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# Handcraft and geometric knowledge – appropriation of knowledge in rio de janeiro from international circulation[1]

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**ABSTRACT**

This article aims at understanding how propositions to insert handcraft into primary school which circulated internationally were appropriated in Rio de Janeiro from the end of the 19th century to the 1930s. The analysis of the sources is based on circulation and transference of knowledge, as well as on appropriation and objectification processes (Matasci, 2015; Valente, 2020). We identified that the three methods put into circulation by Brazilian travelers – Froebel's, Boogaerts's and *Slodj* – were not equally incorporated, referenced or reproduced in the Brazilian context. It was possible to conclude that for handcraft to be considered a powerful helper in geometry, a long objectification process, which took over four decades, was necessary.

**KEYWORDS:** Froebel. Boogaerts. Slodj. Pedagogical Mission.

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*Trabalhos manuais e saberes geométricos – apropriações do Rio de Janeiro a partir da circulação internacional*

**RESUMO**

O presente artigo tem como objetivo compreender como propostas de inserção dos trabalhos manuais no ensino primário, que circularam internacionalmente, foram apropriadas no contexto brasileiro, em particular, no Rio de Janeiro, no final do século XIX até a década de 30 do século XX. A análise das fontes pauta-se sobre a circulação e as transferências de conhecimentos; processos de apropriação e objetivação (Matasci, 2015; Valente, 2020). Identificou-se que os três métodos colocados em circulação pelos viajantes brasileiros – Froebel, Boogaerts e *Slodj* – não foram igualmente incorporados, referenciados e nem reproduzidos para o contexto brasileiro. Conclui-se que, para que os trabalhos manuais fossem considerados como um auxiliar poderoso da geometria, se fez necessário um longo processo de objetivação, de mais de quatro décadas.

**PALAVRAS-CHAVE:** Froebel. Boogaerts. Slodj. Missão Pedagógica.

*Trabajos manuales y conocimientos geométricos – Apropriaciones de Rio de Janeiro de la circulación internacional*

**RESUMEN**

Este artículo tiene como objetivo comprender cómo las propuestas para la inserción del trabajo manual en la educación primaria, que circulaban internacionalmente, eran apropiadas en el contexto brasileño, en particular, en Río de Janeiro, a fines del siglo XIX hasta la década de 1930. El análisis de las fuentes se basa en la circulación y transferencia de conocimiento; procesos de apropiación y objetivación (Matasci, 2015; Valente, 2020). Se identificó que los tres métodos puestos en circulación por los viajeros brasileños - Froebel, Boogaerts y Slodj - no están incorporados, referenciados o reproducidos por igual para el contexto brasileño. Se concluye que para que los trabajos manuales sean considerados como un poderoso auxiliar de la geometría, fue necesario un largo proceso de objetivación, de más de cuatro décadas.

**PALABRAS CLAVE:** Froebel. Boogaerts. Slodj. Misión pedagógica.

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## Introduction

There was a time when Brazilian primary school curriculum organization contained a discipline called Handcraft[5], and such configuration was not only a Brazilian characteristic, but an important international movement that had several different purposes. The dynamics of creation, expansion, the heyday and the decline of the Handcraft subject allow us to better understand the connections – existing in present day's basic education programs – between different handcraft exercises proposed to students and the teaching process of geometric knowledge.

Historical research and studies on the Handcraft discipline in Brazil are scarce. A bibliographical review done by Frizzarini (2018) pointed two master's degree dissertations by Martins-Salandim (2007) and Santos (2012) and two doctoral theses developed by Fonseca (2010) and Oliveira (2012) on the theme. In 2019, two more theses written by Conceição (2019) and Camara (2019) were added to the list. Nevertheless, the investigation theme on geometric knowledge teaching, school handcraft and the international circulation of geometry teaching propositions was present in two Brazilian research projects[6]. In this article, the theses by Frizzarini (2018) and Conceição (2019), which were produced in the scope of their respective projects, lead and support the discussion, the analyses and the conclusions here presented.

The objective of this study is to analyze processes of appropriation and objectification of school knowledge, more specifically the handcraft work that is connected to the teaching of geometry and that was put into circulation based on international contexts. As theoretical-methodological

[5] The term *Handcraft,* with the capitalized H, is used to designate the primary school discipline, whereas *handcraft*, with no capital H, refers to any form of manual exercises with no specific reference to the discipline.
[6] Research projects "*A dimensão prática e a escolarização dos saberes elementares geométricos"* (FAPESP, 2015-2017) and "*Transformações de saberes geométricos no curso primário brasileiro"* (FAPESP, 2018-2020), both coordinated by the first author.

procedures, there were the investigation stages supported by Valente (2020): *(i) a recompilation of teaching experiences*, a stage that gathered research results and information obtained from historical documents connected to teachers' work involving handcraft. After the collection was constituted, there was *(ii) a comparative analysis of teaching knowledge* – here we refined the collection and did an analysis of the knowledge put into circulation and its intersections stemming from both research results and historical sources. Thus, there was the emergence of a possibility to reveal, over time, tendencies towards the settling of propositions and the construction of a pedagogical consensus. Next, we (*iii) analyzed the systematization* that was developed, based on appropriation processes and, finally, we analyzed *(iv) the utilization of knowledge over time*, the last stage of our methodological path, which allowed the information about different teaching experiences to be read in consonance with the theoretical framework and understood as knowledge itself, as well as its objectification process over time, enabling the production of a history of handcraft and geometric knowledge from international circulation.

International circulation is based on Matasci (2015), who considers that the interchange among different countries played a particularly relevant part in the construction of modern school systems in the 19th century in France and in other western countries. It was a complex context, in which countries underwent several changes and there was an intensification of the connections among countries of the world during the first globalization period, with repercussions on social life and on education, which were strictly linked to the construction of national identities.

> There was a lot of discussion about the propagation, transference or dissemination of knowledge. Scholars used to start from the principle that the content which was disseminated remained relatively the same as it traveled from place to place and from person to person. Today, however, we adopt a different assumption, that is to say, the idea that the content which arrives at a place differs, in important aspects,

> from the one which was initially produced. It is mediated. (BURKE, 2016, p. 68, our translation)

Therefore, we aim at understanding how propositions and methods for inserting handcraft into primary school, which circulated internationally, were received and reelaborated in the Brazilian context, more specifically in Rio de Janeiro, the Brazilian Federal District at that time. To the analytical process (based on the analysis of documents), we add a relevant reflection by Valente (2019) on the *objectification* processes at a specific historical period, which resulted in the constitution of objectified knowledge:

> Some situations take a relatively long time: settling, stabilization, the development of a consensus about specific knowledge that gains a systematized shape in order to become a reference for teacher training in terms of the constitution of teaching subjects, scientific and school disciplines. (VALENTE, 2019, p. 17, our translation).

Thus, invited by Valente (2019), we intend to "capture" movements of systematization of *action knowledge*, which, in this article, constitutes knowledge that was observed in foreign contexts, in a historical process, in order to support a plausible and proper historical narrative.

## Brazilian travelers[7]

According to the literature on the History of Education, the end of the 19th century saw teachers going on international pedagogical missions or trips. Those pedagogical trips aimed at bringing successful educational policies and innovative practices closer. Because of this, several countries were interested in sending educators abroad for this purpose (MIGNOT; GONDRA, 2007).

[7] Other terms are used to refer to the travelers. Conceição (2019) designated the teachers in the first Brazilian republican teacher commission from 1890 as "*Experts* in Education". Morais (2019) amplifies the discussion on *experts.*

Brazil took part in that movement and organized the first official republican team of Brazilian primary teachers on a pedagogical mission abroad in 1891. The members of the team were Luiz Augusto dos Reis, Manoel José Pereira Frazão and Amélia Fernandes da Costa. They visited Portugal, Spain, France, Switzerland, Sweden, England, Italy and Belgium.

Luiz Reis, Manoel Frazão and Amélia Costa were all born in Rio de Janeiro. Luiz Reis achieved his formation through practice in primary schools, where he worked as an assistant in primary schools from 1860 to 1870 and became a regular teacher in 1873, when he was considered qualified for teaching at the Court's primary schools. He was a secretary of the Permanent Executive Commission for Teaching and the author of articles published in journals. Manoel Frazão graduated in the Mathematics and Natural Science course offered by Academia Militar do Rio de Janeiro (Rio de Janeiro Military Academy, in free translation). He was the editor of journals and the author of didactical works, all of which were approved to be used in primary school. Furthermore, he created manifests and was a member of the Court's Public Instruction Council and responsible for writing Rio de Janeiro's Handcraft Program in 1890. Finally, Amélia Costa graduated from Court's Normal School, was an assistant at primary schools in 1855 and was considered a qualified regular teacher for primary teaching in 1877. In addition, she was the author of several books, which were approved and distributed for use in primary schools and extensively promoted in newspapers of the day (CONCEIÇÃO, 2019).

The travelers in the commission had an active teaching profile, for they effectively participated in the context in which they were inserted. Through the press, councils, newspapers, pedagogical journals, books and official reports, not only did they contribute to the debate about Education, but also, and especially, they competed against one another with their ideas and propositions about the theme.

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## Handcraft abroad – Appropriation and representations by the travelers

Frazão, Luiz Reis and Amélia Costa highlighted handcraft in their travel records as a relevant element to the formation of primary school students and, consequently, pointed out the necessity to train teachers for such type of teaching. However, in that context, Frazão's (1893) report gained prominence because he was the only Brazilian teacher who had taken two summer courses, in 1891, in the European Handcraft teacher formation center, the famous Swedish Handcraft School, Nääs Seminarium School or *Nääs Slöjd lärare Seminarium*, due to the teaching of the *Slodj* [8] methodology, a term used in Swedish to designate educational handcraft.

The circulation and interchange of knowledge, experience and international references regarding his formation in Handcraft are highlighted in his report. Nääs School was "undisputedly the cradle of educational handcraft, if we prefer not to consider it since Froebel[9]. It was in Sweden that it propagated faster" (FRAZÃO, 1893, p. 416). The Brazilian traveler identified the presence of teachers from different countries[10] at Nääs School.

For primary school, the type of handcraft approached in teacher formation at Nääs School followed Froebel's proposition. It started in kindergarten and went on to primary school to *Slodj*. Manoel Frazão, Luiz Reis and Amélia Costa stated in their reports the presence of Froebelian teaching in Belgium, Sweden, France, Spain and Italy.

[8] Swedish people call handcraft *Slodj*. Although it is not of professional nature, it demands some hand skill. It is a word of Swedish origin, stemming from the adjective *slog*, which means able, skillful (FRAZÃO, 1893). The educational handcraft which the travelers had contact with was adapted to Portuguese in different forms. Some of those forms are *Sloïd, Slöjd, Sloyd.* In this study, we use the term *Slodj*.

[9] Friedrich Wilhelm August Froebel (1782-1852), a German pedagogue, published the book *The Education of Man* in 1826. In 1837, he founded the first Kindergarten and a toy factory. In 1838, he designed the creation of the Children's Guide Formation Institute, which was inaugurated in 1839. Between 1848 and 1852, 31 Kindergartens were openened in Germany. In 1856, the first Kindergartens were established in the United States (FROEBEL, 2001).

[10] Canada, the United States, Brazil, Argentina, Uruguay, Chile, Belgium, Russia, Denmark, Germany, France, Spain, Italy, Ethiopia, Japan, Finland, England, Switzerland and others (CONCEIÇÃO, 2019).

In France, one of the countries mentioned by Reis (1892), Handcraft had special prominence. Based on the experience he had, the Brazilian teacher highlighted the Male Handcraft program[11] proposed in France, in which he identified the "Froebelian modelling" in the first three grades of primary school. For the 1st and 2nd grades, the program recommends the construction of spatial shapes, like spheres, cubes, cylinders and prisms, as well as plane shapes, like squares and rectangles. It also recommends the construction of objects that have those respective forms, like balls, bottles, dice, bridges and windows. There are also instructions for paper folding and cutting with scissors. In the 3rd grade, it suggests working with cardboard, with scissors and using a set square to trace and cut straight lines and right angles, as well as gluing pieces made with colored paper in order to harmonize shapes and colors. Thus, it is possible to identify a close connection between the activities proposed in the Handcraft subject and the initial concepts from geometry teaching, especially the identification of similarities and differences between spatial and plane geometric shapes.

Froebel's pedagogy (or toy pedagogy) advocates the idea that children are naturally innocent and good. It is strongly supported by toys, which were called *gifts,* instruments that served children's education:

> The first *gift* was a small box with six balls inside – three of primary colors, three of secondary colors -, which gave children notions of shape, position, movement, direction, color, weight, density and volume. The second *gift* was a collection of geometric solids – a sphere, a cube, a cylinder – which introduced analysis and comparison between shapes. The third, fourth, fifth and sixth *gifts* were wooden cubes which were gradually and diversely divided, aimed at satisfying children's natural desire to know the inside of things, to see what is inside. (CHAMON, 2005, p. 261, our translation).

[11] The Female Handcraft Program did not refer to Froebel's method (CONCEIÇÃO, 2019). There were difference between the genders in the French programs. A detailed study about the topic can be found in Frizzarini (2018).

Froebel's toys are objects composed of spatial geometric shapes that should be touched, observed and explored. They were initially proposed for Kindergarten, but they were also present in primary school. Particularly, the second *gift* contains three special solids, so children could compare their different shapes: a sphere with a round surface, a cylinder with two plane faces and one curved surface, and a cube with all of its faces plane.

The Froebelian method circulated in Brazil in the second half of the 19th century, especially from the 1870s on. Joaquim José Menezes Vieira[12] founded the first Kindergarten in Rio de Janeiro in 1875, and published *Manual para os jardins de infância, compilação das ideias de Froebel e Mme. Pape-Carpantier* (Kindergarten Manual, a Compilation of Froebel's and Ms. Pape-Carpantier's Ideas, in free translation) in 1882. The book comprehensively describes the *gifts* proposed by Froebel, his propositions and the exercises that teachers should do with each one of the toys. Next, Vieira specifically presents handcraft propositions, like modelling, working with green peas and sticks, weaving, paper folding, interweaving, cutting, embroidery, articulated sticks, working with cardboard and drawing. It is possible to state that the manual is a lesson plan for teachers.

Another method that was portrayed in the travelers' records about their experience in Belgium is the Boogaerts method, which was studied by Frazão in the course he took at Nääs School:

> For working with paper, intelligent and hardworking Mr. Boogaerts, based on mathematical principles, found a way of devising a countless number of exercises and of building a thousand different objects, which not only help develop students' hand skills, but also their imagination, while they also contribute to aesthetic culture and are a powerful assistant in the teaching of geometry. (REIS, 1892, p. 517, our translation).

[12] Menezes Vieira was a doctor and an educator. He founded and directed *Colégio Menezes Vieira* (Menezes Vieira School, in free translation) (1875-1887). Kids' School, adjacent to Menezes Vieira School, was directed by Carlota Menezes Vieira, his wife, and adopted Froebel's material. He was part of Paris Exposition Universelle (1899); of school exhibits (1884-1887). He founded and directed *Pedagogium Museum* (1890-1897) (BASTOS, 2011).

According to Reis, the Boogaerts method is a direct follow-up, for primary school, to Froebel's proposition in his Kindergarten educational program, with handcraft taking part in the pedagogical process for the teaching of geometry. It contains a series of systematic handcraft exercises directly linked to geometry, which shows that Boogaerts tried to remain

> […] always loyal to the great pedagogue's [Froebel] principles. All geometry is applied through constructions with paper. Such science penetrates children's spirits through eye and finger exercises, and admirably prepares them for the true way of physical development (from concrete to abstract), for the notion of the truths of the mathematical domain. (REIS, 1892, p. 518-519, our translation).

The method uses only paper, and all activities (folding, cutting, gluing, modelling) are exclusively done by hand. Hand work is the motor that starts from concrete objects in order to enable the understanding of mathematical abstraction.

Based on Reis' reports, it is possible to observe the similarity between Boogaerts's and Froebel's methods in relation to the use of folding to build spatial and plane geometric shapes in a way that children could manipulate them. It is also necessary to highlight the importance of connecting the making and the handling of the shapes with colors and combinations that result in beautiful and aesthetic decorations. The method stresses that it is not necessary to use any instruments – set squares, compasses – to build the shapes in order to avoid any tools and to make the initial teaching of geometry more playful.

About *Slodj,* Conceição (2019) emphasized that a direct articulation between drawing and geometry was important because it enabled a way of combining teaching with practical activities, which was also encouraged by Boogaerts's method, because

> […] they form the basis for natural drawing in a better way, so children know the models perfectly. Students

> themselves build them, and different difficult levels are introduced, from the simplest to the most complex. (REIS, 1892, p. 523, our translation).

Amélia also emphasized that "the lesson is taught on the board, and the teacher will do the exercise at the same time as the students, who will understand the explanations more easily, because they will have the model before their own eyes" (COSTA, 1891, p. 146). Through *Slodj,* the education of the body, senses and attention was stressed and promoted, always in articulation with drawing, so no object was built before it had been sketched, drawn, analyzed and visualized.

> Swedish people call handcraft Slodj. Although it is not of professional nature, it demands some hand skill. Other languages do not have a word that can express such idea precisely, so they make use of expressions, which can be short or long. Consequently, the word *Slodj* has been accepted in several countries. Therefore, it would not be a mistake to use it instead of *handcraft*, which does not have a precise meaning, because it means everything that can be done by hand, with or without a professional connotation. […] The whole pedagogical process should be directed from concrete to abstract. (FRAZÃO, 1893, p. 354, our translation).

Thus, an important part of the work with handcraft should be choosing models, which should be diverse and adaptable, with progressively growing difficulty, without formalization, from concrete to abstract. Drawing without instruments was considered an important stage to express students' visualization, thinking and intentions both in observation and in practice, in order to inspire hand dexterity, especially in paper and cardboard, while following the idea that what students can notice intuitively should also be done by hand.

After learning from foreign educators, several teaching recommendations and propositions were appropriated and put into circulation by the travelers, especially Froebel's and Boogaerts's methods and *Slodj*. As seen in the traveling teachers' records, there was a formal

intention for geometry teaching to be intimately linked with handcraft, mainly with regard to shapes (construction, drawing, modelling and/or working with cardboard).

For primary school, the three methods stress the need for handcraft to be connected with intuition, practice, construction of geometric shapes without instruments, closely linked to observation, starting from concrete actions and ascending to mathematical abstraction. It is also important to highlight the absence of machines or tools. The direct articulation with drawing is an important step, because it objectifies the expression of thinking, visualization and children's intentions, as well as the possibility of including practical activities in the teaching practice.

In summary, the three methods emphasized here - Froebel, Boogaerts e *Slodj* – characterize handcraft as pedagogical work in order to support geometry teaching. Nevertheless, as stressed by Burke (2016, p.113), what arrived to us was not exactly what happened abroad, because

> [...] whether you call it transference or circulation, we need to remember that the knowledge that we receive is not the same as the knowledge that was originally developed due to misunderstandings, deliberate adaptations or cultural translations.

Therefore, we aim at understanding how such representations that were put into circulation by the travelers were appropriated in Brazil, more specifically in Rio de Janeiro.

## Handcraft in Rio de Janeiro

The end of the 19th century, right after the Proclamation of the Republic (1889), was a period of major transformations in the Brazilian educational process. The city of Rio de Janeiro played an important part at that time because it was the Federal Capital, so many important political, legal and educational discussions happened there. Among those

discussions, there was a substantial curriculum reform for primary and secondary school focused on the Federal District of the interim government. It was the Benjamin Constant Reform[13] of 1890, the first public instruction law in republican Brazil.

Traveling teacher Manoel Frazão was responsible for the development of a part of the 1890 program, specifically the section about the Handcraft discipline, and he was in charge of following the standards recommended by Nääs School from Sweden. Even though the foreign propositions were already in circulation in Rio de Janeiro, as we have seen, the program only referred to Froebelian works suggested for girls. In addition, it is important to highlight that the program was written before Frazão's pedagogical trip, that is, his proximity to handcraft preceded the course he took in the previously mentioned seminar.

The 1890 Reform program explained little about handcraft teaching, but it also happened to the other disciplines that were introduced in the program. However, *Revista Pedagogica* (1891) offered a Detailed Program, in which one can observe that geometry contents were continuously emphasized based on different handcraft activities, as in this extract about cardboard work:

> 1st – With cardboard, form a 20 cm by 20 cm rectangle; 2nd – Construction of the metric scale; 3rd – Sides of triangles, quadrilaterals, polygons, including dodecagons; 4th – Cutting a circle and a semi-circle. (PROGRAMA, 1891, p. 132, our translation).

The articulations between handcraft and geometric knowledge highlight a relation to the intuitive method, to the promotion of active learning, about things, objects and children's intuition. In other words, its main purposes for the development of models, cardboard work, cutting, paper folding, sewing and woodworking are contained in the construction of

[13] Regulation published on November 8th, 1890, through decree number 981. The law introduced the first republican program for primary school.

handcraft itself, especially in response to social, intellectual, moral and physical development of future men and women. Geometry knowledge was harnessed as a good model to be reproduced.

On the other hand, an analysis of the Geometry[14] discipline from the 1890 program showed that it had two different focuses. The first one involved the observation and comparison between spatial figures, which students were more familiar with, but it did not involve the construction of such figures, as can be seen in the extract below from the Geometry program:

> Knowledge of spheres, hemispheres and circles; of cones; of the triangular pyramid and of the triangle; of the quadrangular pyramid, of quadrilaterals and their variations; of cylinders; of prisms; of the parallelepiped, of the cube. Comparison between a cone and a cylinder and an explanation of their differences. Of straight, broken, curved and mixed lines and their tracing. (RIO DE JANEIRO, 1890, n.p. , our translation).

The second focus of the program was closer to the abstract character, to the formalization of concepts, involving the identification of properties and definitions, that is to say, it was even more distant from a type of teaching based on handcraft practice. Moreover, in Geometry regulations, there was no reference or suggestion to the use of concrete materials or instruments, to practical activities, to the making of objects for the teaching of geometry knowledge. Thus, it was possible to state that the articulation of Handcraft with Geometry only happened in a single direction, in which geometric elements were harnessed in Handcraft teaching, but the same did not hold true for Geometry teaching. It is a Brazilian appropriation based on the knowledge that was brought in from abroad.

In order to better understand the complex circulation and appropriation of foreign knowledge in Brazil, while still trying to capture moments of systematization of *action knowledge* (VALENTE, 2019), we

[14] From 1890 to the mid-1960s, Brazilian primary school programs had a discipline called Geometry, which was separated from the other disciplines that involved mathematical knowledge. Over the decades, they were called Arithmetic, Drawing, Mathematics and others.

analyzed two books that were strongly promoted at that time: *Primeiras noções de Geometria Prática* (First Notions of Practical Geometry, in free translation), from 1894, by Olavo Freire and *Trabalhos Manuais – cartonagem escolar* (Handcraft – school cardboard work, in free translation), from 1897, by Ezequiel Benigno Vasconcellos Junior.

Olavo Freire da Silva was the curator of Pedagogium Museum. He was responsible for preserving the museum collection, organizing exhibits and teaching courses to educators. In 1894, Freire stopped working for Pedagogium and was invited to be a Handcraft teacher at *Escola Normal Livre* (Free Normal School, in free translation). Ezequiel Vasconcellos Junior, who was Freire's disciple and to whom he dedicated his work, graduated from the capital's Normal School. He was a Handcraft teacher at the 2nd public school for males at Santa Rita's parish, and his work was praised in handcraft exhibits that were held by Pedagogium Museum.

Olavo Freire's[15] book is based on practical geometry with focus on geometric elements, measurements and daily life objects, but always referring to the construction of geometric figures through the use of a ruler and a compass. The articulation of geometric knowledge is strongly linked to geometric drawing. Practical geometry is interpreted as the practice of drawing with instruments, not as the practice of making handcraft.

There are some signs of cardboard work in Freire's book, regarding the teaching of polyhedrons, however this is not truly evidenced in the body text or in the exercises that he proposes. The author's goal is the knowledge of solids through observation of their bases, side surfaces, height, edges, that is, teaching should be focused on geometry concepts with no proposition of handcraft activities that would students enable to build the referred solids. In summary, although Olavo Freire had some expertise as a Handcraft teacher and had worked for the Pedagogium, a space that welcomed foreign propositions, his publication about the

[15] A detailed study on Freire's book can be found in D'Esquivel (2018); Frizzarini and Leme da Silva (2018); Leme da Silva and Valente (2014).

teaching of geometry knowledge did not emphasize handcraft as a possibility of pedagogical work for the teaching of geometry.

On the other hand, Vasconcellos Junior's objective was to teach cardboard work, which, as emphasized by the author himself, consists of making plane figures, geometric solids and useful objects out of cardboard or thick paper. In order words, it promoted the construction of geometric solids. The manual was organized in two parts. The first section, which is theoretical, was called "*Geometria – noções e definições gerais de geometria"* (Geometry – Geometry Notions and General Definitions, in free translation) and was targeted at teachers. The second section was practical and targeted at students. The theoretical part is a small Geometry compendium, with definitions and the presence of constructions through ruler and compass, similar to Freire's proposition, but shorter. In the practical part, there are cardboard, weaving and cutting activities, and most of them made use of squared paper.

According to Vasconcellos Junior (1897), his manual aims at proposing elements for handcraft teaching based on what was being developed in some European countries, especially in France and Belgium, constituting a segment of handcraft teaching of great educational importance that should be performed after Froebelian works. Freire's manual did not make any reference to the methods promoted by the travelers, only Vasconcellos Júnior mentioned Froebel's work. However, he did not explain how it should be proposed and articulated in his recommendations.

Once more, it is possible to notice a link between the activities proposed by Vasconcellos Júnior (1897) and geometry teaching, but not explicitly as a teaching method. According to the author, the relationship between handcraft and geometry knowledge should happen simultaneously, but he did not explain such interaction.

Therefore, the analysis of the books published in the end of the 19th century revealed a single-way articulation, which seems to show that

geometry knowledge was intuitively inserted into handcraft practice, whereas the harnessing of handcraft in geometry teaching was not equally evidenced.

Years later, in 1923, a new primary school regulation went into effect in Rio de Janeiro. The reform was named Carneiro Leão, who was the public instruction general director at that time. In the program, it is possible to observe, again, that handcraft walked hand in hand with geometry knowledge and they appeared together in the same topics. For instance, for the first grade, Geometry teaching was based on "Practical knowledge with observation of the solids in question: the sphere and the cube" (RIO DE JANEIRO, 1923, p. 8), so that students acquired a clear notion of curved and plane surfaces, preparing them for other notions like faces, angles, edges and corners. At the same time, the Handcraft program proposed the modelling of spheres and cubes, and of objects like these solids, with materials similar to Plasticine/Play Dough.

Moreover, while the 1923 program discussed the teaching of sewing, cutting, *Slodj* and woodworking, it introduced innovations by explicitly approaching geometric knowledge in teaching, as in the modelling program for the 1st grade: modelling of spheres and cubes and of objects that had an approximately spheric or cubic shape with materials similar to Plasticine/Play Dough.

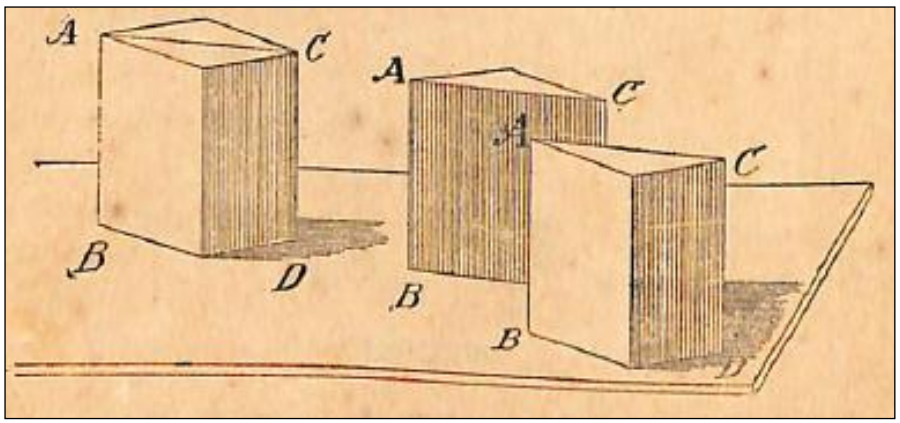
Nevertheless, things were not the same when it comes to Geometry, whose contents were presented without any handcraft proposition, with observation and comparison between solids performed exclusively by sight. That is to say, the relationship was seemingly established in a single way because Handcraft harnessed geometry knowledge, but Geometry did not incorporate Handcraft in its practice as a method. Once more, the systematization of action knowledge (handcraft through geometry) seems to be a long objectification process, according to Valente (2019).

In the 1923 program, *Slodj* was mentioned and proposed for the Handcraft subject in the 2nd grade, exclusively for boys, expressing its

purposes – performing woodworking that had a practical use – and stressing that this type of teaching should not be considered the beginning of professional learning.

Still in 1923, the book *Geometria (Observação e Experiência)* (Geometry (Observation and Experience), in free translation), by Heitor Lyra da Silva[16], was published. According to the author, his proposal for Geometry teaching was modern and appropriated the international circulation of pedagogical models that had not been previously followed in Brazil. An import and relevant characteristic of Heitor Lyra's proposition, in association with its experimental aspect, was the insertion of handcraft as a supporting tool for geometry teaching. Figure 1 contains an example of the articulation proposed by Lyra, in which a parallelepiped-shaped soap bar should be cut in order to generate new geometric figures, triangular prisms.

**Figure 1**: A study of the triangular prism




**Source:** Silva (1923, p. 40)

The articulation of handcraft and the study of geometric notions is also present in the exercises proposed by the author, like the making of geometric solids through cardboard work with specific measurements. As stated by Silva and Leme da Silva (2019, p. 13), the proposition of activities like modelling and cardboard work

[16] A detailed study on Heitor Lyra da Silva's book can be found in Silva and Leme da Silva (2019).

> […] allows us to observe and to touch the solid in order to identify its properties; the concreteness of the object in the beginning of the exploration of figures is an important element in a methodological proposition that values senses, things and experiences.

Heitor Lyra's book indicated a change in the articulation of Handcraft teaching and geometric knowledge, moving closer to what was observed in international discussions about Boogaerts's method, in which the construction of geometric elements and their composition were understood as essential elements to handcraft teaching in order to support geometry teaching.

In 1928, a new regulation was introduced, reflecting the emergence of new international discussions about a type of pedagogy called Progressive Education[17]. Since the program did not contain the contents for each subject, it is not possible to infer anything about the articulation of handcraft and geometry. Nevertheless, the year 1929 saw the publication of the book *A Escola Ativa e os Trabalhos Manuais* (Progressive Education and Handcraft, in free translation), by Corinto da Fonseca. Fonseca (1929) clearly highlighted the strict articulation of mathematical knowledge and handcraft:

> *Mathematics is one of the disciplines that offer better possibilities for handcraft.* In any type of handcraft, there are always measurements to take, calculations to do, so there is always some geometry, arithmetic and even algebra to apply. In a general way, whatever its occasional didactical application is, handcraft is always an applied mathematics course, an executed mathematics course. (FONSECA, 1929, p. 36, our italics, our translation).

[17] The principles of Progressive Education acted in primary school in order to evidence its purpose of educating students entirely. Teachers' centrality should be replaced with children's interest, needs, experience and activities (SOUZA, 2008).

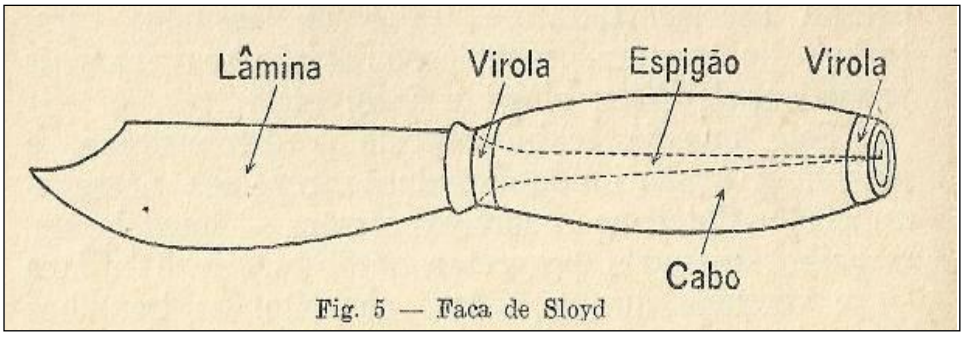
Fonseca's manual was considered exclusively theoretical and it informed how Handcraft teaching should be performed according to Progressive Education:

> We observe that handcraft is not a new and independent discipline that is side by side with other subjects, but it is part of all other disciplines as a didactical *means*. Handcraft is the Progressive Education methodology par excellence, and it represents more a mental task than a material one, despite the materiality of hand work. (FONSECA, 1929, p. 26, author's italics, our translation).

Therefore, as an actual methodology, not just as one more discipline contained in programs, handcraft should take part in the teaching of all subjects in the program, especially in the mathematical field disciplines. Corinto's defense of handcraft as a methodology clearly corroborates his proposal as pedagogical work for geometry teaching, which shows that the international discussions were appropriated by Brazilian travelers.

Corinto's book pointedly discusses *Slodj* and considers it woodworking, as had been done in the 1923 program. In other words, no matter how much the Brazilian travelers' propositions highlighted *Slodj* as a handcraft methodology in a general way, it seems that it was inserted into the Brazilian context as woodworking practice.

**Figure 2**: Handcraft knife




**Source:** Fonseca (1929, p. 40)

Figure 2 shows the "Sloyd knife", presented in the book as suited for woodworking[18], highlighting a specific type of handwork, but not the methodology as a whole. Once more, foreign knowledge gained new understandings and interpretations in Brazil (BURKE, 2016).

In 1934, there was a new publication of primary school programs by the Education Department of the Federal District, but we could only have access to the mathematics program, in which Progressive Education propositions were highlighted. The program was organized in projects, articulating language and social science subjects, which established a close link between handcraft and geometric knowledge. For example, in the teaching of geometric solids, the program recommended cardboard work so as to establish the differences and analogies among them [the geometric solids], to provide a perfect breakdown of their faces, edges, vertexes and angles, and to take special care of the accuracy of representations, especially regarding proportions (PROGRAMA, 1934).

At the same time, relevant publications of the day restarted to reference elements that had been stressed as innovations by the travelers from the 19th century, which was the case of *Trabalhos manuaes escolares* (School Handcraft, in free translation), published in 1934 by Afonso Penna, who clearly stated the modern orientation of handcraft:

> […] without the slightest theoretical concern, but simply as a powerful tool for the education of the sight, while it empowers children's comparative sense, which is so necessary for our improvement over our existence. There are authors, however, who disagree with the making of geometric solids regarding the teaching of modelling because, according to them, they stress that their edges are never perfect in clay or any other material. Well, if we were concerned about a rigorous study of the geometric shapes, they would be right. Nevertheless, this is not our aim, because the exercises in question are recommended to

[18] The making of the *Slodj* knife was proposed for secondary school. However, the author stressed the need for creating a work plan before making the knife, which should be made by students of other grades. At that moment, the book introduced how to make a blueprint, a mold of the object through drawings in vertical and horizontal planes, which introduced the geometric notions of perspective and measurements. However, the use of instruments, like the *Slodj* knife, is mentioned since primary school.

> children who have just started learning, in the first two years of the course. The study of the most common shapes provides students with a powerful educational means composed of half a dozen standards, safe comparison terms for the countless different shapes existing in nature. (PENNA, 1934, p. 135).

In other words, an educational handcraft proposition – with strong articulation of geometric knowledge – was advocated in a publication around 40 years after it had been initially proposed and promoted by the travelers. Froebel's and Boogaerts' methods and *Slodj*, put into circulation by the travelers in the end of the 19th century, were appropriated and adapted to the Brazilian context and were gradually incorporated into regulations and pedagogical manuals.

## Conclusion

This study aimed at analyzing the complex appropriation and objectification processes of the articulation between handcraft and geometric knowledge, which were put into circulation based on international contexts. We identified that the three methods highlighted by the Brazilian travelers in the end of the 19th century – Froebel's, Boogaerts's and *Slodj* – were appropriated, but not equally incorporated, referenced or "copied" from the traveling teachers' reports. The names Froebel and *Slodj* were more mentioned, both in regulations and teaching manuals, whereas there was no direct reference to Boogaerts's method in any of the sources we analyzed, although his propositions were identified.

On the other hand, even though there was no direct reference to the methods, our analysis of over four decades of the Rio de Janeiro context pointed that the handcraft principles stressed by the travelers were incorporated into the teaching of geometry through a slow objectification process. In other words, for handcraft to be considered "a powerful tool in geometry", a real teaching method in which hand work is the motor that

enables the understanding of geometric abstraction, a long time was necessary, with the help of new pedagogical movements, new authors, *experts,* so that handcraft could be legitimized as pedagogical work for the teaching of geometry.

In addition to the enormous complexity of transferring, circulating knowledge, recognizing the misunderstandings, adaptations and appropriation required when it comes to transposing knowledge from one culture to another (BURKE, 2016), it is equally necessary to consider the process of incorporating new pedagogical practice into school culture, which is the case of handcraft as an educational means.

As a reflection, our story has a happy ending. Although the Handcraft discipline disappeared from primary school programs, the incorporation of handcraft as a potential ally for the teaching of geometric knowledge is present in current regulations, as well as in 21st-century textbooks, now with new challenging purposes.

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