Sex Education to ST&i. Let's start with the announcement of *Future of Sex*<sup>5</sup>:

- Remote sex: electronic sex toys (smart vibrators). They are sex toys connected to the Internet: remote kisses and connected pillows.
- Virtual sex: online chat messages and sex in 3D environments. Here are also the multiplayer sex games. One example, the *Red Light Center Game*.

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<sup>4</sup> O conhecimento do conhecimento científico comporta necessariamente uma dimensão reflexiva, que deve deixar de ser remetida à filosofia; que deve vir do interior do mundo científico [...]. Os diversos trabalhos de Popper, Kuhn, Feyerabend, Lakatos assinalam, como traço comum, o fato de mostrar que as teorias científicas, como os *icebergs*, têm enorme parte imersa, **que não é científica, que é a zona cega da ciência, indispensável, entretanto, ao desenvolvimento da ciência.**

Temos de caminhar para uma concepção mais enriquecida e transformada da ciência (que evolui como todas as coisas vivas e humanas), em que se estabeleça a comunicação entre objeto e sujeito, entre antropossociologia e ciências naturais. Poder-se-ia, então, tentar a comunicação (não a unificação) entre "fatos" e "valores"; para que tal comunicação seja possível, são necessários, por um lado, **um pensamento capaz de refletir sobre os fatos** e de organizá-los para deles obter conhecimento não só atomizado, mas também molar, e, por outro, **um pensamento capaz de conceber o enraizamento dos valores numa cultura e numa sociedade** (MORIN, 2005, p. 122, grifos nosso).

<sup>5</sup> In the opening page, the message: "Technology is changing intimacy. *Future of Sex* invites you to a conversation around the nexus of sex, technology and wellness". Available: [www.futureofsex.org](http://www.futureofsex.org). Access: mar. 2020.

- Robots, men and women, like sex machines, capable of expressing love and emotions. They are robotic sexual partners.
- Immersive entertainment: combining the real with the virtual are the offered sexual streams via cameras, with live virtual reality. The first website to launch streaming was Pornhub, in 2016.
- Increased human capacity with portable computational implants (genital prostheses and sexual performances).

Another example: digisexuality. This is another interesting topic in this ST&i universe based on the science of human sexuality.

Neil McArthur and Markie Twist, in the article “*The Rise of Digisexuality*” (MACARTHUR; TWIST, 2017) give rise to the term digisexuality which are the people who choose to experience and be in sexuality in the virtual field or with robots, whether for sex or for an inter-relationship.

In the article, the authors call digisexuality a new radical sexual technology. Why radical? Because they totally exclude the human and the relationship between two people? What scientific rationale can the Sex Education area organize? All questions, with no answer, except to encourage investigations and research; initially, theoretical constructs in Sex Education, from the perspective of ST&i.

One proposal in this direction is Scientific Literacy, which is covered in the following section.

### **The proposal: sex education as scientific literacy**

Since Hurd (1998), passing through Anelli (2011) and using the production of Chassot, (2017) a theoretical and methodological proposal has been structured, in this proximity of Sexual Education with the bases of ST&i.

Carol Anelli (2011) quotes Davis (1935), who organized 14 specific objectives for the study, in general, and six characteristics that identify the scientific attitude, therefore, attitudes in scientific literacy. Many of the objectives of the study, outlined and identified by Davis, are and are linked to the attitudes expected by students involved in the teaching-learning process in Science.

Let's look at Chart 1.

**Chart 1** – Study objectives and characteristics of the scientific study, its attitudes

Specific goals for all students	Characteristics of the student with a scientific attitude
<ol style="list-style-type: none"> <li>1. Command of factual information</li> <li>2. Familiarity with laws, principles and theories.</li> <li>3. Ability to distinguish through fact and theory.</li> <li>4. Concept of cause and effect relations.</li> <li>5. Ability to make observations.</li> <li>6. Habit of basing judgment on facts.</li> <li>7. Ability to formulate viable hypotheses.</li> <li>8. Willingness to change opinion based on new evidence.</li> <li>9. Free from superstitions.</li> <li>10. Appreciation of the contributions of science to our civilization.</li> <li>11. Appreciation of natural beauty or nature.</li> <li>12. Appreciation of man's place in the universe.</li> <li>13. Appreciation of possible future developments in science.</li> <li>14. Possession of interest in science.</li> </ol>	<ol style="list-style-type: none"> <li>1. Willingness to change opinion based on evidence.</li> <li>2. Search for the whole truth, regardless of personal, religious, or social prejudice.</li> <li>3. Concept of cause and effect relations.</li> <li>4. Habit of basing judgment on facts.</li> <li>5. Power or ability to distinguish between fact and theory.</li> <li>6. Free from superstitious beliefs.</li> </ol>

Source: prepared by the author based on Anelli (2011, p. 43)

It is noticed that two characteristics are “removed” from the objectives of studies, precisely because they characterize the “game” of science, presented by Alves (1981), that is, the search for “truth” - philosophy - based on common sense and the serious judgment of the facts. It is the “blind zone”, commented by Morin (2005), without which there is no science, because it must be contextualized, acculturated in each location.

The main point, in Chassot (2017) would be the bet, A methodological tip from Chassot (2017), to think about the curriculum, in a SL proposal that is applicable both to school education and to education and formation in spaces outside the school, it must be between the two trends he commented on, namely: 1) the articulation between school knowledge and power; 2) intersectionality between knowledge/power/identity.

In a nutshell, Chassot (2017), states that we must “[...] convince ourselves that Education must stop being *non-political* to be less domesticating and, thus, contribute to scientific literacy”<sup>6</sup> (p. 113).

From the theoretical study undertaken, it is proposed to think about Sex Education in ST&i, starting with an “adaptation” to Scientific Literacy (SL). Based on this theoretical set, a

<sup>6</sup> “[...] nos convencer de que a Educação deve deixar de ser *apolítica* para ser menos domesticadora e, assim, contribuir para uma alfabetização científica”

provisional definition of what is called, in this study, Scientific Sex Education is proposed: “Sex Education is a science, because it is derived from Education, which, by its nature, is scientific, is a science of social practice, is science of praxis. It is, and also should be, since Pedagogy and Didactics are, in statute, science, branches or derivations of the science of education. Sexual Education is the scientific praxiological teaching of the science of human sexuality (gender and gender diversity or plural genders) in the school curriculum (from basic education to higher education) and in non-school spaces, whether spaces of social and gender empowerment, either in formative spaces leveraged by social movements and party instances under the bias of power and the politicization of the individual in the collective. Sex Education is, therefore, and can be scientific literacy, both for the educator and the student; both the researcher and the researched”.

These are not discussions between learning or literacy. It is understood that the discursive tension must have been overcome. The question is methodological, it is practical. Therefore, few studies in the area of science education have, in fact, presented methodologies on literacy or scientific literacy. A rare exception is the work of Sasseron (2008), who elaborates indicators of scientific literacy, whose main differential is to be and present (have) scientific answers to the problems proposed to students, in contents of Natural Sciences of Elementary Education.

It is indicated in this work that practices and methodologies in Sexual Education approach the bases of ST&I, surpassing the aspect only “school” by the “school”, advancing to reflective, theoretical and methodological aspects in the scope of innovation and in the scope of technology, having science, as the driving force of this “labor”.

Certainly, a great challenge for Sex Education. When the concern is both to value the industrial product in human sexuality, and to reflect on its impacts. And, thus, think about the scientific foundations of science, technology and innovation with a focus on the emancipated subject in a globalized society.

### **Final considerations**

What we have to consider, then, in this brief propositional study is the following: it is possible to bring Sex Education closer to ST&I. This proximity should follow some general guidelines:

- 1) science and the production of knowledge in the area of the science of sexuality, of which, the science of praxis, represented by Education and, therefore, Sex Education, operationalize equations about the choice of a line of Epistemology of Science, formatted in a curriculum.
- 2) The science of sexuality, in this case, is considered in this sense of ST&i, both that produced in the scope of history, philosophy, anthropology, as well as that technological and innovative science, which permeates the industry and consolidates itself in the market, with pleasure products or pleasure technologies.
- 3) The possible application of this Sexual Education close to ST&i can be configured in Scientific Literacy. For this, the sex educator is a professional who was and is scientifically educated: both biological, social, historical, philosophical and anthropological knowledge converges and manages to dimension the inventions or "facts" of social sexuality and market to the formative curriculum.

This model or theoretical discussion is quite initial, still with a provisional name of "Scientific Sex Education" seeks to cover a Sexual Education beyond the school; it intends to embrace the science of sexuality and its production of an innovative-technological market. They are also very incipient reflections in the proposal for a program of studies and debates that, over time, may support more in-depth reflections and more specific products, whether of methodologies or products, properly speaking, which may have the scope of industrial processes and, in this case, the relation between Sex Education and the areas of engineering, computing, design, are interesting points to be considered, in addition to marketing.

What is known and concluded is that the path of this sexual education approach to ST&i begins with studies in the area of Philosophy of Science, Epistemology of Science and the choice of an epistemologist to "talk" and start reflections, as well as theoretical paths, pervaded, for example, by bioethics, Human Rights, health, etc.

Therefore, paths are open for investigations and applications of Sexual Education with Scientific Literacy, as the beginning of a research program on a micro scale that allows a welcome (or not) approach from the perspective of ST&i.

Studies in the area of Sexual Education will find important theoretical and methodological advances in ST&i and about this present-future we have little to say, except to reflect, like the philosophers of the Epistemology of Science, which, at the moment, are our initial theoretical resources. What needs to be glimpsed and considered are the innovative movements of science and the entertainment industry, technology and contemporary society. To follow the advances, without losing the "vein" of science, the science of sexuality, the

science of education, of school praxis and, therefore, of what can be conceptualized as Scientific Sex Education, based on ST&i in the globalized world or, perhaps, the “liquid” world.

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