Case Study About How Bourbakism Became Implemented Via International Agencies In A Key Region Of Brazil.[1]

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The 1960s were characterized by great changes in education in general, and in the teaching of mathematics in particular, throughout Brazil. These changes materialized as a result of disparate movements; on the one hand, there were movements to attribute greater value to education and popular culture, and on the other, there were international agreements between universities, such as the Federal University of Rio Grande do Norte and other governmental entities, with the United States Agency for International Development (USAID), aimed at cultural alignment and diffusion of the values and social practices of the capitalist block. According to Romanelli (apud Cunha & Góes, 2002, p. 32), eleven such agreements were in effect between 1964 and 1968.

In the context of the Cold War, the United States of America (USA) created a mechanism for the alignment of the capitalist block on the American continent, called the Alliance for Progress, which was an agreement involving economic and social assistance from the USA to the countries of Latin America. This fact is confirmed in the Report of the Commission on International Development - presided over by Lester B. Pearson and elaborated between August, 1968, and September, 1968, at the request of the president of the World Bank at that time, Robert MacNamara - in which it is affirmed that "by far the largest part of aid from the USA has been given to countries situated at the periphery of the Communist world, in Latin America, and in areas of great political tension" (PEARSON, 1971, p. 151).

In Brazil, bilateral agreements between the Ministry of Education and Culture (MEC) and USAID intensified following the military coup of 1964, although our research indicates that other agreements were already in effect, including the one in Rio Grande do Norte, prior to those listed by Romanelli that began following the coup. Following, we will focus specifically on these agreements and their interventions in the teaching of mathematics in the state of Rio Grande do Norte.

The economic and social situation of the population of Rio Grande do Norte[3] (RN) at the beginning of the 1960s, characterized by 80% illiteracy, one of the highest birth rates in the world, infant mortality of 420 per 1000 births, and one of the lowest per capita incomes in Brazil[4], made into a testing ground for activities of the Alliance for Progress. In 1960, an agreement was signed between the State Secretary of Education and Culture of RN (SEECRN) and USAID, called the Cooperative Program in Education, which was directed by the Secretary of Education of the state of RN at the time, Francisco Calazans Fernandes. One can note in the clauses of the agreement that, although the administration of the program was to be the responsibility of the Secretary of Education, he lacked administrative autonomy even to determine unilaterally the educational actions to be

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[3] This was the second time in the 20th Century that USAID turned its attention to RN. Due to its location on the American continent, this Brazilian state was a military base for the USA during WWII.
[4] Data from the 1964 report presented by the State Secretary of Education and Culture of RN (SEECRN) to USAID.

implemented and monitor the progress of those actions, these being the responsibility of USAID. In addition, the introductory text to the agreement, written by Francisco Calazans Fernandes, reveals the adoption of existing values at the time regarding education as a presumption for the improvement of the living conditions of the population and economic development of the region, understood as "progress". According to the Secretary of Education:

> Through more dynamic methods of administration, Rio Grande do Norte is promoting, at the moment, a take off in the direction of progress, with the execution of an integrated program of education. With this, the State realized the concept that education is an investment. (FERNADES, 1962, p. 1).

With this ideal of education as a form of individual social ascension and economic development of the society, at the beginning of the 1960s, training activities were outlined for teachers, and new curricula and materials for teaching and adult literacy were elaborated (cf. SEECRN/USAID, 1962)[5].

In 1965, an agreement was signed between the SEECRN and USAID, this time mediated by the Ministry of Education and the Supervisory Office for the Development of the Northeast (SUDENE). The creation of SUDENE, in 1959, was driven by social forces linked to the industrialization of the country that commanded the Brazilian economy. In 1965, after obtaining, through a donation from USAID, one billion and six-hundred thousand cruzeiros destined for the improvement and expansion of the basic and elementary education system, SUDENE served as the intermediary for the above-mentioned agreement with the SEECRN.

Among the priorities of the 1965 agreement were: the education and training of elementary education regents; the application and restoration of the elementary teaching schools; the construction of industrial gymnasiums; production of didactic material; and elaboration of a high school education program (SEECRN, 1965, p. 23). Although most of the priorities were related to elementary education and the training of teachers who worked at this level, those who elaborated the plan for the application of the USAID funds perceived that an expansion of the elementary school system would, after a few years, be accompanied by an increase in the demand for education at the high school level. Thus, the Secretary formed a group of specialists to elaborate:

> an educational program for the high school level to be submitted to the responsible Federal governmental entities and later to USAID/Brazil, the funding agency for the program. All in agreement with the preliminary understandings that are being maintained with the Ministry of Education and Culture, SUDENE, and USAID/Brazil (SEECRN, 1965, p. 13).

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[5] The body of our research was organized based on the following sources: textbooks; institutional agreements; reports of the SEECRN; reports of courses administered to elementary school teachers; plans and reports from the differential calculus course; plans, evaluations, daily class records, and activities used in teacher training courses; news items published in an internal university newsletter; newspaper stories; qualification exams for the UFRN School of Engineering and lists of exam results; photographs of elementary schools taken in the 1960s; and transcriptions of oral testimonies.

This citation, as well as some found in the Cooperative Program in Education from 1962, illustrates the limited autonomy of the SEECRN to make decisions regarding the educational policies they planned to implement.

The agreements described above made it possible to carry out, in January of 1965, the Training Course for Lay Teachers, in which the teacher-students studied, among other subjects, "Mathematics Administration and Learning", taught by Donzídia Pereira Pinto, who was a student of Pedagogy, at the time. The training was conducted in the form of a boarding school from January 11 to February 25 and was attended by a total of 73 teacher-students from different regions of the state.

The contents taught during the Training Course for Teachers included: counting, fundamental operations, expressions, fractions, decimal numbers, decimal and Roman number systems, notions of geometry, and decimal metric system. The planning for the mathematics classes refers to the use of various teaching materials, including the flannel board, fraction equivalent tables, circles, meter, ruler, copies of paper currency (bills), and others that indicated an effort to make available to the teacher different ways of teaching mathematics aside from pure lecturing.

In analyzing the documents from this course, we noted the presence of two trends in mathematics education in the classes taught by Ms. Donzídia's. On the one hand, we found passages in the planning and activities that employ arguments related to what Fiorentini (1995) has called a classic formalist trend, didactically characterized by "precise memorization and reproduction of the reasoning and procedures dictated by the teacher or the books" (FIORENTINI, 1995, p. 7). On the other hand, also present in her teaching practice were elements that are characteristics of what Fiorentini called the empirical-sensualist trend, which dislocates the pedagogical question to the feelings and psychological development of the student.

During the course, the participants received various visitors, among them the accountant and cabinet head of SEECRN and the general administrative chief of USAID. The closing ceremony of the course included the participation of the State Governor, Aluízio Alves (1921-2006), and an USAID representative[6]. One can note here the control of USAID over the training of these teachers.

It was not only elementary education that was being influenced by the agreements with USAID, as in 1966, when the Mathematics Institute of the University of Rio Grande do Norte (IMURN) was being created, another agreement was signed, this time between the Federal University of Rio Grande do Norte (UFRN) and SUDENE. The introduction of Modern Mathematics into the schools was among the objectives of this agreement, which anticipated the professional improvement of teaching staff in the mathematics sector through courses in Mathematical Analysis and Modern Algebra, as well as conditions to develop and administer the "Initiation to Mathematics Course" - which included Modern Mathematics – aimed at probable future university students coming out of what was then the gymnasium cycle. The agreement also foresaw the purchase of books for the IMURN. In our research of the libraries at UFRN, we found books acquired with funds resulting from that agreement, and the quantity of books that address mathematical concepts based on algebraic structures is notable, including the complete collection from the Boubarki group. The purchase of these books was guided by professors Antonio Mario Sette, of the Federal University of Pernambuco, and Nelson de Almeida Braga, of the Mathematics

[6] The name of this representative does not appear on the reports.

Institute of the Federal University of Ceará, who were contracted to teach the Modern Algebra and Mathematical Analysis courses to the professors at IMURN.

Documents show us that in 1966, set theory did not compose part of the contents of the Infinitesimal Calculus I course, but that in 1967, set theory was included in the course, indicating the effects of the courses financed by SUDENE for professors at IMURN.

The changes that took place at UFRN, initiated by the agreement described above, also led to changes at the high school level. The qualification exams for faculty at the School of Engineering show that, in 1966, the contents candidates were expected to know, and which would presumably be taught in high school, were: logarithmic equations, combinational analysis, matrixes, operations with polynomials, equations of circumference and straight lines, area of a triangle, trigonometry, derivative, arithmetic progression, baricenter, function, volume of solids of revolution, sum of angles of convex polyhedrons, Pythagoras' Theory, vectors, and surface area of polyhedrons. It appears that not all these contents were learned in the high school, as the highest grade on that test, in 1966, was 6.4, and 47 of the 119 candidates scored below 3.0.

As we can see, the contents proposed by the first modernizing movement, such as function and derivative, were present in 1966 in the evaluations for entry into the Engineering School, and would thus presumably be included, at least officially, in the high school curriculum. Nevertheless, the concepts proposed by the Modern Mathematics Movement (MMM), set theory in particular, did not yet compose part of the curriculum at this academic level.

Measures were already being taken in 1966, however, to guarantee the dissemination of MMM in Rio Grande do Norte (RN). In that year, the Center for the Teaching of Science of the Northeast (CECINE), together with SUDENE, opened registration for a course in modern mathematics that was held in Recife, Pernambuco, from 1967 to 1968. The person who was selected among the candidates from RN to receive a scholarship to participate in the course, offered by SUDENE, was Evaldo Rodrigues de Carvalho, a teacher at Atheneu High School at the time. According to an interview granted by Mr. Carvalho on April 14, 2006, he learned of the course through his friend Aldo Barbosa, who was a SUDENE representative in the state. Those who had been awarded scholarships assumed commitments to proffer high school teacher education courses upon their return to their states of origin. In Rio Grande do Norte, these courses began to be offered in 1969 in the Capital and in the interior of the state.

Another SUDENE/USAID/SEECRN agreement, in collaboration with the National Institute of Education and Research (INEP), made possible a course for normal school teachers in the state, administered January 4 – 26, 1971, and attended by 130 teacher-students. The objective of the course, in addition to professional improvement[7] for elementary school teachers, was the reformulation of the curricula in the different courses in the Normal Schools.

Among the courses taught were Mathematics and Didactics of Mathematics. The contents taught in the latter included set theory, set of the natural and rational numbers and their operations, decimal metric system, perimeter, area, volume, geometric solids, planifications, classification of flat figures, problem solving, and evaluation in mathematics; in other words, the Modern Mathematics Movement was already present in these courses.

[7] We are maintaining the term used in the document analyzed.

In the bibliography for this course, mathematics textbooks are found that focus on modern mathematics, printed in the second half of the 1960s, including two books by Dienes about the teaching of mathematics in elementary school, one by Jeromes Bruner about general education, and another by Hans Schiefele about programmed teaching. Programmed teaching is characteristic of the technicist trend that occupied a prominent place in Brazilian education towards the end of the 1960s and 1970s.

The program of the mathematics course emphasized how important it was for elementary school teachers to capacitate their students in the rigor of logical reasoning and clear, precise language, as "much rigor is needed in the terminology and conceptualization that must be taught according to the more modern theories" (GUIMARÃES, 1971, p. 123). The contents taught included: set theory; number systems in different bases; properties of inverse operations; sentence structures; factors and multiples; divisibility criteria; factoring; measures; analysis of form factor p/q as an element in a system, as division, as a fraction, as a ratio, and by classes of equivalency; and geometry from a set theory perspective.

The "Additional Reading List" suggests books such as Baker's *Philosophy of Mathematics*; Hogben's *Mathematics for the Million*; *The Magic of Numbers*, by Karlson; and *Mathematics and Imagination*, by Kasner and Newman. In the classes themselves, however, only books about modern mathematics were used, such as *Modern Mathematics*, by Dienes, *Modern Mathematics Course*, by Osvaldo Sangiorge, and *Mathematics for the Modern School*, by Scipione, all books that represented the so-called technicist-formalist trend.

The official change in the mathematics curriculum, with the inclusion of MMM in the first four grades, occurred only in 1973 with the publication of the curriculum guide for this grade level. The person appointed to coordinate the part relative to the teaching of mathematics was Maria Salonilde Ferreira, who in 1971, formed part of the group responsible for the Didactic of Mathematics course mentioned above.

The inclusion of MMM in schools in Brazil in the 1960s took place through various paths, among them, the creation of study groups in various states with the objective of disseminating the ideas of MMM among teachers throughout Brazil, including the states of São Paulo, Paraná, and Rio Grande do Sul.

In Rio Grande do Norte, however, the insertion of MMM did not occur through study groups of teachers interested in disseminating the ideas of the movement, but rather through continuing education courses for teachers conceptualized and financed by agreements with USAID. The gradual insertion of MMM, defined by this international agency, was systematic and occurred at all levels of teaching. During these courses, USAID and SUDENE sought to maintain control of the continuing education through site visits and reports that were required to be submitted to them. Thus, we cannot attribute these changes only to the transformation in the science of mathematics that began in the 1940s, such as the studies of the Boubarki group, but also to political and economic issues that were internal as well as external to Brazil.

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