



Patterns in circulation for teaching Natural Sciences: Object Lessons in transition from Empire to Republic¹

Circulação de modelos para o ensino de Ciências Naturais: o método de ensino intuitivo na transição entre Império e República

Circulación de modelos para la enseñanza de las ciencias naturales: el método intuitivo de enseñanza en la transición entre Imperio y República

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Abstract

This paper takes a historical perspective (final decades of the XIX century) to analyze the circulation of guideline bound to the intuitive teaching method. The documentary sources are two textbooks produced to guide pedagogical practices of elementary teachers: *Primary Object Lessons*, by N. A. Calkins, published in Portuguese language in 1886, and *A Eschola Publica*, edited by Oscar Thompson and others, published in 1895. The spread of objective method or object lessons was allied to pedagogical transformations that include methodological aspects and teacher's training. In conjunction with was gathered together wit economic and social development and become a symbol of modernization in São Paulo State. Focusing on Natural Sciences, this article shows different interpretations and meanings taking for pedagogical innovation in the Brazilian context. These differences show, by the way, different conceptions about science and their teaching based on different patterns of reasoning and mental habits. One of them pays particular attention to the step-sequence logic inherent to the teaching method; the other considers the amount of subject prescribed in the school curriculum.

Key words: Teaching methods. Object Lessons. Teaching natural sciences. Teachers training. History of education.

¹ English version by Fernanda Nakamura. E-mail: fernandavidanakamura@gmail.com. This article is a result of research supported by the National Council of Scientific and Technological Development - CNPq - (Process 311711/2019-7) and by São Paulo Research Foundation - FAPESP - (Process 2018/26699-4).

Resumo

Este artigo adota a perspectiva histórica (décadas finais do século XIX) para analisar a circulação de prescrições vinculadas ao método de ensino intuitivo. As fontes documentais são dois manuais didáticos dedicados a orientar as práticas pedagógicas de professores primários: *Primeiras Lições de Coisas*, de N. A. Calkins, publicado em língua portuguesa em 1886 e *A Eschola Publica*, organizado por Oscar Thompson e outros autores, publicado em 1895. A difusão do método intuitivo ou lições de coisas esteve aliada a transformações pedagógicas que incluem aspectos metodológicos e formação de professores, bem como desenvolvimento social e econômico, tornando-se um símbolo de modernização no estado de São Paulo. Focalizando o ensino de Ciências Naturais, o artigo evidencia diferentes interpretações e sentidos adquiridos pela inovação pedagógica no contexto brasileiro. Essas diferenças explicitam, por sua vez, diferentes concepções sobre a ciência e sobre seu ensino, uma vez que estão assentadas em diferentes formas de raciocínio e hábitos mentais que procuram sedimentar. Um deles, priorizou os passos lógicos para ensinar; o outro foi delimitado às prescrições do currículo escolar.

Palavras-chave: Método de ensino. Lições de Coisas. Ensino de Ciências Naturais. Formação de professores. História da Educação.

Resumen

Este artículo adopta la perspectiva histórica (décadas finales del siglo XX) para analizar la circulación de prescripciones vinculadas al método de enseñanza intuitivo. Las fuentes documentales son dos libros de texto dedicados a guiar las prácticas pedagógicas de maestros de primaria: *Primeiras lições de coisas*, de N. A. Calkins publicado en portugués en 1886 y *A Eschola Publica*, organizado por Oscar Thompson et al., publicado en 1895. La difusión del método intuitivo o las lecciones de cosas se combinó con transformaciones pedagógicas que incluyen aspectos metodológicos y la formación del profesorado, así como el desarrollo social y económico, convirtiéndose en un símbolo de modernización en el Estado de São Paulo. Centrándose en la enseñanza de las Ciencias Naturales, el artículo destaca diferentes interpretaciones y significados adquiridos por la innovación pedagógica en el contexto brasileño. Estas diferencias explican, a su vez, diferentes concepciones sobre la ciencia y su enseñanza, ya que se basan en diferentes formas de razonamiento y hábitos mentales que buscan sedimentar. Uno de ellos priorizó los pasos lógicos para enseñar, el otro se limitó a las prescripciones del currículo escolar.

Palabras-clave: Método de enseñanza. Lecciones de cosas. Enseñanza de las ciencias naturales. Formación del profesorado. Historia de la educación.

Introduction

The question of teaching methods permeates courses for teacher training since the institutionalization of this type of instruction in Brazil, which dates back to the 19th century. In the teaching methods proposition - both those that, in the past, left their mark on the schooling processes and those that aim to change these same processes in the present and the future - values, purposes, and activities are articulated, they aspire not only to endorse principles but also to establish practical continuities² and a repertoire of knowledge to be operationalized and repeated. The guidelines on "how to teach" are not limited to technical procedures, but have implications for the content to be taught and for different levels of curricular organizations and, in general, instigate conflicts in the various instances involved in its proposition and execution. This process is dynamic, it is constituted in a complex combination of innovative practices and others already established and is produced both by theorists from different areas of knowledge and by teachers in the classroom, as well as the means for its diffusion.

In this article, the historical perspective is adopted to examine this issue. For that, We analyze documentary sources elaborated as prescriptions for teaching practice linked to the methodological renewal unleashed in Brazil in the final Empire decades and the first years of the republican regime. Delimited to the contents related to the teaching of Natural Sciences in the elementary course, this analysis aims to understand the dynamics of the circulation of methodological innovations by identifying the multiple vectors intertwined in the data and their dissemination. It is understood that it is possible to capture the meanings given to the pedagogical innovation and scientific culture of the period in the interaction of these elements.

The documentary sources are two books directed at primary school teachers, designed to convey methodological prescriptions regarding the objective teaching method. They are the *Primary Object Lessons* textbook, authored by the American Norman Allison Calkins, published in 1886 and the book *A Eschola Publica – Ensaio de Pedagogia Prática*, published in 1895, as a result of the compilation of the eleven issues of the magazine *A Eschola Publica* that had circulated in the years 1893 and 1894.³

Although different in terms of authorship and publishing processes, the selected printouts have in common the transmission of content to be taught, the presentation of classroom models and instructions to teachers, allegedly riddled by the professional experience of their authors, in addition to affirming explicitly the link to Pestalozzian fundamentals and intuitive processes for learning. The two documentary sources dedicated to the dissemination of the teaching method, which, linked to pedagogical reforms, were considered an efficient resource to cause positive repercussions not only at school but also in society in general. In the Brazilian context, it acquired the connotation of pedagogical modernization and, in the state of São Paulo, it became a symbol of educational policies allied to the republican regime, after its implementation (SOUZA, 1998; CARVALHO, 2000; MONARCHA, 1999).

The defense of this specific method to raise Brazilian educational levels was taken up by monarchists and republicans in the transition between these two government regimes. In 1879, it acquired a legal character with the promulgation of Decree No. 7,247, of April 19

² The expression practical continuities is used by Raymond Williams (1979) to describe, in the process of cultural incorporation, the elements directly experienced that act in the elaboration of meanings and encompass both the doctrinal conceptions and the way of practicing them and, in general, are managed in institutions and other training spaces.

³ The periodical *A Eschola Publica* was published between 1893 and 1897 with interruptions and circulation of 1,000 copies in each monthly edition. Its organizers and analysts have adequately pointed out the existence of two distinct phases in the circulation of the journal, which can be identified in graphic changes, changes in the group of editors, an increase in the number of collaborators and sections, and, consequently, content. The first phase had eleven volumes published between 1893 and 1894 and the second, 10 volumes that went public between 1896 and 1897.

(BRASIL, 1942), which regulated primary and secondary education in the city of Corte, and remained in the official guidelines of the state of São Paulo until 1920. This Decree was published by order of the Minister of State for Business of the Empire, Carlos Leôncio de Carvalho, who actively participated in educational initiatives that, under different auspices, arose in the province of São Paulo. However, more forceful than the prescription in the legislation was the defense of the method made by the then deputy Rui Barbosa through a favorable opinion to the Decree and the translation of the didactic manual *Primary Object Lessons*, by N. A. Calkins. The opinion published in 1883 under the name of Primary education Reform and several complementary public education institutions (BARBOSA, 1947) combined with translation constitute a prolific set of documents describing both Brazilian educational problems and the hope of reversing them with the introduction of new practices in a school system to be renewed as well.

The book, *Ensaio de Pedagogia Prática* is the result of the compilation of eleven volumes of the journal *A Eschola Publica*, which is considered one of the first and most successful initiatives of the São Paulo pedagogical press (CATANI, 2003).⁴ These printouts are contemporary to the educational reform led by Gabriel Prestes and promulgated in 1892, which structured teaching in the state of São Paulo after the Republic proclamation. In this structure, Normal School and Practicing Schools were thought of as radiating poles of methodological demonstration and, acting in these institutions, the editors of *A Eschola Publica* transcribed in the journal the classes taught there and some exercises of students to disclose to readers the procedures adopted and the results obtained, to elucidate "whoever attends cannot, what processes are used in the Model School" (MOTTA, 1894, apud THOMPSON et al., 1895, p. 8, our own translation), mainly, those intuitive derivatives of Pestalozzi's propositions.

Placing the issue of teaching methods at the center of the analysis demonstrates that, from this didactic element, it is possible to detect pedagogical innovation because interactions between actors, devices, discourses, and practices modulated the meanings acquired. To this end, we seek to characterize interpretations, creations, and prescriptions designed to guide the ways of using the intuitive method, focusing more closely on the teaching related to Natural Sciences.

The model version of the intuitive teaching method

Rui Barbosa's intention to offer Brazilian legislators, at the end of the monarchical period, a model educational project elaborating the set of Opinions on teaching and the translation of the didactic manual of N. A. Calkins is unequivocal. The foreign bibliography consulted, the statistical data used, the attempts to obtain financing for the publication of the book and the bill resulting from this study, all of them eloquently materialize their purpose of structuring the system at all levels and disseminating a set of pedagogical practices designed to guide the training of teachers, the central axis of the intended changes.

To legitimize the choice of the Calkins manual, the translator elaborates a praiseworthy preamble and, in it, highlights the qualities of the work comparing it to others of the same genre and reproduces the evaluation made by Ferdinand Buisson, representative of the French government at the Philadelphia International Exhibition, held in 1876: "the best collection of objective lessons, so far published" (CALKINS, [1886], 1950, p. XVI, our own translation). With this support, he indicates to readers that, despite the differences between the European and American continents, both adopted the same path for progress: the reform of teaching and

⁴ This journal has been used as a source for studies from different perspectives. Among them, one can indicate that of Marta Carvalho (2001), which summarizes her pedagogical possibilities in the expression "tools box"; that of Adriana Pinto (2012), which characterizes it editorially, that of Marcus Aldenison de Oliveira (2018), which focuses on the lessons related to the teaching of Arithmetic and that of Valdemarin and Pinto (2010) that deals with the fundamentals of the intuitive teaching method.

the use of the intuitive method. For him, the greatest merit of the work would be in the description of the processes designed to exercise the senses and intelligence through observation, which would result in better training of students who, in turn, would contribute to raising the Brazilian socio-educational levels. It includes a profusion of explanatory notes and chapters of its own to adapt the content to its potential readers.⁵

Another legitimizing strategy for translation is based on incorporating the author's prefaces into the Brazilian edition. It is reported through them that the first edition of the *Primary Object Lessons* was published in 1861, in the United States of America, to systematize the ideas of Johann Heinrich Pestalozzi (1746-1827) in didactic procedures. N.A. Calkins states that the content of the manual, based on his professional experience, is detailed to meet the needs of teachers and, therefore, contains a description of each of the steps necessary to teach and develop the child's spirit, accompanied by examples and demos. The educational potential of the teaching method is reaffirmed in the prologue of the 15th edition (1870): the author clarifies that he intended to "demonstrate practically even more clearly, the principles of true *objective teaching* and the relationship of this method of teaching to the ordinary branches of education instruction in schools "(CALKINS, 1950, p. 23, emphasis in the original, our own translation). It also informs that the deletions and additions of examples were dictated by practice and relate to the exposition of the subject and not to the principles, which are "*true laws, deduced from the nature of the spirits that have to be instructed*" (CALKINS, 1950, p. 24, emphasis in the original, our own translation) and, therefore, are immutable. However, the presentation of the teaching objects to students may vary, as has been demonstrated in successive editions. In the 40th edition proem (1884), the author states that his belief in the qualities of objective teaching remains unshaken and that suggestions, advice to teachers, and guidelines for teaching Reading and Drawing have been added.⁶

The organization of the North American manual was not altered in the Brazilian translation and, explaining the empiricist foundations of the teaching method (VALDEMARIN, 2004, 2006) to be described, the order of the chapters denotes the importance attributed to each of the human senses - the channels of perception and ideas - in the learning process.⁷ Vision is considered the most active meaning, and for this reason, the manual begins teaching the Forms. It is an appropriate content, according to the author, to describe in detail the steps of the method and to exercise teachers and students in their use in the classroom. Next, the lessons on Color, Number, and the four operations, on Size, on Drawing and on Time are presented, contents that directly involve the observation of objects. Lessons on Sound and Elementary Reading, which is based on the sounds of language, are presented to educate hearing and ensure that this sense acts in the development of intelligence. The lessons on the Quality of Things, prepare for the teaching of the Lessons of Things, proper said, and for the lessons on the Human Body which, being more intricate due to the confluence of different senses, encompass the skills to discriminate, classify and associate the ideas from objects and natural phenomena and, consequently, drive the development of mental processes in general.

⁵ The translator makes extensive use of footnotes to explain certain language choices, additions to, in his view, elucidate the original text and justifications for creating at least three lessons: on sounds and on the teaching of reading, whose original content was not compatible with the teaching of the Portuguese language and adds a lesson on the magnet, which was noted in the opinion mentioned above by Ferdinand Buisson.

⁶ Lourenço Filho (1950) provides information on the professional trajectory of N. A. Calkins in the Preface to volume XIII of the Complete Works of Rui Barbosa. He began his career as teacher and director of primary schools in the interior and New York City; the prestige obtained with the publication of the manual elevated the author to the post of director of elementary schools in New York and president of the National Education Association, a position he held for about thirty years.

⁷ It is worth noting that Calkins is co-author of a manual for teachers that follows the curriculum organization of the primary school in the presentation of lessons and content. See KIDDLE; HARRISON; CALKINS, 1873.

The author and translator, therefore, affirms that the objective of the manual is to contribute to the training of teachers - beginners or not - through the description of the appropriate sequence to teach and develop the spirit of the children. For that, models of lessons are presented to exemplify, according to them, in a clear and detailed way, the steps to be adopted in the execution of the method and, consequently, the unfolding of the principles in practices.

The invariable principles on which all lessons are rooted can be summarized as follows: knowledge is derived from the contact of the senses with objects and phenomena from the outside world, with the perception being the first stage of the development of intelligence, so education must cultivate perceptual channels offering opportunities and incentives for them to be exercised. The first operation of perception consists in identifying similarities and differences between objects and progressively evolves towards association and classification. The development of perceptive faculties depends on the adequacy of the exercises offered to them, and they should encourage the attention, curiosity, and autonomy of children.

In the author's words, the process of teaching progresses "from the simple to the complex; from what is known, to what is ignored; from facts to causes; from things to names; from ideas to words; from the principles to the rules" (CALKINS, 1950, p. 31, our own translation) because the process of learning begins with the perception coming from the sensations and "the *attention*, fixed on what was perceived, leads to *observation*. Finally, thanks to observation, comparison, and classification of experiences and facts, *we have reached knowledge*" (CALKINS, 1950, p. 31, emphasis in the original, our own translation).

In this conception, primary education should cultivate "habits of accurate observation," so that knowledge about things precedes knowledge of words, which, in turn, must express acquired ideas and not just empty sounds of meaning. It should be noted, therefore, that for the practice of this method, books are secondary materials because made of words, they are useful only when expressing ideas from things. To better clarify this process, the author states that only observation and experience can transform words into "paintings of this signified reality in printed characters" (CALKINS, 1950, p. 34, our own translation).

To implement these principles, instruction must be supported, at least during the first two years of schooling, by dialogues about the interests, things, and facts known to children, to develop observation and language, according to the following guidance:

The child's first lessons at school should be given in conversation with the greatest simplicity, awakening the spirit, developing the habits of observation, and training students in the use of language. This work prepares you for a more accurate study of the shapes, colors, numbers and printed words (CALKINS, 1950, p. 59, our own translation)

These dialogues are made up of questions whose answers are not merely yes or no (what do I see? What do I hear? What do I taste? What do I smell? What do I do? Where do I go? How do I go?), but describe what was observed and deal with objects in everyday use, such as toys, clothing, home, and school furniture, among others.

According to the author, the Form is the ideal content for initiation in the method because it is a variable property, easily perceived by the vision, lends itself to be described with simple words, and makes it possible to exercise observation and comparison and classification. The sequence of steps constituting the method, abundantly exemplified in the teaching of Form, is the same for all contents: conversations about known objects, from which the apparent characteristics are observed, and named, which constitute the basis for comparison with other objects to establish similarities, differences, use and material of which they are made. The final step of the method is to return to familiar objects with practical exercises to recap and check the progression in knowledge. The spoon, for example, is an object very present in the daily

activities of children and, therefore, it can be taken as a didactic object to engage in dialogues in the classroom; at the end of the process, it must be described as an object of "oval, concave shape, narrow, flat handle, which extends to the opposite part of the shell" (CALKINS, 1950, 174, our own translation) and which presents variations in size, uses, and materials.

The author explains that it is not just a matter of using trivial objects, but of using them obeying thinking about the students' development. In the first phase of learning, objects should be distinguished by name, their main parts, shape, color, and uses identified. The observation must focus on objects already known, such as billiard balls, chairs, bells, pins, hats, shoes, and doors. In the second phase, shape, color, size, matter, qualities, applications, and origins must be distinguished, and the natural elements transformed by man are themed, and among them, the manual contains lessons on a sponge, water, milk, glass, sugar, cork, and wood. These lessons aim to improve observation and consist of exercises to the group and distinguish qualities, which should result in learning the differences between rough and smooth, fragile and resistant, opaque and transparent. In the third phase of the Lessons of things, we reiterate It should be noted that the study must be deepened, especially regarding the use made of the objects and the observation of the properties by the children themselves, and for that, "the master will direct them to notice the qualities, but do not tell them the ones that students can readily discover" (CALKINS, 1950, p. 505, our own translation). In this phase, the manual only presents general plans of the lessons and suggestion of objects to be treated, "leaving the master the selection of exercises, experiences, colloquies and questions to the disciples about things, their properties, applications, etc." (CALKINS, 1950, p. 505, our own translation), assuming that, like students, teachers have acquired autonomy in the use of the method.

The content widely referred to as Natural Sciences is not broken down in Calkins' manual, but the themes related to it can be identified in different lessons, which makes it possible to analyze it differently.⁸

The study on water exemplifies the various entries that the same theme contains in the methodological description of the manual. The lessons on qualities are designed to identify them and, simultaneously, to group the elements that possess them. In this didactic context, water is the element observed to describe transparency, quality of "things through which it is easily seen" (CALKINS, 1950, p. 450, our own translation) and is distinguished, by the same process, from those that do not have this property (opaque). It is also present in the lesson dedicated to observing the liquidity, fluidity, and property that certain liquids have to drip, moisten or wet, as well as in the lesson dedicated to observing the solubility of some elements.

The author warns that these exercises should not be converted into the memorization of definitions, but should contribute to the establishment of the observation habit, thus influencing "the general teaching methods professed at school (CALKINS, 1950, p. 463, our own translation).

If in the lessons on qualities, water is used to group them according to the sense that perceives them, in the second phase of the Lessons of Things (which, in general, coincides with the second year of primary school), its study, correctly said, it starts with conversations between teacher and students about its uses and applications (drinking, eating, washing). It continues with instructions to "observe and express the aspect it has" (clear, transparent, colorless, odorless, liquid) and its properties: "*that drips, and moistens*, from where it follows that it can be *liquid*" (CALKINS, 1950, p. 496, emphasis in the original, our own translation). Thus, qualities discussed in previous lessons are taken up to characterize and individualize an element; to them are added new observations, such as their origin on rainy days or explanations

⁸ The name of the subjects in the manual is not identical to that adopted in the Brazilian primary school of the period, given the criteria, already explained, for the organization of the manual. However, there are contents in both the two registers, with different emphases. The lessons on Form, for example, correspond to the content that appeared here under the rubrics of Drawing, Geometry, and Forms; the extensive lessons on colors appeared in the curriculum as subjects of the Physics and Chemistry program.

about brooks, fountains, streams, and springs, extending the reasoning for the formation of rivers. Other properties are gradually introduced: "They also warn that, under the influence of heat, water becomes vapor, or evaporates, as well as under the action of *cold*, it hardens, becomes ice or *freezes*" (CALKINS, 1950, p. 496, emphasis in the original, our own translation), which expands its uses in each of these states (heating, preservation).

The study on the water is concluded with the elaboration of a table, described below, composed of three columns in which the qualities, uses, and places of obtaining are listed, with the orientation to be used as a script for the production of texts.

WATER

<i>Qualities</i>	<i>Uses</i>	<i>Where to get</i>
Transparent	Drinking	from the clouds
Tasteless	Cooking	in the rain
Colorless	Washing	from the ground
Odorless	Moving machines	through fontains and
Liquid	Heating houses	wells streams and rivers
Evaporable	Preserving foog	from Tanks and Lakes Net

(CALKINS, 1950, p. 497)

One chapter of the manual, the penultimate, is dedicated exclusively to the human body. The study of this theme of Natural Sciences constitutes, according to the author, the basis for the further study of physiology. His teaching is based on the analogy between houses and bodies: "houses as places of habitation; the body as the soul's house or mansion" (CALKINS, 1950, p. 521, our own translation).

It is possible, observing a puppet, to name the parts that together make up his body and identify them in the children's bodies: "the head, neck, trunk, arms, hands, legs and feet" (CALKINS, 1950, p. 522, our own translation). Following are the lessons on observable movements of breath and their role in maintaining life, by similarity, to the explanation of blood circulation and the function of food and the heart.

In the study of the face and its constituent parts that, in turn, integrate the head, the dialogues between teacher and students must lead to the observation of the most apparent characteristics, that is, its "round or oval shape, narrowing downwards [..]; the nose in the middle of the face, elongated from top to bottom, pyramidal [...]" (CALKINS, 1950, p. 526, our own translation). In the dynamics of methodological prescriptions, previous knowledge about forms is applied to the human body and new specificities are added to them, such as "the property, which has the physiognomy, of revealing so many things about us," the feelings of joy and sadness and "the good or evil disposition of our nature" (CALKINS, 1950, p. 526, our own translation).

The lessons about the sense organs are an opportunity to return to the analogy of the body with the houses and to exalt its function in the acquisition of knowledge: "the *ear*, as the door through which *sounds* enter; the *eyes*, like the windows through which the soul looks out, and enjoys the beauty of the wonders of the universe; the *eyelids*, like the curtains of those windows" (CALKINS, 1950, p. 535, emphasis in the original, our own translation). Therefore, these lessons serve as the biological justification for the teaching method set out in the manual.

The exercises designed to group similarities and differences allow the teacher to talk about the skin that covers animals, such as sheep, cow, horse, cat, dog, and the plumage of birds until they reach the skin that covers the human body. The elasticity (pulling the skin and letting it return to its natural position) and flexibility (bending the fingers) must be observed. You can also use hours of intense heat to teach that

perspiration or sweat permeates the skin, passing through small holes, which are called *pores*. Inquire the designation, which we give to the bodies riddled with these tiny holes. Tell them that we call the skin *porous* because it is riddled with tiny holes, where it sweats. So subtle and numerous are these pores, that the tip of the little finger, supported on the hand, or the face, covers thousands of them (CALKINS, 1950, p. 549, emphasis in the original, our own translation).

It is worth noting that porosity has already been observed as the quality of different materials in other lessons and that the examples on each characteristic can be extended as needed. At the end of each stage, a summary of what has been learned is written.

Thus, the analysis of this source allows us to state that the intuitive teaching method in the version of N. A. Calkins was introduced in Brazil as part of a broader set of measures aimed at the reform of education. Produced in the monarchical period, Rui Barbosa's proposals - including the prescriptions in the translated manual - described an educational apparatus yet to be created and, in it, the teaching method played a strategic role, which would justify the choice of a version described in detail and the different intersecting markers with which he intended to give him distinction: translation, recommendations and adjustments related to the Portuguese language. In this set, the method proposed by Calkins was intended to present to teachers and training institutions, the prescriptions as well as their theoretical justifications, for the introduction of new teaching practices. Using the expression by Sobe (2013), it can be said that the author, translator, and the work performed the accreditation function of the intuitive teaching method in Brazil and, together, gave it a sense of innovation.

Practical pedagogy in the version of the manual A Eschola Publica

Other prescriptions for the use of the intuitive teaching method in primary school were intertwined in the final years of the Empire and the initial years of the Republic, despite Rui Barbosa's effort to distinguish the characteristics of those produced by N. A. Calkins. In the city of Corte and in the province of São Paulo different initiatives, mainly private ones, aimed at introducing changes in teaching methods and materials, in the literacy processes and the training of teachers, both through regular courses, as well as conferences and lectures (see HILSDORF, 1986; MORAES, 1998; RIO DE JANEIRO, 1884; BASTOS, 2002; SCHELBAUER, 1998).

After the establishment of the republican regime, the group that assumed power in the state of São Paulo, implemented a policy based on the dissemination of instruction and the improvement of its quality. The educational reform of 1892, initiated by Caetano de Campos and continued by Gabriel Prestes, made the course for teacher training at the Normal School of the capital and the Model Schools Annexes, the centers of innovations in teaching practices. Reis Filho (1981), supported by a student's report, states that the pedagogical training of future teachers began with the observation of classes given at Escola Modelo, to "incorporate the mechanisms of the classroom procedure through visualization. With two hours of daily observation, you should prepare to reproduce when your turn comes" (REIS FILHO, 1981, p. 73, our own translation), the procedures, and the material used. To make this strategy feasible, two teachers with experience and training in North American teaching processes were hired, the same route adopted by Rui Barbosa for the dissemination of the method.⁹

⁹ These are Maria Guilhermina Loureiro de Andrade and Miss Marcia Browne. The first, from Rio de Janeiro, had studied in the United States, and the second, North American, former director of Normal School, was working in São Paulo (CHAMON, 2005; REIS FILHO, 1981).

The creation of the magazine *A Eschola Publica* is part of this reform effort because acting in the recently structured institutions, its editors transcribed in the periodical the classes taught there and some exercises of students, making this professional and institutional condition the guarantor of the prescriptions transmitted. Carlos da Silveira, one of the first analysts of this magazine, explains his creation based on the combination of several factors: "new masters, recently introduced methods, processes that are not yet very common" (SILVEIRA, 1929, p. 323, our own translation) that together justified the investment in a form that echoed the changes with the readers.

The first phase of the journal consists of 11 issues published between 1893 and 1894 and had as editors, and main authors Professors Oscar Thompson, Antonio Rodrigues Alves Pereira, Joaquim de Sant'Anna, and Benedicto Maria Tolosa and, in 1895, with some deletions and additions, the content of these editions was compiled in a book, analyzed here, which, keeping the same title as the magazine, received a subtitle to clearly explain its claims - *Essay of Pedagogy Practice* - and identify the initiative: *Pedagogy of São Paulo*.

The organizers affirm that the publication was not linked to any official agency and, to maintain it, they stimulated subscriptions, charged late payments and offered gifts: a letter with the central aphorisms of Pestalozzi, in a luxury impression that "can be nailed to the wall of classrooms or teachers' (*A ESCHOLA PUBLICA*, 1894, n° 6, p. 48, our own translation). From an ideological point of view, however, the magazine was fully aligned to make education one of the pillars of support for the republican regime (cf. in CARVALHO, 2003). The four editors were graduates of the Normal School in the capital and, at the beginning of their careers, working in the teaching profession or the direction of schools (SILVEIRA, 1929). Oscar Thompson had a longer trajectory and held the highest positions in the São Paulo educational system. Before that, he was a teacher and director of *Escola Modelo do Carmo* and interim director of Normal School of the capital (MONARCHA, 1999; GONCALVES, WARDE, 2002); Antonio R. Alves Pereira and Benedicto Maria Tolosa, were teachers at the Model School and subsequently participated in other editorial projects and discussions on methods of teaching reading, including the publication of books (MORTATTI, 2000).

Unlike the Calkins manual, the exposure of the contents in the book *A Eschola Publica* was linked to the purposes of primary education - reading, writing, and counting - and denoted its hierarchies: Reading, Arithmetic, and Language took precedence over other subjects. However, a greater number of pages were occupied by the contents referring to the Natural Sciences subdivided into Zoology, Botany, Physics, Chemistry, and Biology. The lessons published in the successive editions of the journal provided a fragmented perception of what should be taught, as the organization by materials adopted in the book revealed the current curriculum design. This grouping also highlighted the authorship of the lessons: Oscar Thompson wrote the lessons on Arithmetic; A. Pereira was responsible for the Intuitive Reading, Botany and Zoology lessons; Benedicto Tolosa presented the lessons of Language and Drawing and Joaquim Sant'Ana presented those of Physics, Chemistry, Cosmography and some aspects of Zoology.

According to its organizers, the book and the journal *A Eschola Publica* intended to focus on the practical aspects of teaching, which may justify the inexistence of the exposition of the fundamentals of the classroom models. It was clear, however, the affiliation to Pestalozzian principles (reproduced at the end of the book and in epigraphs), but in the São Paulo interpretation, the methodological innovation was conformed under parameters different from those exposed by Calkins.

The less subtle difference can be seen concerning one of the main contents in the exposition of the method in its North American version. In the year 1894, twenty lessons were published in the magazine named *Language on Object Lessons*, without specific authorship, informing that with them, good results were obtained at *Escola Modelo*. These are more

schemes than models of classes, accompanied by guidance that they can occupy about 15 minutes a day and that provides "subject for many days." The excerpt below illustrates the mentioned difference:

Lesson I - Names of objects

Object. Objects designated by their names.

Method. Put everyday objects in children's hands. Have each child say what he or any other child has.

Result. There will be oral expressions like this: I have a ball. João has a book. Sara has a bell. (ESCHOLA PUBLICA, 1894, p. 45, our own translation).

As can be seen, there are no indications or details of the steps to be followed so that the perception of the senses becomes an idea, but the formation of phrases indicates that the central objective of the scheme concerns with the teaching of language.

However, this set of lessons was excluded from the book published in 1895, which indicates the meaning that was being given to the method, which can also be followed in the analysis of the disciplines focused on the teaching of Natural Sciences.

The contents designated as Zoology in object lessons and classification of animals, signed by A. Pereira, start with studying the human body. The author advises that the discrimination of parts of the body must occur "always making the child point to the part of the body that he names" (PEREIRA, 1895, p. 96, our own translation). According to the class model presented, the dialogue should lead the children to feel their faces, hands, and arms to perceive the difference in textures, which the teacher names: bones, flesh, and skin. The same procedure leads to the discrimination of head, body, and limbs, and their subparts; with the students' responses, the lesson will be organized, as shown in the excerpt below:

The teacher should draw the students' attention to the shape of the head, reminding them of the approximate geometric figure of that part of the body, teaching them the formation of spherical, spheroidal words; as well as concerning the neck, it teaches that it looks like a cylinder and therefore has a cylindrical shape (PEREIRA, 1895, p. 97, our own translation).

The lessons must proceed with the observation of the different parts of the human body, which are named and described in terms of their characteristics. The author advises that questions should be asked until it is possible to arrive at the following terms: "The human body is divided into *head*, *trunk*, *limbs*. The upper limbs are called *upper limbs*, and the lower limbs are *lower limbs*" (PEREIRA, 1895, p. 96, emphasis in the original, our own translation). There are recommendations for introducing advice on nutrition, hygiene, and body posture whenever appropriate. As this content occupies a large part of the school program, A. Pereira guides to avoid abstract notions with young children and prioritizes those arising from the perceptions of the senses.

Respecting the same progression adopted in the teaching of the human body, the classification of animals must be taught, which begins with the best known, the domestic ones - the dog, the cat, the horse, the ox - of which the children describe the known breeds before watching a puppy brought to the room, for example. When it is not possible to observe the animal itself, the engravings can be used. In summarizing the usefulness of dogs for protection, the author gives the following guidance: "the teacher should illustrate this sentence by explaining what sheep are and giving a notion of what ferocious animals are" (PEREIRA, 1895,

p. 103, our own translation) or "should the teacher illustrate with credible stories" (PEREIRA, 1895, p. 105, our own translation) when mentioning that dogs can protect men.

To establish among students the idea of what a domestic animal is, a dialogue is recommended, leading to the following result:

Domestic animals are those who live with men, accompanying him in his work and rendering services to him.

There are domestic animals whose purpose is to feed us with their meat. The dog, the cat, the sheep, the ox, the chicken, the goose, the horse, the donkey, the goat are domestic animals (PEREIRA, 1895, p. 102, our own translation).

The author points out that in the lessons for the initial years of the elementary course he presented "a classification that is easy to assimilate and not entirely scientifically correct" and, following the indications contained in the school programs, he added lessons in the book on wild animals and on ringlets and mollusks.

A. Pereira also teaches Botany, which deals with flowers and leaves, with the orientation that, whenever possible, one should "do the study on the plants themselves; so it is very advantageous that the boys are studying, for example, the flower, have one to observe it" (PEREIRA, 1895, p. 273, our own translation). For the study of the stem, plant pots, or information obtained on walks around the school can be used; to describe the root, and flowers, and fruits, he recommended the use of engravings. To understand what are the calyx and corolla of flowers, some objects called similar words, must be remembered.

These lessons are also an occasion to explain the formation of words. There are guidelines for the distribution of this content in primary school grades: lessons on seeds and vegetables, nutrition and plant reproduction can be given for 2nd and 3rd grade classes because students would already be familiar with reading and with the observation habit to be practiced with species grown in the classroom; for the 4th year, compendia can be used and, if the school does not have a school museum, pictures and prints must be provided.

In lesson models, however, it can be seen that the time and opportunities determined for direct observation of objects and things are short. The examples of dialogues or steps for conducting classes are suppressed and syntheses of the subject to be taught increase, which resembles typical exhibitions of textbooks, passing methodological prescriptions into the background, as can be seen in the excerpt below.

Recap until you get this result:

The stem is the part of the plant that almost always moves from the bottom up, and that supports the leaves and flowers.

Plants that have such a small stem that they do not appear are called *stem plants*.

The stem can be simple or branched.

A simple stem is the one that has no branches.

The branched stem is what divides branches into branches.

The soft stems like those of maize and rice are called *herbaceous stems*.

The hard stems like bamboo and pine are called *woody*.

The herbaceous or woody stems that are the distance between us and where leaves come from are called *culms* (PEREIRA, 1895, p. 282, emphasis in the original, our own translation).

The absence of observation exercises is verified even in the lessons related to the teaching of Reading, the first content prescribed in the book, and also signed by A. Pereira. Citing Pestalozzi, the author indicates the use of conversation, exemplified by a detailed dialogue between teachers and students. The dialogue presented as a model is similar to those present in Calkins' book, with the significant difference that A. Pereira, regardless of the presentation of the object, recalled pre-existing observations, using engravings or words written on the blackboard. Thus, it appears that, regardless of the content covered, there is a strong presence of language teaching and word formation in the ways of using the method in its São Paulo version.

Still, in the field of Natural Sciences, the physics lessons are written by J. de Sant'Anna, and in them, the adherence to the intuitive teaching method is also explicit. There are guidelines for observing objects existing in the classroom or brought by children (wood, sponge, moringa) on which the necessary dialogues for learning can be initiated. The author explains that if the class was aimed at adults, much other knowledge would be transmitted, but in the case of children, Pestalozzi's precept must be followed: "The measure of knowledge is not in what can be taught, but in what children can learn" (SANT'ANNA, 1895, p. 79, our own translation).

It also justifies that the inclusion of Natural Sciences in the official teaching program led him to articulate the notions on the subject with the way of teaching them, that is, content and method. Despite these intentions, the concepts overlap with the methodological indications, as can be seen in the excerpt taken from a lesson about the impenetrability of bodies:

Then he will send a boy to take his place. The boy will naturally say: I can't because you're there.

Now ask the whole class: - If this room were full of boys, could one more fit?

The class will undoubtedly answer: - No, only if a boy came out.

After the boys are well-formed, say: 'Two bodies cannot occupy the same place.' For a bottle to be filled with water, the air must come out; the nail does not penetrate the wood, it only removes the fibers, and that is why it enters; the paint does not penetrate the blotter, it only occupies the space that constitutes the pores.

And so, children will be well in possession of the idea of impenetrability, one of the properties of bodies (SANT'ANNA, 1895, p. 76-77, our own translation).

Even in lessons on topics more conducive to observation, the same overlap can be seen, as illustrated by the guidelines for the teaching of gravity:

Throwing a stone, a pencil, a pen, a piece of paper, is observed that all these bodies fall.

We can, therefore, tell children that all bodies, anywhere, once free and abandoned, always fall to the earth in the direction of a vertical line.

Play now bodies of different weights, and it will be seen that the heaviest ones fall faster than the lighter ones.

Tell the children that this is due to air resistance. So that in a place where there is no air, all bodies fall equally at the same speed (SANT'ANNA, 1895, p. 80, our own translation).

Adherence to methodological innovation and the intention to see it disseminated is unequivocal in the discourse of the São Paulo authors. Among them, J. Sant'Anna recommends

that the teacher uses many examples and small experiences to clear the ideas acquired by students. With this procedure, according to him, it would be possible to avoid certain behaviors that persist until secondary school, in which the lectures that confuse "explained matter with the exposed matter" prevail (SANT'ANNA, 1895, p. 83, our own translation). The frequent review of lessons and questions to students, according to him, can avoid these evils.

The lack of the necessary materials, however, can be a vector to modulate the use of the method and the teacher recognizes that "The easiest and most methodical way of teaching both physics and chemistry, is even doing experiments for students to see. But, for now, we do not have any material for this "(SANT'ANNA, 1895, p. 184, our own translation). This difficulty is accentuated in the lessons for teaching Chemistry, which deals with simple bodies, compounds, and mixtures exemplified in metals, gunpowder, sulfur, and carbon.

However, there is no suggestion for its didactic use in the lesson on water, which is easily accessible material, but explanations about its composition, its physical states, and its uses in the following terms:

Water is made up of two gases, hydrogen and oxygen, and is a too abundant body in nature. It also exists naturally under other states. Indeed, in the liquid state, we find it forming rivers, lakes, seas, in the gaseous state, forming clouds and finally in the solid-state, forming ice at the poles and in the high mountain peaks (SANT'ANNA, 1895, p. 186, our own translation).

In the final stage of the study of this element, the conditions of drinking and using water are addressed and, to exemplify, "the teacher ahead of the class should have a glass of water and show it to everyone" (SANT'ANNA, 1895, p. 188, our own translation). The synthesis of the lesson, which is intended to verify what has been learned, is not distinguished from the content present in textbooks whose format, by definition, dispenses with prescriptions for teaching practice. This is precisely the dimension that the book *A Eschola Publica* intended to disseminate among teachers. The summary of the lesson, as can be seen in the excerpt below, focuses on the verification of concepts and notions and not on the production of a text by students:

Ask yourself what kind of body water is, where it is, what it is for, where water is found in solid, liquid, and gaseous states. Let it be said that water suitable for domestic use is called potable - and that which is unsuitable - unsafe; that the water in the sea, in some lakes is salty and that the water in the river, in the springs, in some lakes, is sweet. Count also that water is found in the blood of animals, in the sap of vegetables, in wells, etc. (SANT'ANNA, 1895, p. 188, our own translation).

The verb to observe, central to the Pestalozzian conception and Calkins' interpretation, is replaced by others in the teaching prescriptions of J. Sant'Anna: "*Tell* the children that in a vacuum or emptiness there is no sound. *Explain* well what vacuum or emptiness means "; "Then *tell* them that sound also walks in any medium other than air"; "*Speak* to them also at the speed of sound. So, *count* that the speed of sound is 340 m. per second "(SANT'ANNA, 1895, p. 92-933, emphasis added, our own translation). Counting, speaking, and explaining, therefore, conform to the interpretation of the method presented in the São Paulo manual.

Final considerations

The sources analyzed, and the excerpts highlighted, sought to underline the different meanings attributed to the intuitive teaching method in the final decades of the 19th century. Linked to the same educational principles, supported by their authors' professional experience and institutionally legitimized, these interpretations were intended to change teaching practices, hence the adoption of classroom models in which the intention to innovate was aimed.

These prescriptions make up a network, also integrated by the educational legislation, by the pedagogical forms and by several agents that played a strategic role in marking political and professional achievements with the symbol of change. Under this identity of purposes, different prescriptions coexist to accomplish them, described in the present analysis. Part of the differences between the two forms are related to the editorial modality of each of them: the manual, the form adopted by Calkins, favors the articulated exposition of the regulatory foundations of the method, didactic procedures, and lesson models; the Paulista manual is a compilation of articles intended primarily for the exhibition of models of classes, with the theories from which these models were derived.

In the São Paulo version analyzed, the methodological innovation was subordinated, mainly, to the programs of the disciplines, which, because they are very detailed and comprehensive, determined the pace of the method: less sequence of steps for its application and the greater volume of exposed concepts. Initially published in monthly editions and produced by more than one author, this manual had its innovative possibilities delimited by a comprehensive curriculum also conveyed in the manual, thus justifying a speech that incorporated both the pre-existing information, as well as the methodological indications, to novelty to be introduced.

The constitutive steps of the teaching method, explained in each of the publications, present significant differences concerning the procedures that characterize the beginning and conclusion of the lessons. The education of the senses, prioritized in the North American version, is a step quickly accomplished in the São Paulo version, working as an assumption. The definitions, not necessarily coming from the senses, favor language; the conclusion of the process through a synthesis based on a keyword framework proposed by Calkins is replaced in the manual *Eschola Publica* by a ready-made lesson that in the end, can dispense with the observations.

These differences explain, in turn, different conceptions about science and its teaching since they are based on different forms of reasoning and the mental habits that they seek to generate. The pace applied to observation, a procedure that triggers the intuitive method. To the final synthesis, verification of what was learned as prescribed in the two forms, reveal that, in the São Paulo version, the articulation with the concept of active and transforming science, characteristic of Modernity, which has in its vision its initial contribution and seeks to make the physical world and its phenomena intelligible to man is weaker than in the North American version. The elements to be directly experienced in the São Paulo version - the practical continuities - remain based on memorization and compendium as depositaries of knowledge, despite being mixed with partial innovations in teaching procedures.

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