

## **The Protagonism of the National Technical School in Teacher Education: what monuments and mathematics say**

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**ABSTRACT – The Protagonism of the National Technical School in Teacher Education: what monuments and mathematics say.** This article aims to discuss the National Technical School (ETN) in its protagonism in the formation of teachers for Technical Education and some of the ideas that circulated at the time, from its origins to the period that culminated in the operation of ETN. For this discussion, the following research sources were used: the architectural monument, the former headquarters of the Ministry of Education and Health (MES), documents from the School's archive, and the archive of the Casa Museu de Villa-Lobos, the CBAI Bulletins, the textbook *Mathematics* and the work translated by CBAI *Psicologia para Professores do ensino industrial*. Analyzing these Documents / Monuments allowed to verify some elements of these circulating ideas: eugenics, nationalism, and the purpose of Mathematics.

**Keywords: Industrial Education. Teacher training. Documents/Monuments.**

**RESUMO – O Protagonismo da Escola Técnica Nacional na Formação de Professores: o que dizem os monumentos e a Matemática.** Este artigo tem por finalidade discutir a Escola Técnica Nacional (ETN) em seu protagonismo na formação de professores para o Ensino Técnico e algumas das ideias que circulavam na época, desde suas origens até o período que culminou com o funcionamento da ETN. Para essa discussão foram utilizadas as seguintes fontes de pesquisa: o monumento arquitetônico, a antiga sede do Ministério da Educação e Saúde (MES), documentos do arquivo da Escola, e do arquivo da Casa Museu de Villa-Lobos, os Boletins da CBAI, o livro didático *Matemática* e a obra traduzida pela CBAI *Psicologia para professores do ensino industrial*. Analisar esses Documentos/Monumentos permitiu verificar alguns elementos dessas ideias circulantes: a eugenia, o nacionalismo e a finalidade da Matemática.

**Palavras-chave: Ensino Industrial. Formação de Professores. Monumentos/Documentos.**

## Introduction

The history of technical education is correlated with the process of industrialization, the need to specialize the labor force in the new production mode, industry, which was developing in various parts of the planet. To provide this education, schools founded in Brazil lacked qualified teachers. Training teachers to work in industrial education has always been a challenge for the Federal Government in several administrations. In an attempt to find a more lasting solution, a Normal School for industrial education was founded in Brazil's capital, Rio de Janeiro (RJ), the National Technical School (ETN). The purposes of the ETN included training and qualifying teachers for this branch of education.

The school began in 1917 with the name Normal School of Arts and Trades Wenceslau Braz and ceased its purpose of training teachers in 1978, when it was renamed Centro Federal de Educação Tecnológica Celso Suckow (CEFETRJ), Maracanã Branch.

The National Technical School was the protagonist in the training of teachers for the federal system of vocational education in the technical and industrial schools of Brazil's capital cities. Located in one of the country's decision-making centers, Rio de Janeiro, the school also engaged in discussions and decisions regarding industrial education. In other words, it was a space where ideas circulated, and pedagogical movements were sparked.

Because of this, this text aims to discuss the role of the ETN in teacher education and some of the ideas that circulated in it. For this, this article used architectural monuments such as the former headquarters of the Ministry of Education and Health (MES) and documents from the School's archive and the archive of Casa Museu de Villa-Lobos, bulletins of the Brazilian-American Commission for Industrial Education (CBAI, 1947), the textbook *Mathematics* and the CBAI translation of *Psychology for Teachers of Industrial Education*. Everything was analyzed from the perspective of Le Goff's concept of documents / monuments (1992, p.545), which sees every document of a monument. "Only an analysis of a document as a monument allows collective memory to recover it and the historical to use scientifically, that is, in full awareness of the subject."

It is possible to notice the use of the nomenclature monument for literary works. If we refer to Faria's dictionary (1962), monument, from the Latin *monumentum*, it that which brings to the memory of something, a pledge, hence several particular meanings: tomb, statue, inscriptions, tombstone, temple, literary work, sign, hint (of recognition). In the *on line* Aurélio dictionary, in 2015, in addition to statues, tombstones, tombs, among others, a monument is also any intellectual or material work that, because of its high value, is passed on to posterity.

Therefore, in this perspective, Monuments are also Documents, and according to Moura (2016) they are objects of historical and / or artistic value whose merit for preservation is set by a legal regime. In

this article, such research sources made it possible to verify ideas about mathematics and pedagogy that circulated inside the ETN, as an institution for teacher education, as well as ideas that circulated in a context outside the walls of the school, such as eugenics and nationalism.

### **The Protagonism of the National Technical School (ETN)**

Located in Rio de Janeiro, Brazil's capital when it was founded, the National Technical School stood out from other technical schools in the country for its location and, as its name implies, for producing models for the other schools of the federal system of vocational education. This education began in 1909, by Decree No 7.566, which determined the foundation in all the state capitals schools of apprenticeship and craftsmanship (Escolas de Aprendizizes e Artífices) for free primary vocational education. Run by the Federal Government, these schools were intended "[...] not only to qualify the children of the less favored by fortune with the indispensable technical and intellectual training, but also to make them acquire habits of profitable work, which will remove them from ignorant idleness, the school of vice and crime" (Brazil, 1909, P.1).

The schools of apprenticeship and craftsmanship, intended to train young workers for the industries of the newly declared Brazilian Republic, had a curriculum divided into the disciplines of General Culture, common to all courses, English, Spanish, French, Mathematics, Physics, Chemistry, Natural History, World History, General Geography, and the disciplines of Technical Culture, specific for each course. All courses had the discipline called Technology of Trade and Technical Drawings, also intended for trades. All technical courses included the disciplines of Industrial Hygiene, Labor Organization, and Industrial Accounting.

According to Moura (2018), it was essential to train teachers to act on the foundation of this new kind of education, that is, workshop and the disciplines of technical culture. A countrywide shortage of teachers led the mayor of Rio de Janeiro, Amaro Cavalcanti (1849-1922), to found, through Decree No 1800 of 1917, the Normal School of Arts and Trades Wenceslau Braz with the goal of training teachers, masters and foremen for the various institutes and vocational schools, in addition to preparing manual labor teachers for city primary schools.

According to Fonseca (1961), in 1919 the school was transferred to the federal administration, in an agreement with the Federal Government, to minimize the lack of teachers. In 1937, the Normal School of Arts and Trades Wenceslau Braz was closed on account of Law No. 378, of January 13, 1937, which determined that the schools of apprenticeship and craftsmanship were to become technical secondary schools (Liceus Industriais). Leopoldina Palace, which housed Wenceslau Brás School, was demolished to make way for a new building. However, after the construction was finished five years later, the new building was renamed National Technical School (ETN), as the Organic Law of Indus-

trial Education came into force through Decree-Law No. 4073, of January 30, 1942 (Brazil, 1942).

The Organic Law organized industrial education into two cycles: the first cycle included primary industrial education (former middle school), the teaching of masteries, teaching of trades and learning; the second cycle included technical education (former secondary) and pedagogical teaching. The amendments of this law brought legislative unity to Brazilian vocational schools, allowed holders of a technical secondary education degree to enter university, shut down technical secondary schools and schools of apprenticeship and craftsmanship, and changed the purpose of vocational education, thereby responding to the interests of workers, companies, and the nation.

With a new configuration, the ETN retained its role of training teachers for industrial education, complying with the sub-clause of Article 4 of Decree-Law No. 4073, which announces: "It is also the role of industrial education to train, improve or specialize teachers of certain disciplines of this education, and administrators of services related to this education". Performing its role, the ETN offered courses in all the disciplines of the first and second cycles, in addition to teacher training, refresher and specialization courses.

It is important to emphasize that teacher training was intended for those who taught the technical culture disciplines. An important ally stands out in this context: the Brazilian American Commission for Industrial Education (CBAI); composed of Brazilian and American technicians who worked together to develop exchange relations, training, and several activities of industrial education of mutual interest.

According to Falcão and Cunha (2009), the CBAI was created as the Ministry of Education searched for qualified professionals. In this search, in 1942 the first foreign teachers were hired from Switzerland and the United States. However, a more stable solution was needed. In 1943, the Minister of Education, Gustavo Capanema, attended the first Conference of Education Ministers and Headmasters of the American Republics, held in Havana. At the conference, in an understanding with the American education authorities – represented by *Inter American Fundacion Inc*, a branch of the *Office of Inter-American Affairs* – Gustavo Capanema brought Brazil and the United States closer through an exchange of educators, ideas and pedagogical methods. Thus, in 1946, as part of the United States cooperation agreement with Brazilian education, the Brazilian American Commission for Industrial Education (CBAI) is created to roll out the education cooperation program.

According to Brito and Moura (2019), the National Technical School encountered difficulties to implement the pedagogical courses provided for in the legislation in two methods: Didactics of Industrial Education and Administration of Industrial Education, both lasting one year. The Didactics course was implemented only in 1954 (Brazil, 1954). This, however, did not prevent the school from qualifying teachers by offering other courses such as: single courses, specialization courses

and vacation courses. Many of these trainings programs took place in partnership with the CBAI.

The vacation courses taught by CBAI, according to Brito and Moura (2019), took place in two stages:

In the first stage, the selected teachers were gathered at the National Technical School to review general and technical knowledge, study the English language, and update and expand their knowledge about life in Brazilian society. The second stage was a sort of internship in the United States: a one-year stay with six months internship in vocational schools, three months in manufacturing plants to improve teachers' mastery of the trades, and three months attending a teacher education course. Upon returning to Brazil, the teachers-students wrote about their professional experiences in the CBAI Bulletin (Brito; Moura, 2019, p. 208).

The vacation courses were held annually in the state capitals of Rio de Janeiro, São Paulo, Porto Alegre, and Recife, considered to be in strategic locations for teachers of the federal system of vocational education to move. The CBAI offered several courses on wood craft (joinery and carpentry), metal (machine mechanics, locksmithing and welding), drawing, Industrial Teaching Methodology, Organization of Methodical Series, and content review. The activities were broken into theoretical, practical, and visiting activities. Practical classes took place at manufacturing plants of São Paulo and Rio de Janeiro.

For the pedagogical course, according to the Organic Law of Industrial Education, applicants were required show proof of vaccination, of not carrying any contagious diseases and being vaccinated. The conditions for admission were: having completed any of mastery courses or any of the technical courses and passing the entrance exams. Teachers who passed were also required to have worked in industries for at least three years. This was the profile of a professional who lacked only the Didactics Course to become qualified to teach in the federal network of vocational education with a bachelor's degree. The Pedagogical Course was a program organized under the educational framework of psychology, history, teaching and trade methodologies and with specific characteristics of industrial education.

The National Technical School also offered with the CBAI the course *Training Within Industry* (TWI), known as *pedagogy* of industrial education. This training method was brought to Brazil in 1950 by the CBAI to help increase the country's manufacturing production. According to Moura (2013), this method was applied in technical and industrial schools and in the various industries of electronics, footwear, metallurgical, pneumatic, automotive among others installed in Brazil's main states. The ETN hosted several meetings of industry leaders and technical schools, which adopted the TWI with significant results.

The National Technical School had its name changed many times; in 1965, it was renamed Guanabara Federal Technical School, due to the

federal capital being moved to Brasília. In 1967, it was named Federal Technical School Celso Suckow da Fonseca, as a posthumous tribute to its first headmaster. In 1978, it was turned into the Federal Center for Technological Education Celso Suckow Fonseca, the name which it has kept to this day.

These changes did not change its status as a technical school or its role in training and qualifying teachers for technical education. But the names contained records of significant events for the school community: being a national school, being a Guanabara (state) school and the importance of Headmaster Celso Suckow da Fonseca.

### **Circulation of ideas/Pedagogical movement**

The name National Technical School encompassed more than the role as a teaching institution described in decrees, regiments, and regulations: it carried a set of ideas constituted by several agents, which can be analyzed / interpreted by using different research sources. In this sense, some documents / monuments were analyzed: the Brazilian Man Statue, the building of the Ministry of Education and Health, the CBAI bulletins, the mathematics textbook, literatures, documents from the ETN archive and the archive of Casa Museu de Villa-Lobos, in order to express some circulations of ideas and pedagogical movement, inside and outside the walls of that school.

For example, the construction of the Brazilian Man Statue by the Minister of Education and Health Gustavo Capanema, in the Estado Novo period of President Getúlio Vargas (1937-1945), roughly corresponds to the period when the Normal School of Arts and Trades Wenceslau Braz was closed, the ETN was opened and the CBAI was created. According to Moura (2016), the statue was meant to represent the physical characteristics of the Brazilian man in the future, as well as the qualities of an intelligent, cultured or working man. The monument, according to Knauss (1999), would occupy the gardens of the future headquarters, under construction, of the Ministry of Education and Health (MES). The statue and the building should convey harmoniously the same objectives: the formation of the Brazilian man.

The men who conceived the statue were four teachers: Oliveira Vianna, Rocha Vaz, Roquette Pinto and Froes da Fonseca. They never came to a consensus as to the physical characteristics of the Brazilian man of the future. But all of them believed that the predominant characteristics of this Brazilian would be pale brown white skin, straight dark hair, and dark eyes. According to Moura (2016), they trusted in a white future for the country, representing an approximation to the supposed virtues of the European man. To achieve this, it was necessary to invest in an education and health focused on raising a white, virtuous Brazilian man, shaped to European standards of virtue. Such conclusions consist in the fact that these intellectuals belonged to the Brazilian eugenics movement. Due to the dissension and disagreements, the Statue of the Brazilian Man was never built.

In 1944, an act at the MES gardens commemorated the launch of the cornerstone for a new statue to be built: the Brazilian Youth Monument. The act was presided over by Minister Gustavo Capanema and the whole ceremony was accompanied by a musical ensemble, student choir and Military Police band, conducted by Maestro Villa-Lobos (1887-1959). Anthems and patriotic songs were performed. Brazilian maestro and songwriter Heitor Villa-Lobos was one of the major edifying figures of New State nationalism via music education. In his book, *Nationalist Music in the Government of Getúlio Vargas*, Villa-Lobos (1941) describes the importance building a Brazilian musical consciousness with amateur school choirs, as it encompasses a set of complex educational factors of civism, collective discipline, and constitution of a unity of Brazilian national culture.

According to Moura (2016), the former building of the Ministry of Education and Health, now known as Palácio de Cultura Gustavo Capanema, represented the modernist ideas of the time with regard to architectural constructions. For this reason, it was considered the first monumental building, designed to be the headquarters of public services and to follow the rigor and principles of modern architecture, which earned it international recognition. Minister Capanema was concerned about integrating the building and monument with the plastic arts, which was considered key for the elaboration and completion of the entire ministerial premises. In the permanent exhibition at Capanema Palace, a statement by an unidentified author says: “Capanema imagined the Ministry headquarters at the same time as a place of work and a house for the arts. So the building was only considered completed when the plastic arts were incorporated”. Some of them are works by Candido Portinari, Oscar Niemeyer, Celso Antônio, Bruno Giorgi, Adriana Janacópulos, Jacques Lipschitz, and Burle Marx.

The events of the non-construction of the Brazilian Man Statue, the commemorative act to launch the cornerstone of the Brazilian Youth Monument with Villa-Lobos and the construction of the Ministry of Education and Health headquarters took place in the city of Rio de Janeiro, but had national coverage. These events respectively circulated ideas of, respectively, eugenics, nationalism, modernity/art, all connected to the education of young Brazilians in schools throughout the country. In this context, we will see some ideas that circulated at the National Technical School.

Analysis of the documents of the School’s archives allow the perception that the School was a physical space of extreme importance, regarded as the heart of industrial education: the workshop. According to Moura (2018), it was a place for machinery, equipment, management techniques, discipline, organization, planning performance, productivity, and effectiveness. It was a space where the technical knowledge of each workshop prevailed, combined with the knowledge of Drawing, Mathematics and Geometry. The disciplines of technical culture, which comprised technical knowledge, were the ones where industrial education lacked qualified teachers.

The works produced in the workshops were presented in an annual exhibition, the students' degree of improvement was evaluated and the best works were awarded. Esse tipo de exposição, no cenário internacional, se tornou a partir de 1950 uma competição conhecida como *WorldSkills Internacional*, um verdadeiro campeonato de práticas de oficina na formação profissional.

The CBAI (1947-1962) published bulletins with the news and ideas that circulated in the Ministry of Education, industries, the ETN and other Brazilian technical schools. All of its articles referred directly to situations concerning industrial education. The articles published in this journal were authored by CBAI technicians, technical culture teachers, education authorities such as Anísio Teixeira and school headmasters, among others. They dealt with several topics, such as: school building repairs; curricula; teacher training courses; TWI pedagogy; safety in the workshop and at work; hygiene, health, and work-related diseases; contents of workshop practice; contents of mathematics, design, physics and chemistry, applied to the operation of machines, engines and equipment.

TWI was an effective method of training for work in industries, but it was not the only "pedagogical" idea circulating in federal schools. Psychology also emerged as an important ally in this process of vocational education. The CBAI translated, among other technical literature, the book *Psychology for Industrial Education Teachers* (Roslow; Weaver, 1949), intended for all who wished to enter the vocational education sector.

Roslow and Weaver considered psychology as a science that studies the behavior of the individual as he adapts to the environment. For the authors, industrial education concerns the teaching and learning of manual skills and it is not compatible with passive methods. They describe two learning methods: the parts method, or analytical method, and the global method, both of which will be used depending on the content to be taught.

The parts method, or analytical method, implies the division of the matter into smaller parts, or units, and the learning of these parts in consecutive order in relation to the whole. This method is necessary to avoid loss of time and dejection, as learners may feel that the task is long and complicated. Subdivisions are permissible and must be done consistently. The authors illustrate this method with its application in pattern making and sewing. A girl learns to cut patterns and to make clothes out of parts. While she does the activities separately, the learner will have a general understanding of what needs to be done and the relationship between the parts.

The global method implies the repetition of a complete series of an activity until a satisfactory yield is obtained. Often it is not a practical method because it wastes time and material. There is no need to correlate separately taught parts. The authors' example is the case of drivers, who, at the very beginning of their training, must perform all



the necessary operations that result in the moving and steering of an automobile. A mechanic can be trained by this method to perform the operations of machine adjustment, drilling, filing, turning and others.

The choice of the best method to be used in an activity depended on each situation, and the combination of both methods could be deemed necessary for a better performance and yield of the task to be completed.

In 1967, the National Technical School produced an all Brazilian *Mathematics* textbook. It was an original work authored by ETN mathematics teacher Arlindo Clemente. The author warns on the first pages of his *Mathematics* textbook that he regards the technical course as an end course and not a preparatory course for engineering colleges, although students had a legitimate right to try the entrance exams and continue their studies. This warning was a reminder that technical schools did not prepare students to pass the entrance exams, but instead trained them to become technicians.

## Final Considerations

What do monuments and mathematics say?

The monuments, be architecture or documents, enabled a discussion of the thoughts of the period, the quest to modernize the country, with a strong nationalist tendency. Ideas that circulated in the period and that were illustrated by the background of the launch of the cornerstone of the Brazilian Youth monument and by the design and construction of the headquarters of the Ministry of Education and Health. Even the discussions surrounding in the project of the unbuilt monument, the Brazilian Man Statue, are interesting for an analysis of the line of thought in force at the time, eugenics. Such ideas permeated the context in which technical education and the training of teachers for it were undertaken.

Since its creation in the early stages as Normal School of Arts and Trades Wenceslau Braz, the National Technical School coexisted with the country's process of industrialization. This is shown by the way in which mathematics was taught at those schools, prioritizing the needs of the disciplines of Design and Technical Education as an end and not a means for entering university. The concern to qualify faculty for technical education with pedagogical courses and vacation courses shows a consonance with the CBAI, the TWI "pedagogy" and the psychology of industrial education, which illustrate a concern to modernize this education.

Researching technical education and the role of the ETN in teacher training for technical vocational education, as well as mathematics focused on vocational training, helps us to visualize a pedagogical aspect in the country's process of industrialization.

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