

**BRAZILIAN SECONDARY EDUCATION REFORM LAW (law nº 13.415/2017) AND  
THE NATIONAL COMMON CURRICULAR BASE: ANALYZING TECHNOLOGY  
CONCEPTS**

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**Abstract:** Technology has been part of society in many aspects of daily life as a large significant contributor to human being development and a major influencer to human relationships. Nowadays, it has been generally agreed that digital information and communication technologies have impacted the ways people, specially youngsters, interact and communicate. This paper aims at analyzing the concepts of technology in the Brazilian Secondary Education Reform Law (law nº 13.415/2017) and the National Common Curricular Base. It refers to a documentary analysis that made it possible to understand that, historically, technology has been influencing society as well as interaction and communication, especially with the youth. The analysis was based on Lemos (2015), Santaella (2013) and Kenski (2017) among others. In addition, it is observed that the way technology is being addressed in passages of the Brazilian Secondary Education reform documents is still affected by the critical view on technology Platão and Aristóteles had perceived in the twentieth century.

**Keywords:** education, technology, secondary education

**Resumo:** A tecnologia integra a sociedade em muitos aspectos da vida cotidiana, colaborando significativamente para o desenvolvimento do ser humano e influenciando as relações humanas. Atualmente, aceita-se o fato de que as tecnologias da informação e comunicação digitais impactaram a maneira como as pessoas, especialmente os jovens, interagem e se comunicam. Este artigo tem como objetivo analisar as concepções de tecnologia nos documentos da Reforma do Ensino Médio: Lei nº. 13.415 / 2017 e na Base Nacional Curricular Comum. Trata-se de uma análise documental que possibilitou compreender que, historicamente, a tecnologia vem influenciando a sociedade, a interação e a comunicação, principalmente com os jovens. A análise foi baseada em Lemos (2015), Santaella (2013) e Kenski (2017) entre outros. Além disso, observa-se que a forma como a tecnologia está sendo abordada em trechos dos documentos da reforma do ensino médio brasileiro ainda é afetada pela visão crítica sobre a tecnologia que Platão e Aristóteles haviam percebido no século XX.

**Palavras-chave:** educação, tecnologia, Ensino Médio

## **Introduction**

Technology has been part of society in many aspects of daily life as a large significant contributor to human being development and a major influencer to human relationships.

Nowadays, it has been generally agreed that digital information and communication technologies have impacted the ways people, especially youngsters, interact and communicate.

Moreover, these technologies have transformed labor market not only due to work relationships changes but also to the destruction and creation of new professions. Youngsters have to be prepared to face all those rapid profound job market transformations and this should be one of school's major roles. It is widely recognized that the role of Secondary Education is to prepare those youngsters to deal with all those changes in both professional and personal scenarios.

National education official documents have been altered throughout the years in order to adjust to the needs of society taking into consideration all the varied contexts influenced by technology which affect labor market. Based on that, this paper aims at analyzing the concepts of technologies defined in the following Brazilian official secondary education documents: law nº. 13.415/2017 which refers to the High School reform in Brazil and the Brazilian Common Core Curriculum.

### **Technologies and concepts**

Lemos (2015) believes that we cannot understand controversies, potential and conflicts brought by technology in our present life without taking into account the historical view of technology and its symbolisms, referring to genealogy, history and the main views of Philosophy of technique. The author also believes that recognizing that the origin of the phenomenon called technology is due to men appearance leads to the subsequent course of events: philosophical discourse, the idea of *tekhnè* and the scientific process.

At first, Lemos (2015, p. 26) explains the difference between technology and technique. According to the researcher, technology represents “technical objects, machines and their respective manufacturing processes”, while technique covers diverse areas such as dance, economy, sports or even objects, tools and machines. As stated by Lemos (2015) technique comes from the Greek term “*tekhnè*” and can be translated as art. It is derived from

the first Philosophical concept of technique whose goal is to distinguish human actions from nature actions. *Tekhnè* and *phusis* (natural process of reproduction) are part of a process named *poièsis* (production): natural mechanisms self-produce which differ from humans. Lemos identifies the current criticism on technology as a result of Platão's and Aristóteles' polarized views: Platão draws the dichotomy *Tekhnè X Èpistèmé* \_ practical knowledge X theoretical knowledge, the second was more valued by Platão because men who work with *tekhne* they copy, imitate, and this view is still considered by society nowadays. In regards to Aristóteles' understanding *Tekhnè* is seen as inferior compared to *Phusis* (nature actions), they are considered artificial because they are not able to self-reproduce.

Besides Platão and Aristóteles, Lemos adds two other philosophers from the twentieth century whose focus on Modern technology makes them perceive another critical view which still affects the place of technology nowadays. The author is referring to Heidegger and Simondon. The latter advocates that the use of machines is in charge of the contemporary sensation that technology is not part of human culture since men do not deal with tools anymore. *Tekhnè* would be considered culture's enemy because it does not belong to noble culture areas. In order to express his opinion against this view Simondon creates *Logos* of *Tekhnè*, techno-logy, a philosophy of mechanisms\_ "mechanology". Heidegger's view on Modern technology is based on Modern Science which must be used but also kept distant recognizing *tekhne* can be useful, wisely and safely, but it should not be controlling society. "In fact, technique, "*tekhne*" and technology represent the three phases which form the historic development of technique. They complete one another." (OLIVEIRA, 2008, p. 2)

Although in our current society we are surrounded by digital technologies, we have always been surrounded by technologies in general. "Technologies are as old as the human species." (KENSKI, 2017, p. 15). The author states that technology can be found in all ages and in every type of social relationships, and whose connections are established with knowledge and power.

The word technology was first used by Jacob Bigelow in 1829, to discuss the

“application of sciences to the useful arts.”<sup>1</sup> Figure 1 shows the book Elements of Technology.

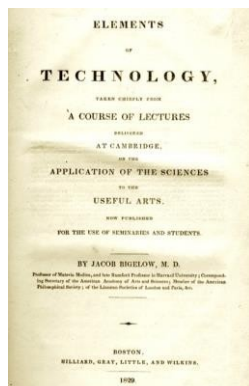


Figure 1.

Lemos (2015) underlines the fact that technology has had a major impact on western societies. He also highlights the fact that technology has gained diverse meanings and representations with social life where power and domain vary from/to Society/Technology.

Oliveira (2008) declares that all human activities are narrowly connected to the historical development of technology including technology of communication and information. “Technology comes from technique, a very ancient term which refers to a set of norms regarding practice of any art or activity and later, the activity itself of producing tools used to meet human needs, more recent definition due to the context of the Industrial Revolution.” (NOSENGO, 2008, p. 19, 20)

Santaella (2013, p. 285) describes in details the generations of technologies which were developed throughout the years reaching what is called ubiquitous phase:

- Technologies of Reproducibility (newspaper, photography, cinema)
- Diffusion Technologies (radio, television)
- Technology Readiness (1990 media culture: mass culture – digital culture;

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<sup>1</sup> BIGELOW, J. Elements of Technology taken chiefly from a course of lectures delivered at Cambridge, of the application of the sciences to the useful arts; now published for the use of seminaries and students. By Jacob Bigelow. Boston: Hilliard, Gray, Little and Wilkins, 1829.

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gadgets, cable TV, VCR, copy machines, walkman...)

- Access Technologies (computer communication, interactivity)
- Mobile Technologies (cellular phones)

The authors Wahab, Rose and Osman (2012) aimed at contributing to the existing literature by reviewing the development, definitions and concepts of technology and technology transfer. Figures 3 and 4 show the table on definitions of technology.

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Table 1. Various Definitions of Technology from Previous Literatures

Year	Scholars	Definitions
1968	Merrill	Technology connotes the practical arts, bodies of skills, knowledge and procedures for making, using, and doing useful things.
1968	Strassman	The tools, a stock-pile of utensils, but to a kind of tool-using behavior, a set of methods for making specific goods.
1970	Jones	The way in which the resources inputs are converted into commodities.
1971	Hawthorne	The application of science to solve well-defined problems.
1972	Galbraith	The systematic application of knowledge to practical tasks.
1976	Teese	A set of knowledge or experience related to the production of a product or the implementation of a process.
1981	Hawkins and Gladwin	The specialized knowledge pertaining to the production of the goods and services in organized economic activity, including the knowledge and skills required to manage a set of interrelated technical processes.
1983	Pacey	The application of scientific and other organized knowledge to practical tasks by ordered systems that involve people and organizations, living things, and machines.
1987	Woolgar	An integration process of physical objects, the process of making the objects and the meaning associated with the physical objects. These elements are not distinctive and separable factors, but form a seamless web that constitutes technology
1989	Goulet	The application of science because of their special relationship.
1991	Methé	A process where its origins and destination are connected and its dynamic nature is highlighted.

Figure 3: Definitions of technology

1992	OECD	A structure or a network due to various feedback loops between it and other sub-systems within a society, and to its obviously non-linear development projections
1992	Natarajan and Tan	The knowledge or expertise that is required in the production or assembly of a given good. Technology therefore embodied in the related machinery and utilized by a firm.
1996	Levin	Technology is not really a 'thing'; it is better characterized as an approach. It is the application of scientific principles to solve practical problems. Technology has been described as having three facets: material artifacts (things), the use of artifacts to pursue a goal, and the knowledge to use these artifacts.
1996	Burgelman et al.	The theoretical and practical knowledge, skills, and artifacts that can be used to develop products and services as well as their production and delivery systems. Technology is embodied in people, materials, cognitive and physical processes, facilities, machines and tools.
1998	Lovell	Technologies are separated into 'product technologies' (associated with the physical and engineering aspects of equipment) and 'process technologies' (associated with the processes by which problems are solved).
2002	Tihanyi and Roath	Information such as a patent, know-how or trade secrets. Conversely it can be modified as equipment, component assemblies/parts or as a final product. Production techniques/processes, which require necessary skills to apply different methods of production, represent a combination of tangible and intangible technology. Technology can also include information that is not easily reproducible or transferable.
2003	Maskus	The information necessary to achieve a certain production outcome from a particular means of combining or processing selected inputs which include production processes, intra-firm organizational structures, management techniques, and means of finance, marketing method or any of its combination. Technology may be codified in formulas, blueprints, drawings, and patent applications or uncoded in the sense of requiring implicit know-how on the part of personnel.
2006	Reisman	The development and application of tools, machines, materials and processes that help in solving human problems.

Source: Szali and Raduan (2011)

Figure 4: Definitions of technology

## Full Time High School/Secondary Education

In order to increase high school retention rates in Brazil in addition to enhancing the



quality of secondary education, the Ministry of Education has been discussing and working on an education reform, known as *Novo Ensino Médio*<sup>2</sup>.

According to The National Common Curricular Base in Brazil, secondary education is the final stage of Basic Education, subjective public right of every Brazilian citizen. However, the educational reality of the country has shown that this stage represents an obstacle in guaranteeing the right to education. Some of the factors which explain this scenario are: the insufficient performance of students in the final years of Elementary School, the curricular organization of the current High School with excessive curricular components, and a pedagogical approach that is far from the cultures of youth and the job market. Besides the need to universalize attendance, other major challenges of High School nowadays are to guarantee students' permanence and learning, responding to their present and future aspirations (BRASIL, 2017<sup>a</sup>).

It is relevant to consider contemporary social dynamics, marked by rapid transformations resulting from technological development. It is a matter of recognizing that changes both in national and international contexts directly affect young populations and, therefore, what is demanded from their formation to face new social, economic and environmental challenges, accelerated by technological changes in the contemporary world. In this increasingly complex, dynamic and fluid scenario, uncertainties connected to changes in the world of work and in social relations represent a great challenge for the formulation of policies and proposals for curricular organization for Basic Education in general and also for secondary education (BRASIL, 2017<sup>a</sup>).

The Brazilian Common Core Curriculum alerts that there is need to perceive youngsters not as part of a homogeneous group, adopting a broad and plural view of youth, denoted as diverse, dynamic and active participant in the formation process that must encourage autonomous and critical behavior in the world. The youth are in constant dialogue with other social categories, also immersed in contexts meaningful to their reality, and have an important role in defining the directions of society. Therefore, secondary education must

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<sup>2</sup> The term *Novo Ensino Médio* refers to the High School reform.

contribute to the formation of those youngsters fostering critical thinking and autonomy, understanding the first term as informed understanding of natural and cultural phenomena, and autonomy as the ability to make informed and responsible decisions. Consequently, schools must provide experiences and intentional processes that guarantee learning and promote situations in which respect for human people and their rights are permanent (BRASIL, 2017a).

Taking into account the previous scenario, it is essential that the law nº 9.394/1996- which establishes guidelines and bases of national education (LDB, Art. 35)- be reinterpreted in order to reach the goals that lead to the exercise of citizenship and to respond to the diversity of young people's expectations regarding their formation: to explain that preparation for the job market is not directly linked to the early professionalization of young people - since they will live in a world of today's unknown occupations and occupations characterized by the intensive use of technologies – but the opening of possibilities for immediate action, in the medium and long term and for the solution of new problems. School's roles have to make clear its commitment to scientific-technological foundations of knowledge production, promoting through the articulation between different areas of knowledge:

- understanding and use of concepts and theories which make up the basis of scientific knowledge, methodological procedures and their logic;
- recognition of the need to continue learning and improving their own knowledge;
- appropriation of languages of digital technologies and the fluency in their use;
- appropriation of scientific languages and their use in the communication and dissemination of knowledge.

Respecting diversity in society, the recommendations defined by the National



Educational Council<sup>3</sup>, CNE / CP N°. 11/200954 should be followed: - to stimulate the construction of flexible curricula, respond to the heterogeneity and plurality of their conditions, interests and aspirations, with space and time for open and creative use. – to promote the inclusion of the mandatory central components provided for in legislation and educational standards, and flexible and variable components of curriculum enrichment that will electively allow *itinerários formativos* that meet students' interests and needs (BRASIL, 2017a).

In order to replace the single high school curriculum model with a diversified and flexible model, the law n°. 13.415 / 2017 amended the LDB<sup>4</sup>, establishing in Art. 36 that the high school curriculum will be composed of the National Curricular Common Base and of elective disciplines (*itinerários formativos*), which should be organized through different curricular arrangements, according to their relevance for each specific context and the possibility of the educational systems: I – languages and their technologies; II – mathematics and its technologies; III – natural sciences and their technologies; IV – applied human and social sciences; V – technical and vocational training (BRASIL, 2017b).

This new structure emphasizes decision-making behavior, since it provides for varied *itinerários formativos* to meet multiple students' interests: academic deepening and professional technical training. Furthermore, it ratifies the organization of High School by areas of knowledge, without direct reference to all the contents that traditionally make up the curriculum of this stage.

### **Analysis of the concepts of technologies present in the High School Reform Law and The Brazilian Common Core Curriculum**

By referring back to some passages of the official education documents mentioned in this text, the term technology can be easily identified in controversial, potential scenarios as

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3 BRASIL. Conselho Nacional de Educação; Conselho Pleno. Parecer n°. 11, de 30 de junho de 2009. Proposta de experiência curricular inovadora do Ensino Médio. Diário Oficial da União, Brasília, 25 de agosto de 2009, Seção 1, p. 11.

4 LDB: Law n° 9.394/1996-which establishes guidelines and bases of national education.

described by Lemos (2015) also observed in this part of the law when it comes to *itinerários formativos*: “to meet multiple students' interests: academic deepening and professional technical training.”

Moreover, the statements made by Kenski (2017) and Oliveira (2008) declaring society has always been surrounded by technology and that human connections are directly and rapidly influenced by technology can be seen in excerpts such as the following:

It is relevant to consider contemporary social dynamics, marked by rapid transformations resulting from technological development... directly affect young populations and, therefore, what is demanded from their formation to face new social, economic and environmental challenges, accelerated by technological changes in the contemporary world. (BRASIL, 2017a, p. 462)

The following excerpts of the law nº. 9.394/1996 (LDB, Art. 35) refers to the concept of technology adopted by Lemos (2015) and Nosengo (2008) who underlines the fact that technology has had a major impact on western societies, has also gained diverse meanings and representations and it is used to meet human needs: “in order to reach the goals that lead to the exercise of citizenship and to respond to the diversity of young people's expectations regarding their formation: to explain that preparation for the job market is not directly linked to the early professionalization of young people - since they will live in a world of today's unknown occupations and occupations characterized by the intensive use of technologies - but the opening of possibilities for immediate action, in the medium and long term and for the solution of new problems.”

The next selections of the laws nº. 9.394/1996 and nº. 13.415/2017 agree with Santaella (2013) when she addresses that fact that technologies affect the teaching and learning processes: “school's roles have to make clear its commitment to scientific-technological foundations of knowledge production... understanding and use of concepts and theories which make up the basis of scientific knowledge...; recognition of the need to continue learning and improving their own knowledge; appropriation of languages of digital technologies and the fluency... I – languages and their technologies; II – mathematics and its

technologies; III – natural sciences and their technologies; IV – applied human and social sciences; V – technical and vocational training.”

### **Final Remarks**

By agreeing with Costa and Coutinho (2018), the intention is not denying that Secondary Education’s role is to prepare youngsters to labor market. However, the Brazilian Reform Secondary Education documents seem to focus mostly on dealing with technology in very specific and superficial contexts not willing to foster actual critical thinking and autonomy of the youth so that they could develop a broader social, political, scientific, financial and technological view.

It is also clear that the way technology is being addressed in passages of the Brazilian Secondary Education reform documents is still affected by the critical view on technology Platão and Aristóteles had perceived in the twentieth century.

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