



Afro do Amaral Fontoura: the systematization of arithmetic knowledge for the Guanabara teacher training courses¹

Afro do Amaral Fontoura: a sistematização de saberes aritméticos para os cursos de formação de professores da Guanabara (1960-1974)

Afro do Amaral Fontoura: la sistematización del conocimiento aritmético para los cursos de formación de profesores de Guanabara

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Abstract

The article investigates whether the teacher Afro do Amaral Fontoura can be considered an expert in school mathematics in times of Escola Nova and investigates the knowledge he systematized in the primary education program of the State of Guanabara, published in 1962. The methodological theoretical framework uses the following concepts: professional knowledge, mathematics to teach, mathematics for teaching and the expert. The study is guided by the following questions: what traces allow us to affirm that Afro do Amaral Fontoura was an expert for the teacher training course in the teaching of mathematics, from 1950 to 1970, in the initial grades, when proposing *Escolanovistic* ideas? What knowledge was systematized and objectified by Fontoura throughout the Arithmetic Program of the State of Guanabara (1962)? To answer these questions, based on sources found at the Higher Institute of Education in Rio de Janeiro, we found that Fontoura falls into the category of educational expert in the state of Guanabara, so that it enabled the systematization of arithmetic knowledge approached throughout practical life situations.

Keywords: Expert. Systematization of knowledge. Afro do Amaral Fontoura.

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Resumo

O artigo investiga se o professor Afro do Amaral Fontoura pode ser considerado um *expert* da matemática escolar em tempos de Escola Nova, bem como os saberes por ele sistematizados no Programa do ensino primário do estado da Guanabara, publicado em 1962. O referencial teórico metodológico utiliza os seguintes conceitos: saberes profissionais, matemática *para* ensinar, matemática *a* ensinar e *expert*. O estudo é norteado pelas questões a seguir: que vestígios nos possibilitam afirmar que Afro do Amaral Fontoura foi um *expert* para o curso de formação de professores no ensino da matemática, no período de 1950 a 1970, nas séries iniciais, ao propor ideias escolanovistas? Que saberes foram sistematizados e objetivados por Fontoura por meio do Programa de Aritmética do Estado da Guanabara (1961)? Buscando responder a essas indagações, com base em fontes encontradas no Instituto Superior de Educação do Rio de Janeiro, verificamos que Fontoura se enquadra na categoria de *expert* da educação no Estado da Guanabara, de modo que possibilitou a sistematização de saberes aritméticos abordados por meio de situações da vida prática.

Palavras-chave: *Expert*. Sistematização de saberes. Afro do Amaral Fontoura.

Resumen

El artículo investiga si el profesor Afro do Amaral Fontoura puede considerarse un experto en matemáticas escolares en tiempos de Escola Nova y el conocimiento que sistematizó en el programa de educación primaria del estado de Guanabara, publicado en 1962. El marco teórico metodológico utiliza lo siguiente conceptos: *conocimiento profesional*, *matemáticas para enseñar*, *matemáticas a enseñar* y *expert*. El estudio se guía por las siguientes preguntas: ¿qué huellas nos permiten afirmar que Afro do Amaral Fontoura fue un experto en el curso de formación docente en la enseñanza de las matemáticas, en el período de 1950 a 1970, en los grados iniciales, al proponer ideas de Escolovan? ¿Qué conocimiento fue sistematizado y objetivado por Fontoura a través del Programa Aritmético del Estado de Guanabara (1962)? Buscando responder a estas preguntas, con base en las fuentes encontradas en el Instituto Superior de Educación en Río de Janeiro, encontramos que Fontoura cae en la categoría de experto en educación en el estado de Guanabara, por lo que permitió la sistematización del conocimiento aritmético abordado a través de situaciones prácticas de la vida.

Palabras clave: *Expert*. Sistematización del conocimiento. Afro do Amaral Fontoura.

Introduction

This article was produced based on the idea that the historical study of the constitution of knowledge that involves the training of a professional teacher can elucidate how the reference teaching fundamental representations were produced. Accordingly, Valente (2017, p. 202) questions which professional knowledge should be present in this aforementioned training. It is also worth highlighting the need to think of the importance of experts in order to define, produce, and disseminate this knowledge, using their works, courses, etc. In other words, this work aims at analyzing, in a historical perspective, the constitution of knowledge involved in teacher education. According to Valente (2015), this knowledge is considered, under new conceptual bases, as arising from “objectified knowledge”, that is, from those that institutionalize over time, becoming explicit, formalized, transmitted, and intentionally included in teacher education.

We emphasize that, in the sphere of the research interested in analyzing the professional formation of teachers, the discussion on knowledge² is something fundamental, as it is important to comprehend the movements in order to produce the professional knowledge of the teacher who teaches mathematics.

Thus, this study proposes to discuss the expertise of Afro Amaral Fontoura in Education and the production of professional knowledge, both issues will be treated as categories that will assist in the analysis.

Considering the reflections of Hofstetter, Schneuwly, Freymond (2017), we can think of expertise as an action of the specialist in Education who works within an institution. Perceived by this scope, we are discussing the professional responsible for aligning the knowledge of the profession with that of the discipline. In practice, the specialist, also called an expert, is called upon by the State to deal with the resolution of technical problems, categorizing them based on the appropriation of the ideas of Hofstetter et al (2017). Therefore, requirements are used, such as: being recognized by peers for their expertise; appropriation of educational concepts that were disseminated at an international level; being summoned by the State to solve technical problems; systematization of knowledge in the educational field, as well as its dissemination.

In Rio de Janeiro, França (2016) identified that Afro do Amaral Fontoura was the author of the Arithmetic Program for the State of Guanabara³, in the year of 1961. We believe that the analysis of this document may allow the understanding of changes in what had been previously established. This process requires the comparison of the aforementioned Program with Afro's books, intended for teachers and students, among other members of the educational scenario. Therefore, this article aims to verify whether Afro do Amaral Fontoura can be classified as an expert, and how our work is centered on the systematization of knowledge. We also intend to problematize, through the Program, the role of Fontoura in the systematization of mathematics for teaching and teacher training, that is, the emergence, by Afro's hands, of a new mathematics to teach and a new mathematics for teaching.

It is necessary to add that allied to a documental analysis, the historiography we have been composing seeks to understand the movements of historical constitution of professional teaching knowledge, knowledge to teach and knowledge for teaching (HOFSTETTER; SCHNEUWLY,

² We differentiate wisdom from knowledge. “The former is more linked to subjectivity, to the experiences lived by the subject, implicit means of action, of reasoning; the latter is the result of systematization, of a more consensual character, subject to generalization and objectification, an institutionalized cultural product, whose purpose is the systematization and organization of certain wisdom in order to facilitate its communication” (VALENTE, 2018, p. 381).

³ In 1960, with the foundation of Brasília, the federal capital was transferred there and, with it, a new conformation to the space of the city of Rio de Janeiro, giving rise to a new federative structure: the State of Guanabara (FRANÇA; VILLELA, 2015).

2017). However, whenever we investigate the knowledge inherent to the teaching profession and the training of teachers who teach mathematics, we deploy two specific theoretical hypotheses: mathematics to teach and mathematics for teaching. The former refers to the object taught by the teacher and the latter refers to the set of tools the teacher must have at his or her disposal to put into practice the mathematics to teach. Both are in close articulation with one another, but it is the latter that constitutes the professional knowledge of the teachers who teach mathematics (BERTINI, MORAIS, VALENTE, 2017). Thus, we consider mathematics to teach and for teaching as products of a scientific process, derived from research, research group dialogues, appropriation, reflection, creativity, and theoretical synthesis. Currently, it is these hypotheses/categories that support the historical studies that seek to unveil the role of mathematics in the process of academic professionalization of teachers who teach mathematics.

Hence, this work is guided by the following question: what evidence allow us to state that Afro do Amaral Fontoura was an expert for the mathematics teacher training course in the early grades, from 1950 to 1970, after he proposed *escolanovistic*⁴ ideas? What knowledge was systematized and objectified by Fontoura through the Arithmetic Program of the State of Guanabara⁵?

Maciel (2019) states that there are knowledges that arise from teaching experiences, that are systematized and conveyed in pedagogical manuals, through counseling. For this reason, we bring forth manuals authored by Fontoura, expecting to help capture the knowledge systematized in the Program, given that ordering and objectification both occur through levels or stages, that is, they are historical processes.

Thus, the teacher guidelines found in the manuals produced by Fontoura can be of assistance in the analysis of the process of systematization, objectification, and institutionalization of the knowledge adopted by the Program of the State of Guanabara. Therefore, to answer the questions, we use Valente (2018), who proposes three steps to explain the phenomenon of converting knowledge into science, or even its objectification. As we pointed out earlier, we consider wisdom to be something subjective and embodied by someone, and knowledge to be something disembodied, intelligible to anyone, and therefore objectified. Valente (2018, p.381) denominated the study steps to the process of transforming wisdom into knowledge as “the recompilation of teaching experiences, comparative analysis of teachers’ wisdom, and the systematization and use of wisdom as knowledge”. To answer the question “what knowledge was objectified by Fontoura in the Program of the State of Guanabara?” we will perform a methodological exercise analyzing this process using the steps proposed by Valente (2018). For this present study, we will consider the teachers of primary education of the 1960s. França and Villela (2015) state that most these teachers have worked in public school systems, in the recently implemented modality of three shifts, and with weekly rotations to meet with the demands for vacancies. During this period, the government did not hold a pedagogical control over the teachers, and this gave them autonomy to prepare their own lesson plans, since the government’s emphasis was to increase the number of openings and organize and restructure the new federative unit. Our hypothesis is based on the idea that before the State of Guanabara was created, teachers from the State of Rio de Janeiro, as it was known, who had not yet elaborated their own teaching program, used the Primary Teacher Library”, published by the Ministry of Education and Culture in the João Goulart government, as a teaching guide. Therefore, we believe that these teachers had been using Fontoura’s material for a long time.

⁴ The school should offer opportunities for the student to develop their own knowledge from observation and experimentation, “then, teaching would associate ‘seeing’ with ‘doing’” (VIDAL, 2011, p. 498)

⁵ The Primary Education Program of the State of Guanabara is a reprint of a textbook, vol. 1, found in the Biblioteca Didática Brasileira collection, of authorship of Afro do Amaral Fontoura. The program is from 1961, however we are analyzing the sixth edition, from 1965, unaware of any further modification (FRANÇA, 2016, p. 218).

1. Fontoura's prestige amongst his peers

Fontoura was born (1912 – 1987) in the province of Rio de Janeiro. He graduated⁶ from the University of Brazil⁷ with a degree in Philosophy, back when national capital was in Rio de Janeiro. He later specialized in Sociology in the United States of America (FRANÇA; DOMINGUES, 2018).

We verified that Fontoura, having graduated in magisterium, worked as a teacher in several schools, starting his teaching career at the age of 17. After graduation, he taught at major state colleges⁸.

We understand that Fontoura's multifaceted profile, which allowed him to articulate knowledge from various fields, as well as to establish networks and connections originated by the surveys and positions he occupied, may have attributed an identity to his professional life. We can verify Fontoura's varied activities by consulting sources such as *Hemeroteca Digital*; much of the news linked to the Brazilian Association of Education (ABE)⁹; *Diário de Notícias* (1960) – “ABE opens enrollment for the Psychology of Learning course”; *O Fluminense* (1964) – “Teaching courses 'School Institutions' and 'Directed Studies' promoted by the Department of Education for Teachers”.

In order to investigate Fontoura's process of constituting knowledge, we began the movement of recompiling systematized teaching experiences, that is, we collected and selected information organized in manuals, books, etc., which could evidence teachers' pedagogical work proposals.

The recompilation of teaching experiences, as we are understanding this procedure, involves the selection and separation of information reported in pedagogical journals; organized in textbooks and teaching manuals; standardized in teaching laws; contained in personal documentation of students and teachers; materialized in pedagogical devices for teaching, among other types of documentation capable of documenting information about the pedagogical work of teachers (VALENTE, 2019, p.380).

⁶ Despite the great amount of research, we could not find the exact date of his graduation. We know he went to university after completing the regular course. Researching at *Hemeroteca*, we found his work in universities from 1950 onwards. He probably completed his degree in Philosophy in the mid-1940s.

⁷ The University of Brazil, located in Rio de Janeiro (Federal District) was created by law Nº 452 of July 5, 1937, which brought together schools or universities, institutions, and the National Museum. Later, with the University Reform of 1968, it became the Federal University of Rio de Janeiro (FAVERO, 2006, p. 18; 26-27).

⁸ We found news about his performance at the Pontifical Catholic University of Rio de Janeiro (PUC/RJ) in 1950 and 1951; at the State University of Rio de Janeiro (UERJ) in 1956, where he received the Marshal Hermes medal as a professor at the institution; at Universidade Santa Úrsula (USU); at the Faculty of Social Service of the Federal District; and at the Army's Major Command School (ECEME). He also held the presidency of the Brazilian Association of Normal Schools in the 1960s, when he promoted several events, in addition to chairing the 1st Brazilian Congress of Normal Education, held in Rio de Janeiro (FRANÇA; DOMINGUES, 2018).

⁹ Meetings to discuss the draft Law of Guidelines and Bases (LDB) were registered at ABE. From these meetings, in which Fontoura participated in the position of advisor to the Committee on Education and Culture of the Chamber of Deputies, the author prepared an opinion that, later, resulted in the preparation of the book “Guidelines and Bases of National Education”.

We began by selecting some of Fontoura¹⁰'s work. We immediately observed the diversity in themes, also found in other authors of pedagogical ¹¹manuals, which demonstrates a broad, general education common to this type of author, who commonly presents multipurpose experiences as a teacher.

In a quick bibliographical review, we verified that Fontoura is considered an author of great dissemination and coverage by different researchers: [...] Fontoura is the protagonist of a large didactic production that will be used for several years to come in teacher education” (SCHNEIDER; STENTZLER, 2011, p. 9).

We believe that the various manuals produced by Fontoura, as a result of the appropriation of the scientific literature of the time and of his teaching experiences, “became subsidiary of the mandatory readings recommended for those of regular schools and, therefore, exerted a notable pedagogical influence on the normal teaching of Maringá, and were considered highly recommended literature between the 50s and 60s of the 20th century” (VIEIRA; MACIEL, 2012, p.1).

We can say that despite Fontoura having been one of the most expressive authors of that period, disseminating the principles of *Escola Nova* through publications by Editora Aurora, with collections of manuals aimed at teacher training, produced in several editions and large print runs, and presenting a speech which exposed concerns with the training of teachers, there is a scarcity of works on the repercussion of his methodological practices in teacher training courses and his name is rarely remembered in theses and dissertations.

The largest reference we found, without a doubt, is related to his intense performance in the production of pedagogical manuals for teachers between the 1940s and 1970s. This production was favored by the emergence of the Brazilian publishing industry, benefiting the nationalization of books used in schools. Thus, instead of adopting foreign manuals, as had happened for decades in Brazil, the most referred texts and authors are those from national manuals”. And among the national authors, whose manuals had notable dissemination, we have Afro do Amaral Fontoura (MACIEL; VIEIRA; SOUZA, 2012, p. 239).

In addition to his work as a teacher and as author of books, Fontoura was chosen to be responsible for the Brazilian Didactic Library of Editora Aurora¹².

Based on the aforementioned facts, we see an evidence of Fontoura's expertise in the teacher training courses and his concern in solving the realization of the *Escola Nova's* ideas in his works, emphasizing the operationalization of this *Escola Nova* principle. Therefore, it was possible to verify the acknowledgments of his professional performance,

¹⁰ “Aspects of Brazilian Rural Life”, “Brazilian Encyclopedic Dictionary”, “General Didactics”, “First Grade Special Didactics”, “Civic Education and Civic Calendar”, “Fundamentals of Education”, “Introduction to Sociology”, “Introduction to Social Service”, “Test Manual”, “Primary Education Methodology”, “The Drama in the Countryside”, “Planning in Primary Education”, “Ruralism: Base of the National Economy”, “Sociology Program”, “Practice Teaching”, “General Psychology”, “Educational Sociology”.

¹¹ By “pedagogical manual” we mean printed material such as books, textbooks or even a set of gathered texts, generally organized by an author, a group of people, or an institution. Its purpose is to guide and mediate the practice or craft of teaching around a knowledge or a set of knowledge, such as elementary mathematical knowledge (REPOSITÓRIO UFSC).

¹² The Brazilian Didactic Library collection was organized by Afro do Amaral Fontoura. Its authors were teachers of regular schools, acknowledged by future teachers, facilitating the implementation of New School ideas contained in this collection. It was organized into two series: Series I (The living school); Series II (Brazilian Education Law); (Textbooks for children); Series IV how to learn by playing (didactic material). (FONTOURA, 1960). Further details see FRANÇA (2016).

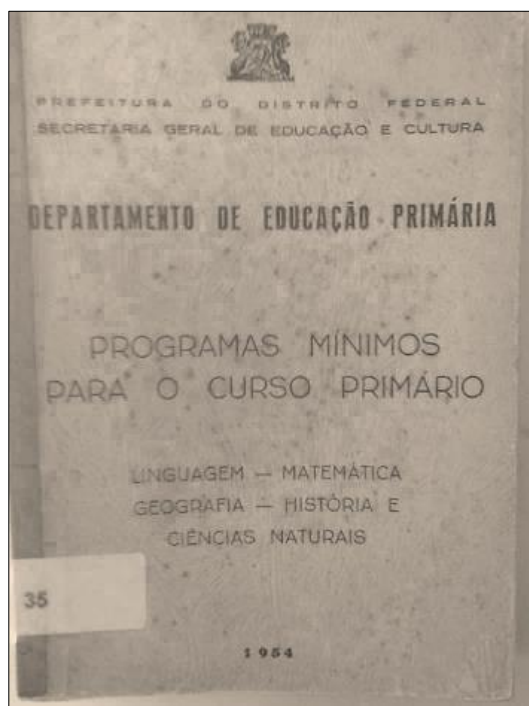
as well as of the evidence of his expertise in the field of education. We can say that the dissemination and use of the collection of the Brazilian Didactic Library was possibly driven by the need to standardize education in the new State of Guanabara. Hence, to materialize this new organization, Fontoura was summoned to become responsible for the new educational guidelines. This choice was certainly motivated by Fontoura's expertise and wide dissemination in the field.

During the elaboration of our documental *corpus* in the initial stage, *the recompilation of teaching experiences*, we also selected the Minimum Program for primary education of the Federal District, published in 1954, in order to compare it with the program developed by Fontoura.

It is necessary to remember that, at the time of publication, education was governed by the guidelines of the Capanema Reform¹³.

A question to be considered is: "how to implement these changes prescribed by Law?". We found at the Brazilian Education Memorial Center (CMEB) a 1954 publication of the Minimum Program for Primary Education of the Federal District, enacted in 1952.

Figure 1: cover of the Minimum Program for Primary Education, 1954



Source: CMEB

With the document in hand, we noticed that the Mathematics Program was prepared by Irene de Albuquerque¹⁴. In it there is the systematization of the minimum contents for primary education. It is an attempt to clarify the new perspective of education for teachers. It often

¹³ Title that was given to the changes proposed to the Brazilian educational system between 1942 and 1946, led by Capanema: such decree-laws became known as Organic Laws of Education. One of these decrees, Decree-Law No. 8.529, of January 2, 1946, demonstrated its influences through its escolanovistic ideas, as the concern with the integral education of the child is noticeable, and not only with reading and writing and with the didactic-methodological guidelines. Such concerns are still considered insufficient when relating school to life, learning through action, and taking into account the child's development for school organization.

¹⁴ Active persona in the escolanovistic ideals. She was a fulltime professor of Teaching Practices in the Normal Course at the Institute of Education of Rio de Janeiro, and of Methodology in the Improvement Courses at INEP; author of textbooks for future teachers. (See FRANÇA, VILLELA, 2015).

implies the need for new practices. It does not provide details, however, it offers general guidelines as to methodology, perhaps because it aims to establish a minimum curriculum.

To achieve such a scope (sic), here are some general suggestions. [...] Unify the calculation processes, preventing the student from having to undergo constant readjustments when changing teachers. Use, for each case, the most efficient, most intuitive, most economical, or least error-prone (sic) processes. [...] Grade the difficulties, teach a little at a time. [...] Provide sufficient absorption of learning through varied games, making each exercise preceded by an oral recapitulation of the knowledge that needs to be absorbed (DISTRITO FEDERAL, 1954, p. 59).

It is worth mentioning that the analysis performed did not detect this representation in mathematics for teaching. Apparently, the marks of the Program were given by the bias of child development and by an adaptation to the children's interests, as well as the introduction or distribution of minimum content between grades.

It is worth noting that although the Program's creator was one of the great authors of didactic manuals, disclosing new methodologies for arithmetic, in the Program's proposals, she acted in a reserved manner. There is no emphasis given on suggestions for activities using games and other materials as support. We can infer that the author preferred not to bring the suggestions to the Program, although these activities were already known by the teachers through the textbooks of the time. Perhaps she assumed this more neutral position to avoid exhausting debates that would jeopardize the Program's implementation, or even hinder the continuity of dialogue and partnership with teachers. Thus, the author possibly decided not to assume rather radical positions, choosing not to prescribe how to materialize the *escolanovistic* ideas in the classroom.

However, there was a need of official methodological guidance for teachers. How to approach mathematics and teach it in the active method¹⁵? That is, which mathematics for teaching? How to articulate mathematics for teaching with the mathematics to teach in more practical situations? That is, to take care of education based on the child's interests and based on their actions and development. How to achieve this through observation, reflection and experimentation, respecting individualities and seeking an improvement in the action itself? We think that Fontoura, in his manuals, had already been rehearsing the systematization of mathematics to teach in this perspective.

Therefore, we can infer, at the end of our first stage, that there is consensus in the materials that have been studied. However, the Program developed by Fontoura had explicit guidelines for teachers, as we will see next.

2. The Systematized knowledge: mathematics to teach and mathematics for teaching in the Primary Education Program of the State of Guanabara

Based on the considerations elaborated for the mathematics to teach and the mathematics for teaching¹⁶, we take the opportunity to resume the research proposal on this knowledge systematized by Amaral Fontoura in the Program of Guanabara, in 1962.

¹⁵ According to Souza (2009, p. 189) “[...] students are led to learn by observing, researching, asking, working, building, thinking, and solving problematic situations that are presented to them, whether in relation to an environment of things, objects, and practical actions, or through symbolic actions in situations of social and moral sense”.

¹⁶ Following the same idea as before, *mathematics to teach* is "better linked to the disciplinary field, better linked to mathematics", and *mathematics for teaching* is "articulated to the teaching profession." (BERTINI; MORAIS; VALENTE, 2017, p. 9).

Hence, we return to questions such as: which knowledge was systematized by Fontoura in the Arithmetic Program of the State of Guanabara in 1962¹⁷?; what new official knowledge are these, instituted from the actions of this character?; is it possible to make a counterpoint between this knowledge and those that were disseminated previously?; What new mathematics for teaching, contained in the Program, was systematized to train teachers?

Note that in the first stage of the process, in which we observed the transformations of wisdom into knowledge, entitled *recompilation of teaching experiences*, we collected the guidelines given to teachers through the manuals produced by Fontoura and other materials, as mentioned before, producing our documental *corpus*.

Then, we attempted to characterize similarities through the *comparative analysis of teachers' wisdom* with our selected documental *corpus*, which are related to productions of Fontoura, such as the Brazilian Didactic Library, by Editora Aurora; the Primary Teacher's Library; the Teacher's Library; the Minimum Program (1954), among others works that deal with teaching in the early school years, aimed at guiding teachers. Thus, we sought to verify whether this wisdom brought any convergent information to teachers, and if the proposed guidelines matched.

The *comparative analysis of teachers' wisdom* aims at promoting a new selection within the scope of the inventory elaborated before, with the assembly of the collection of wisdom dispersed at a given time in the history of school education. This selection involves a new inventory, now composed by the separation of information on teaching experiences that are convergent from a perspective of orientation for a teacher's work. Through this research procedure, it is possible to reveal trends in the settlement of proposals and construction of pedagogical consensus on what the teacher must know to carry out his/her office. (VALENTE, 2018, p. 381).

For the last procedure of systematization and analysis of the use of wisdom as knowledge, we sought to analyze the Program of Guanabara, comparing Fontoura's work with the previous Minimum Program (1954), from the perspective of the conceiving professional knowledge, and questioning which knowledge were systematized and objectified by Fontoura through the Arithmetic Program of the State of Guanabara. The objective is to verify what transformations occurred in the mathematics to teach and in the mathematics for teaching, comparing what was officially available and what was systematized by Fontoura in the Guanabara Program.

The procedure of systematization and analysis of the use of wisdom as knowledge represents the last stage of the path that transforms information on teaching experiences into professional teacher knowledge. Systematization and analysis of use are procedures performed concurrently. Thus, it is up to the researcher or group of researchers to organize, from the previous stage, an asepis of

¹⁷ For this analysis, we used the 6th edition of the Program of the State of Guanabara of 1965

subjective and conjunctural elements of the pedagogical consensus, so that the wisdom can be seen as something capable of being generalized and used, that is, so that it can be seen as knowledge. On the other hand, the analysis includes, jointly, the verification in normative and/or didactic-pedagogical instances of the occurrence of use of the elements systematized by the researcher (VALENTE, 2018, p. 381).

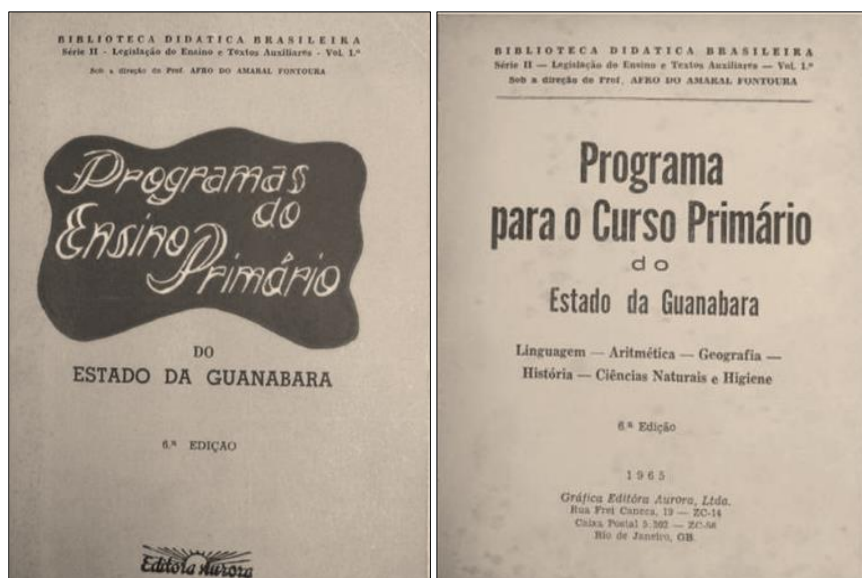
As mentioned before, the Program is a reprint of the Brazilian Didactic Library collection; for this reason, it is interesting to compare the Program with Fontoura's work that provide guidance in the teaching of mathematics. Thus, we collect guidelines for teachers in the volumes of this collection, in the previous Program, and in other Fontoura's manuals.

For this first Program, Fontoura chose to republish a pedagogical manual that was very popular among primary teachers at the time - *The State of Guanabara Primary Education Program* -, which was already the reissue of *the Primary Education Program*, Volume I, Series II - Teaching legislation and auxiliary text (1962), from the Brazilian Didactic Library collection, organized by himself.

In the introduction of the Program, Fontoura announces the implantation of the Guanabara Renovated School, in accordance with the regulations imposed by LDB n° 4.024/1961 and with the advances in pedagogy and psychology.

The State of Guanabara is to be congratulated with the revolution that now begins in its primary education. Peaceful and constructive revolution aimed at bringing education in the former capital of the Republic up to date with Pedagogical Sciences. In fact, for no less than 50 or 60 years, the great masters of Pedagogy have been demonstrating the absurdity of demanding the same results from all students (GB, 1965, p. 13).

Figure 2 – Cover and back cover of the State of Guanabara Primary Course Program (1965).



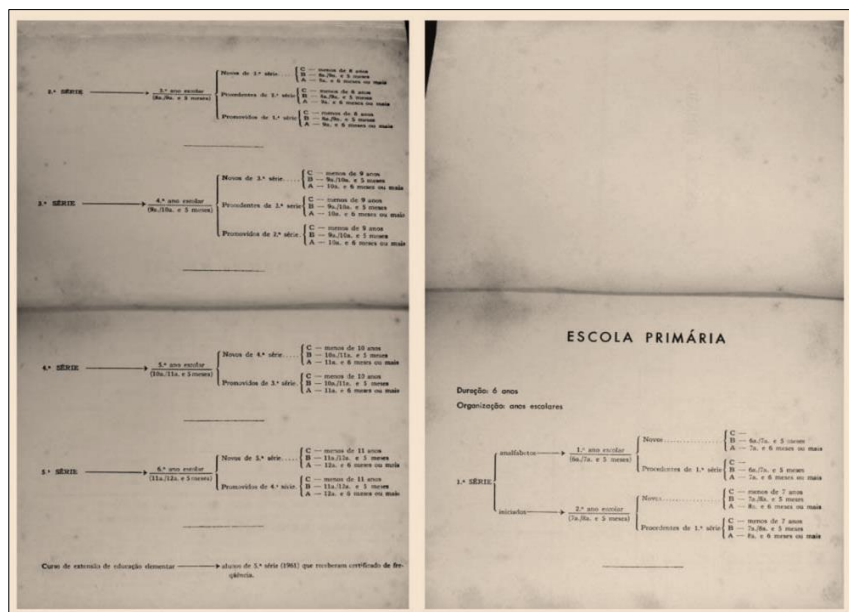
Source: Repository UFSC.

In the elaboration of the Program, an introduction written by Fontoura was added, an organizational chart elucidating the new distribution of the primary course, with six years of schooling, distributed amongst six grades. The 1st grade was intended for illiterate students, so the literate ones were already allocated to the 2nd grade. The general objectives were accompanied by suggested activities for Language, Arithmetic, Geography, History, Natural Sciences and Hygiene.

Already in the introduction, there are signs of the systematization of organizational knowledge, perhaps resulting from the influence of scientific psychology, already systematized by Fontoura in the Manual of Tests¹⁸, from 1960, which reflects the period of entry of pedagogical and psychological tests in schools. It is composed of a first part, which discusses the theory of *Escola Nova*, and other ones responsible for prescribing activities and guiding the teacher's practice. In another segment of the Program, the author provides theoretical explanations on the tests and, later, presents methodological prescriptions for their application. In addition, it indicates ways to classify students based on the parameters produced (FRANÇA, 2016). In this Manual, Fontoura (1960, p. 3) argues: “We believe that, equally, in all Brazilian states, the verification of achievement of millions of students in primary schools is done through tests”, announcing the need for the application of this type of instrument, as he understands it as essential to the assessment of learning, due to its practicality and objectivity.

Fontoura reproduces these ideas in the introduction of the Program when he justifies the new structure of series and classes. We can say that the Program systematized and aimed at knowledge related to planning, evaluation, methods, and techniques related to the internal organization of the classroom.

Figure 3 – Classification of students by grade.



Source: The Guanabara Primary Course Program (1962).

¹⁸ See FRANÇA (2016).

In his manual, *Methodology of Primary Education*¹⁹, after the introduction, which discusses the theory of Escola Nova, Fontoura begins a section in which there are prescriptions for activities and guidelines for teaching practice, structured through chapters that are divided according to following topics: Language Program, Mathematics Program, History Program, Geography Program, and Science and Hygiene Program. It is worth noting that each topic has its general objectives, methodological guidelines, minimum knowledge that each student should have at the end of each grade and examples of didactic activities by content.

The Fontoura Mathematics Program structures its recommendations by presenting the following: I - general objectives; II - methodological guidelines; III - problem solving; IV – minimum knowledge that must be obtained by the students in each of the six grades. Then, another session for each grade begins with the following titles: minimum knowledge and skills to be acquired; didactic examples and suggestions; general notions; concepts and approaches distributed by series.

Figure 4 – Example of student classification.

Source: Primary Education Program of the State of Guanabara (1962).

In the methodological guidelines of the Primary Education Program of the State of Guanabara (1962) its foundation in the *Escolanovistic* ideology is understandable as follows:

To meet the exposed objectives, mathematics education should be essentially practical, progressive, utilitarian, and pleasant. It is necessary to eliminate all wisdom without real application, which would unnecessarily overload the schoolwork, to the detriment of its efficiency. On the other hand, it is necessary to obtain the perfect mastery of usable wisdom and skills (1962, p. 98).

¹⁹ It contains 449 pages, with dimensions of 180mm by 135mm. The manual is subdivided into five parts: Language Methodology, Mathematics Methodology, Social Sciences Methodology, Natural Sciences Methodology, and Drawing and Handicrafts Methodology. Different distribution than the Guanabara Program. (FRANÇA, 2016).

Table 1 – Synthesis of the Primary Education Program (Arithmetic) of 1965.

| Year | Topics Covered |
|--|---|
| 1st school year (illiterate new students) | Literacy and counting. |
| 2 nd school year (formerly known as 1 st grade) | Regarding wisdom and skills. Exemplification and teaching suggestions. General notions (right, left, big, small, object comparison). Priority in the idea of counting; grouping the elementary addition and subtraction operations addressed concomitantly in tens, with results up to 99. Notion of zero as absence, discussed later, when the concept of ten is explored. Solving problems related to practical life. Legal system of measuring units (calendar and time). Mental calculation. |
| 3 rd school year (formerly known as 2 nd grade) | Review of prior knowledge in counting; generalization of the notions of even and odd numbers; counting to 1000. Mental calculation techniques; addition up to 3 installments and subtraction as a reverse operation; multiplication as an abbreviated sum (product up to 9000); objective idea of division (quotient up to 9). Generalization of the notion of fraction. Reading and writing fractions with denominators 2, 3, 4, 5, 6, 7, 8, 9. Different types of sequences. Monetary system. Legal system of measuring units. Geometry (solids). |
| 4 th school year (formerly known as 3 rd grade) | General overview. Count to the million. Multiplication by multipliers up to 3 digits. Long divisions with dividers up to 2 digits. Fractions and mixed numbers. Addition and subtraction of fractions. Operations with decimal numbers. Prisms and pyramids. Simple geometric figures. Legal system of measuring units. Perimeter notion. Mental calculation. |
| 5 th school year (formerly known as 4 th grade) | General overview. Count to units of billions. Mental calculation of small numerical expressions. Operations with integers and their properties. Operations with fractions and decimal numbers. Percentage. Monetary system and business transactions using mental calculation. Area calculation. |
| Admission Course (formerly known as the 6 th school year) | General overview of all content from previous years with further in-depth. Mental calculation. |

Source: Abstract prepared by the authors of the Program (1965).

There are some peculiarities in this Program. The first of them is the systematization of mental calculation from the 2nd year of schooling, even applied to geometry and the monetary system (see the Primary Education Program of the State of Guanabara, 1962). Let us look at some examples: Mental calculation must be used in problems by applying only one of the notions at a time (p. 115); mental calculation of tens and dozens (p. 115); preparatory mental calculation for multiplication with reserves (p. 121); preparatory mental calculation for division (p. 122); mental calculation with Cruises (p. 125). For the 3rd school year: mental calculation of addition combined with multiplication (p. 128); written and oral calculus contests (p. 137). For the 4th school year: mental calculation involving amounts (p. 135); mental calculation involving simple expressions used for learning the abbreviated division process (p. 138); mental calculation involving business transactions (p. 145). For the 5th school year: mental calculation of perimeters and areas (p. 146). This fact can be proved by observing the objectives of the Mathematics Program:

Solve, accurately and promptly, problems of practical life; develop good thinking methods making the best use of your mental resources; give immediate and correct response to all elementary operations; [...] use the concept of mental calculations to solve practical problems quickly and safely (GB, 1965, p. 98).

The description of the topics to be covered in each grade, as listed above, are presented for the teachers in each subject in detail, with examples of approach and guidance. There is a dialogue with the teacher presenting recommendations on the approach that should be applied.

The active method was observed from practical exercises, the development of reasoning, and the use of materials, including the use of different games. Regarding these aspects, Fontoura guides the use of weekly calculus contests to develop mental calculus techniques:

To encourage accuracy and speed, organize a weekly calculation contest (lasting from 5 to 20 minutes, depending on the school grade) according to the level of the class, with a predefined duration (always the same), and mastering only one difficulty of each operation (example: multiplication propose multiplier of a digit with reserves). (GB, 1965, p.101).

We can infer that a specific knowledge related to *mathematics for teaching*, e.g., the use of calculation games and competitions, was systematized in the Program, and is consistent with the role given to students in the tasks that prioritize projects and interest centers²⁰ that are directly related to the so-called Active School, defended by the escolanovistic movements. Fontoura provided the following guidelines on *mathematics for teaching*:

Motivation - a) beginning from the concrete; b) do not provide absurd data; c) start from the child's experience; d) start from the children's activities at school; e) start from a project whenever possible; f) establish research (FONTOURA, 1961, p. 209-210).

We also verified that the examples contained in the Program had short statements and objective answers. It is noticed that the material emphasized aspects such as the time used in the execution of activities, the systematization of teaching and standardization, and the concepts that were immersed in the representation of the teaching vacancy adopted by the author.

The dissemination of Fontoura's manuals at the Institute of Education can be certified by the records of purchases from the Library of the Teacher Training Course for Normal Education (CFPEN) and from the Historical Library of the Institute of Education, which we had access to in the CMEB collections. The archival research exercise provided the verification that these manuals were acquired by the institution in large quantities, so that the copies were available in the Professor's Library, where we could observe, through consultations in its book of records²¹, that the material obtained a large number of access. Regarding the number of copies present in the Institute's library, it is noteworthy that this shows that teachers understand the mathematical knowledge present in the material produced by Fontoura as elementary.

²⁰ In Brazilian lands, Lourenço Filho and Abner de Moura were the promoters of the Ovide Decroly's proposal in which education should start from the centers of interest. Abner de Moura's 1931 book, *The Centers of Interest at School: suggestions for globalized lessons according to the Decroly system*, had a preface written by Lourenço Filho and was part of the Education Library (CAMARGO, 2000, p. 111).

²¹ This material belongs to the collection of the ISERJ Memorial Center, not yet available online.

Thus, according to our research, their production was extensive, especially of pedagogical manuals. It has published one booklet, four compilations of educational legislation, and nineteen textbooks.

Some Considerations

Valente (2018, p.384) points out that any research that studies the historical construction of professional knowledge can support future teacher education projects and therefore help to reduce the gap between the future teacher education environment and the place where he or she will exercise the profession.

Thus, this research is contained within this scenario, seeking to characterize the knowledge that is demanded of a teacher who teaches Mathematics based on the Primary Education Program of the State of Guanabara.

The analyzes presented so far make it possible to systematize results that answer the following questions: what traces enable us to state that Afro do Amaral Fontoura was an expert for the teacher training course that taught mathematics in the early grades from 1950 to 1970, with *escolanovistic* ideas? What knowledge was systematized and objectified by Fontoura through the Arithmetic Program of the State of Guanabara?

It is important to point out that the systematization of knowledge was in vogue during the processes of professionalization of teacher education throughout the analyzed period. In the studied Program, we chose to highlight some knowledge *to teach* and *for teaching* objectified by Fontoura. Among the knowledge to teach, we focus on arithmetic, specifically mental calculation. As for the knowledge for teaching, we prioritize the methodology of games and professional knowledge related to classroom organization.

According to França (2016), Fontoura was responsible for producing the 1962 Arithmetic Program of the State of Guanabara. This shows that this teacher performed as an instrument of the state, contributing to the production of a Program for the new State of Guanabara. Fontoura was acknowledged by his peers and had knowledge on the teaching profession, as he worked in the training of primary teachers at the Institute of Education, in addition to having also been a professor at higher education institutions, such as Puc-Rio, Uerj, USU, Eceme, also having occupied the position of president of the Brazilian Association of Normal Schools. Such facts further demonstrate his *expertise*.

Furthermore, we cannot leave out the appropriation of the scientific literature of the time, quantitatively systematized by the author. On this note, we highlight its versatility, since it has had publications in different areas, characterizing the production and systematization of knowledge.

The dissemination of the wisdom produced by Fontoura is verified in the documentation of the Institute of Education. However, there are other factors that contributed to make the dissemination more effective, amongst them: the authors of the manuals at the time, in their great majority, were teachers at normal schools and occupied positions of prestige among future teachers; the high number of editions reached by the collection organized by Fontoura, helping the acceptance of the reformist proposals; and the position of power occupied by Fontoura, at the time of the reforms of the State of Guanabara.

Can we explain the emergence of a new mathematics *for teaching* Arithmetic, and the inclusion and exclusion of content in the *mathematics to teach*? Regarding the elementary mathematical knowledge for teaching, analyzed in Fontoura's work, the author follows the ideas of Escola Nova in relation to teaching methods. Hence, we observe close relationships between psychology and pedagogy, conditioning activities to the development of students' potential, using different material resources in the classroom as a way to help students in their learning.

We can also try to understand the changes in mathematics *for teaching*, found in the Program, if we consider that Fontoura's productions, in general, had as centrality to guide the

teacher's actions in the classroom, i.e., a prescribed and instrumental knowledge. Thus, in the Program, Fontoura reproduced the knowledge necessary for the training of teachers that he defended in his works; knowledge that corroborated the *escolanovistic* ideals, such as: finding relations between school and real life, learning through action, and considering child development for the organization of learning at school. For this movement, the emphasis of education is not on the accumulation of wisdom, but on the ability to apply it to situations that have been experienced.

In summary, the study on these issues points to a knowledge objectified by Fontoura in the elaboration of guidelines for teaching Arithmetic in primary school during the Escola Nova in Brazil, influencing the training of teachers in this segment in the referred period. We emphasize that his professional path may have contributed to the dissemination of his ideas on *mathematics for teaching*.

Thus, based on the characteristics established throughout this work, we verified that Fontoura fits into the category of *expert* in school mathematics in the Escola Nova era. Regarding this aspect, the author fulfills the following requirements: solid formation resulting from his studies and practices in the teaching profession; elaboration of knowledge that were objectified in the Primary Education Program of the State of Guanabara; large dissemination of his proposals in pedagogical manuals and texts that influenced a generation of educators, having led actions that permeated the elaboration of policies related to teacher education.

Regarding the *mathematics to teach*, some contents seem to have gained more prominence. They are the following: the construction of the concept of number, teaching the four fundamental operations, teaching fractions, multiplication tables, and problems. The Program emphasized the simplification of the four operations, quick calculations and mental calculation, that is, practical arithmetic. It is also interesting to consider the concern with the exploitation of the monetary system and its transactions, as it aimed to serve a workforce mainly dedicated to commerce.

As for *mathematics for teaching*, we concluded that the knowledge that was aimed at in the Program followed the recommendations of the fields of psychology and didactics regarding the concern with what to teach at each stage of schooling. Thus, a practical, utilitarian, graduated, and pleasant approach to Arithmetic was emphasized, with the use of games and professional knowledge regarding the organization of the classroom.

The study presented herein, of a historical nature, deserves a deeper look regarding the works of Afro do Amaral Fontoura. During the research, it was noted that the author guided normal education in the period from 1930 to 1970 with a very extensive bibliographic production, which calls for a glance in his direction.

In short, Afro Amaral Fontoura, due to his *expertise*, enabled the systematization and objectification of arithmetic knowledge that considered situations in the student's practical life, as well as functional proposals, such as mental, utilitarian and fast calculation through games and competitions, and knowledge referring to the form of organization of a classroom, according to scientific psychology studies.

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