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ARTIGO ORIGINAL/ ORIGINAL ARTICLE

The mathematical teacher education of indigenous teachers in Brazil in the last decades of the 20th century: memoirs of a teacher educator

A formação matemática de professores indígenas no Brasil nas últimas décadas do século XX: memórias de uma professora formadora

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ABSTRACT
This article presents a historical study based on Oral History as a research methodology and on situated learning theory. The data analyzed are the memories of a teacher educator who trained indigenous teachers during the last decades of the 20th century. Based on the reality of indigenous education of some ethnic groups in Brazil, mathematics educators who teach teachers elaborated different proposals from the ones in use. The data were produced from interviews, authorial texts, and recollections of the teacher about her pedagogical actions in training courses for indigenous teachers. The results revealed an intense dialogue between indigenous and non-indigenous knowledge and pedagogical proposals for schools. Those elaborated proposals value the ethnic, cultural, and social diversity of each ethnic group, no longer guided by a Eurocentric and elitist understanding of mathematics but based on knowing the existence of different mathematics typical of different cultures and social groups.

Keywords: Mathematics Education, Mathematical Education of Indigenous Teachers, Oral History.

RESUMO
Este artigo apresenta um estudo histórico pautado na História Oral, como metodologia de pesquisa e na teoria da aprendizagem situada, como referencial teórico, a partir do qual as memórias de uma professora formadora de professores indígenas, referentes às últimas décadas do século XX, foram retomadas e analisadas. Discussões e ações sobre a realidade da educação escolar indígena de algumas etnias do Brasil por educadores matemáticos formadores de professores, estruturaram a elaboração de propostas diferenciadas das modalidades então em vigor. Os dados foram produzidos a partir de entrevista, textos autorais e rememorações da professora em suas ações pedagógicas em cursos de formação para professores indígenas. Os resultados evideciaram a promoção de um intenso diálogo entre os conhecimentos indígenas e não indígenas, assim como a elaboração de propostas pedagógicas para as escolas, valorizando a diversidade étnica, cultural e social de cada etnia, não mais orientadas por uma compreensão eurocêntrica e elitista da matemática, mas pautando-se na compreensão da existência de diversas matemáticas, próprias das distintas culturas e grupos sociais.

Palavras-chave: Educação Matemática, Educação Matemática de Professores Indígenas, História Oral.

INTRODUCTION

> *Filadelfia Village, Benjamin Constant County, February 1996. At this rainy time in Northern Brazil, there was the Indigenous Teachers Education Course for the Ticuna people, in Alto Solimões, Amazonas State. I, as teacher of the Mathematics and Mathematics methodology disciplines, during the back and forth journeys through the route where Javary River runs to Solimões River, stepping on mud of different colors, slippery and fine, of the river beds and floods, thought that, under my feet, I could have the raw material that, if well addressed within a didactic situation, could provide moments of cultural expression and the mathematical thinking of Ticuna teachers.*
>
> *By reasoning about this cultural matter characteristic of the Ticuna people and also about the knowledge embedded by teachers-students about the plane geography forms and the local and universal measurement units, I sought to take to the classroom a familiar and pleasant activity to the students; it would be based on using the clay collected right there, under our feet and, based on it, we would discuss about the countless situations that could come up from it.* (Corrêa, 2001,183-184).

This excerpt brings back memories of a teacher trainer; they also rescue stories, knowledge and experiences that highlight a way of thinking and developing the mathematical education of indigenous teachers in Brazil, in the late 20th century.

We herein aimed at approaching some moments of this story. We sought to disclose the Mathematical understating and the Mathematics teaching supporting the education actions taken by this teacher between the 1980s and the 2000s, through her memoirs. To do so, we carried out an interview with her in November 2021. Based on the transcription of this interview, the teacher recalled some other facts and moments, as well as collected documents (publications, field journals and reports [1] produced for PhD thesis). Thus, the produced narrative became an extended and in-depth version of the original interview.

The elaboration of the present article was supported by the joint and reflected writing that was discussed by the authors and inspired by Oral History as methodology, based on Garnica (2005, p.7):

> (a) the transience of its results; (b) the impossibility of a prior hypothesis whose research aim will lie on proving or refuting; (c) the non-neutrality of researchers who, during the interpretative process, take their perspectives and filter previous experiences they cannot get rid of; (d) that the formation of their understandings take place not as the result, as within a trajectory where these same understandings, and the means to get to them, can be (re)configured; and (e) the impossibility of reestablishing regulations for systematic, previous, static and generalist procedures.

Accordingly, similar to Silva (2019, p.43), we understand that, although there are no "regulations or recipes about how to build and treat interviews as research source", there are two essential aspects: a careful and justified description of the adopted procedures and the centrality of the

[1] As part of the material produced in her Doctorate (Corrêa, 2001), "eight reports about the eight worked steps were produced – of the total of 15 steps – in the Teacher Education Course. The work started in 1995 and finished in 2001" (Corrêa, 2001, p. 21).

negotiation process set with the deponent, since the first contact.

To analyze the narrated experiences, we sought inspiration in the sense of situated learning (Lave, 2015; Lave and Wenger, 2001), because, similar to Lave (2015, p.40), we understand that:

> The sense that any activity (and it surely included learning) is situated in – made of, is part of – associations among people, contexts and practices, in the theoretical core of the social practice theory took us to the ideas that learning is situated in complex communities of practices (cultural and mutating, as part of a historical process that has formed the social life). Things are built for and based on their relationships; and, thus, cultural production *is* learning, which *is* cultural production.

Hence, this learning process, in practical terms, concerns a relational understanding of practices, participation, people and contexts, in a way other than that usually thought as learning, i.e.:

> Whenever a study about learning is intentionally focused on one single individual, there is one thing to be learned, and the particular trajectory of the thing has to be drafted in order to reach the individual's head, all three are set as (unique) relevant entities. Before starting the analysis, they are set as if in parenthesis when it comes to participation relationships in the on-going practices. The theory of social practice invites us to broaden the research in the ethnographic field, and insists in the relevance of daily practices as the *locus* of people's lives production (Lave, 2015, p.42).

An important implication of such an idea lies on the sense that learning means participating[2] in social practices; thus, "it is not possible approaching 'learning' or 'culture and learning' without taking in to consideration their entanglement to the political-economical life, to struggles and historical disputes, their coherence and inconsistences". (Lave, 2015, p.45).

Accordingly, the present article was structured as follows: we started by briefly addressing the history of indigenous education and of indigenous teacher education in the country; subsequently, we describe the process to become a educator of indigenous teacher, based on the interview; and we go on describing and analyzing some events experienced by indigenous teachers yet in the teacher education process. The article ends with some considerations about the [mathematical] indigenous teacher education in Brazil.

A sight over the formal indigenous schooling process in the late 20th century

The history of indigenous education in Brazil, which we will briefly approach, was supported by the catechization, civilization and forced integration of indigenous peoples to the national society. This was the reason for having indigenous schools that "worked as instrument to impose differentiated identities and cultures" (Plano Nacional de Educação, 2001, tópico 9.1). We will herein introduce information about the 1980 to 2000 timeframe by situating the first actions for the mathematical education of indigenous teachers and the time of stronger actions taken by Teacher Roseli.

[2] The sense of participation is essential in this theory. Frade and Tatsis (2009 apud Deodato, 2012, p.28), by getting closer to the definition proposed by Lave and Wenger (2001) for the Education field, state: "Participation includes speaking, doing, sensing and perceiving: learning is dealt in terms of distinction between venture types than in distinctions of human qualities and knowledge".

According to Grupioni (2006, p.47), from the 1970s onwards, one could see the rise of

> civil entities for indigenous peoples' support, that have started to act with certain indigenous communities" in different regions countrywide and, along with them "education projects specific to the social-cultural and historical reality of indigenous peoples, based on a new educational paradigm that respects inter-cultural aspects, multi-languages and ethnicity.

In the struggles for the recognition of traditional territories and for economic alternatives that could make it possible achieving "great autonomy for indigenous communities' (p.47), schooling gains prominence as tool to establish "less submissive relationships and more egalitarian ones, either with official 'indigenism' sectors or with other segments of the Brazilian society" (p.47). Thus, it is essential for indigenous individuals to learn a second language – Portuguese – and to dominate some mathematical operations.

By paying close attention to this new way of thinking, the Acre Pro-Indian Commission (CPI/Acre), stood out as "one of the pioneer institutions in the initial formation of indigenous teachers at high school level" (Matos & Monte, 2006, p.83). Between 1983 and 2005, this entity implemented the mathematical teacher education courses for indigenous teachers; they "covered the diversity of 10 societies in the region, based on the collaboration of State bureaus and of international agencies and on the personal engagement of professors from dozens of universities" (p.83).

One of the implemented projects during this time was "An Experience Elaborated by Indians in Acre State"[3] - cited by Craveiro and Perret (2007, p. 113). It was created in 1983 based on the implementation of the Program of Differentiated and Bilingual Intercultural Teacher Education, in 2000, which would be "the first indigenous school education experience in the country; it was based on indigenous participation and on its autonomy to create their own schools" (Craveiro & Perret, 2007, p. 109).

As for the specific case of mathematical teacher education among indigenous teachers, the course "Sciences and Mathematics Teaching in Indigenous, Urban and Rural Contexts" – created between 1985 and 1990, in the Araguaia River region, Mato Grosso State – is considered one of the first of this kind in the country and the precursor of Inajá projects I and II. In both bases – course and projects -, the active participation of Unicamp professors was essential for their conduction (Moreira and Baraldi, 2016).

This whole move concerns the active participation of universities; it is reinforced by the 1988 Constitution and by the Bill of Guidelines and Bases of National Education, also known as LDBEN, from 1996. The Constitution, in its article 210, guarantees to indigenous peoples "education in their mother language, and the right to set their own learning processes and the respect to their cultural and artistic values" (Brasil, 1988). LDBEN, in its articles 78 and 79, provided on the right to "a specific and differentiated school for indians, and the offer of bilingual and intercultural school education" (BRASIL, 1996). Accordingly, as

[3] According to the author: "The whole Project was thought based on the very expectations of indians for gathering knowledge to make sure about the possession and management of their territories, to get the means to improve the life conditions in their communities, by reinforcing their mother language, customs, traditions and by keeping their extractivist culture. The indigenous teacher would represent the chain linking the traditional knowledge of their people to non-indigenous knowledge" (Craveiro & Perret, 2007, p.111).

highlighted by the National Discipline Matrix Reference (RCNEI):

> Brazil slowly found the cultural differences that have survived after almost five-hundred years of acculturation and assimilation attempts of these peoples. Nowadays, it is certain that there is not just a reference in our past, but that it will be part of our future (Brasil, 1998, p. 31).

It is also important highlighting CNE/CEB Resolution n. 03/1999, which provided the National Discipline Matrix Guidelines for Indigenous School Education. Besides endorsing the ideas found in RCNEI, it approaches the teacher education of indigenous teachers. Based on this document:

> For the indigenous school education to be really specific, differentiated and adjusted to the cultural peculiarities of indigenous communities, it is necessary for professionals who act in schools to belong to the societies involved in this school process. There is consensus that indigenous educational customers are best assisted by indigenous teachers, who must have access to initial and continuous teacher education courses that are especially planned to deal with indigenous pedagogies. (p.15, emphasis by the present authors)
>
> The qualification of indigenous teachers requires the participation of experts in formation, experience and sensitivity to work aspects typical of indigenous education, including professionals from the Linguistics, Anthropology and other fields, who are not always easy to be accessed, given the small number of such professionals in the country. These experts' profile must be drawn based not just on their academic titles, but on a set of other competences that are not exclusively supported by the fact of having, or not, a major degree, which is a requirement among the demands of State Education Councils to authorize the courses to work (p.16, emphasis given the present authors).

Accordingly, the Guidelines either acknowledge that indigenous school education must be provided by indigenous teachers or that their formation "requires the participation of experts with teacher education, experience and sensitivity to work with aspects typical of indigenous education" (Brasil, 1999, p.16), selected based on carefully thought criteria rather than just on their titles.

Learning "how to make it": becoming a indigenous teacher educator

The teacher's participation in study groups about Mathematics Education, Modeling and Mathematics History had impact on the way she thought about school mathematics and about how she acted in the classroom. These experiences broadened her interest in matters enquiries, such as: Why should we teach and learn Mathematics? How can we teach this discipline?, among others. The pedagogical deeds started to embody ideas coming from these study fields and aimed at contextualizing and at giving meaning to what was taught (Corrêa, 2001).

Simultaneously, in 1989, she entered her Master's Degree in Mathematics Education at Universidade Estadual Paulista (UNESP), in Rio Claro; she was advised by Prof. Eduardo Sebastiani Ferreira. Her advisor invited her to join the study group called Seminar of Mathematics Education History (SHEM). This group was created one year before, by professors of the Mathematics, Statistics and Computer Sciences Institute (IMECC) at

UNICAMP[4]; it aimed at conducting in-depth studies about the History of Mathematics and Mathematics Education based on the pedagogical practice of Mathematics teachers. Besides, issues focused on the school education of indigenous and other groups seen as sociocultural minorities always had room in the group's discussions (Corrêa, 2001). SHEM had strong influence on the development of pedagogical propositions in the Mathematics field for courses aimed at indigenous teacher education. Sebastiani Ferreira and professor Marineusa Gazzetta were precursors in working with indigenous mathematics education in Brazil.

These educators started their field work in indigenous lands by assisting a course focused on teacher education belonging to ethnicity Tapirapé, in central Brazil. Sebastiani Ferreira started working with indigenous teachers in 1985, when he was called in UNICAMP by two non-indigenous teachers from the Tapirapé school (Corrêa, 2001). He accepted the invitations to respond for a consultancy and, after visiting the village, he elaborated the proposition to support the school; he asked Marineusa Gazzetta to join the project (Corrêa, 2001).

He also acted as assessor and consultant at Waimiri-Atraori Program, which was elaborated along with the indigenous, themselves. New schools have emerged, but now they counted on teachers belonging to these ethnicities and who were prepared to teach. The school was now differentiated from the already known urban and rural schools. "It was differentiated in terms of school calendar, which follows the traditional celebrations, the work in the crops, the hunting and the collective fishing" (Sebastiani Ferreira, 2004, p. 84-85). He always aimed at:

> ... teacher education the indigenous teacher/researcher, based on Ethnomathematics, in other words, the Teacher/indian is the ethnographer of its own culture and the one building the bridge from this knowledge to the so-called Western Mathematics, in order to propose to the students a careful educational process. This is the proposition by the Ethnomathematical Research Program created by Ubiratan D'Ambrosio (Sebastiani Ferreira & Corrêa, 2011, p.215).

Marineusa Gazzetta acted in several indigenous teacher education projects (Inajá Prokect/MT, Tucum Project/MT, Pirá-yawaura Project/AM, among others); she was the president of the Indigenous School Education Committee (bond to the Education and Culture Ministry – MEC). She had active participation in the elaboration of National Discipline Matrix Guidelines for Indigenous School Education and in the production of Mathematics didactic materials specific for indigenous teacher education, in general. Throughout her experiences in the villages, she observed that:

> The knowledge and know-how typical of each culture are found in the daily lives of communities, more in ones than in others and, most of the time, the teacher, itself, holds all this knowledge, but putting this knowledge in schools' the discipline matrices is not an easy task. First of all, because the formal school does not belong to the original culture and, based on several indigenous peoples, the aim of this school is to teach "things of the white man, because the things of indians we teach ourselves"; secondly, because indigenous schools belong either to the municipal education network or to the state network, and most of them are not

[4] Nowadays, it is called Institute of Mathematics, Statistics and Computer Sciences.

> allowed to have a specific and differentiated discipline matrix, they must follow the single matrix adopted by the referred network, although the Bill of Guidelines and Bases of Education ensure them a bilingual, specific and differentiated education. Several indigenous teachers' formation projects were, and are, developed, as well as others focused on follow-up and discipline matrix development, but only few indigenous schools in the country keep the principles of intercultural education (Gazzetta, 2009, p.159-160, emphasis given by the present authors).

According to Roseli, the almost 10-year participation in SHEM – getting to know the differentiated thoughts and attitudes in the work with cultural and social minorities, by critically discussing them, by exchanging ideas about experiences lived in different regions countrywide with teacher education – was the very foundation of her formation as researcher, professor and indigenous teacher educator.

Several Works at SHEM [5] focused on Ethnomathematics as ethnographic research and Mathematical Modeling project within its pedagogical and other dimensions; it approaches the History of Mathematics and its educational implications – which were developed. It is in this context that Roseli is introduced to Indigenous Education and invited to join Project Inajá I. About her participation in it, she stated that:

> *My first contact with indians, nominees for teachers in their village, happened in Inajá Project – Teacher Education Course for the Lay Teachers in Mid-Araguaia Region, in 1988, when I went to work as the courses' teacher, in São Felix do Araguaia, MT. This job, at first followed the pedagogical coordination by UNICAMP/IMECC professors; it had Prof. Eduardo Sebastiani Ferreira and Prof. Marineusa Gazzetta among its coordinators. [...] She attended the professor-students group of the course, which counted on approximately a dozen of indians from the Karajá and Tapirapé tribes, teachers from villages in regions of municipalities participating in the project. Later on, in the city of Santa Terezinha do Araguaia, to the North, I could broaden my knowledge on indians belonging to both ethnicities, as well as about their people. This knowledge allowed me to get closer to the group of indigenous teachers and to start learning about how to deal with differentiated cultures* (Corrêa, 2001, p. 4 - 5).

According to her, this experience was really remarkable for her professional development as indigenous teacher educator and had significant impact on the courses proposed in the following years. Roseli also highlights the methodology adopted for the Inajá Project. It was this very methodology that encouraged her to accept the challenge of becoming an indigenous teacher educator:

> *Working at Project Inajá I, in all its stages, was a great source of learning. In my search to enhance a pedagogical practice that was unacceptable in urban public schools, this work allowed me to reason about new approaches and new directions to education. (...) They had to get to know their region of origin and to assess it based on its several aspects and phenomena. This was the initial pedagogical strategy and*

[5] In the introduction of her book "Mathematical Ideas of Culturally Different Peoples", Mariana K. Leal Ferreira (2002, p. 9) states that "the first systematic research about mathematical concepts and systems of culturally different peoples date back to the late 1970s, and they value the studies about ethno-knowledge, with emphasis on Anthropology and Sociology disciplines, and on matters of sociocultural nature in international conferences on Mathematics Education (Leal Ferreira, 2002). According to her, "it formally launched a new field in ethno-sciences: ethnomatematics" (Leal Ferreira, 2002, p.9).

> *the courses' starting point. Based on this knowledge, and on what was reported and explained by the teachers-students groups, the work in specific field kept on going* (Corrêa, 2001, p. 5).

Based on Moreira (2016), "Project Inajá stood out due to its differentiated methodology, since it worked with students based on what they already knew". Similarly, Camargo (apud Moreira, 1997, p. 70) highlights, by reporting the experience lived in Project Inajá (1987-1990) with lay teachers from Mid-Araguaia region, Northeastern Mato Grosso State, that "the action along with teachers coming from the countryside, from the city, from the patrimony and from Tapirapé Village was a great challenge, either for us or for them, students" and that the Project methodology "was differentiated because professors had autonomy and the perception that they had to adjust it to the region's needs, that they could not act as they used to with their students in Unicamp".

Later on, at early 1990s, a Project for Ticuna [6] teacher education took place in Upper Solimões River region; it was boosted by a non-governmental organization (Matos & Monte, 2006, p. 83). This action also pointed out that the focus was a "specific and differentiated indigenous teacher education in order to reinforce the language and the traditional knowledge of one of the biggest indigenous populations in the country" (Matos & Monte, 2006, p. 83).

This and other propositions for the indigenous teacher education were encouraged and reinforced by the 1988 Constitution that

> Ensured to Brazilian indians the right to think like indians, in other words, to remain themselves, with their language, cultures and traditions. By acknowledging that indians could use their mother language and their learning processes in school education, one implemented the possibility of the indigenous school to help the process to ethnic and cultural positioning of these peoples by leaving the position of one of the main vehicles for assimilation and integration". (Grupioni, 2006, p. 56).

It was at this time, after the enactment of the new Constitution, that Roseli started acting as trainer of indigenous teachers. Beyond her work in São Paulo and Minas Gerais states, she worked in the indigenous teacher education in Mato Grosso and Mato Grosso do Sul states (along with many ethnicities in the region - Xavante, Terena, Kadiwéu, among others), as well as in Amapá (Waiãpi) and Amazonas (Ticuna) states. Except for Amazonas State, she worked for short periods-of-time and its part did not last long. However, these experiences were enough to get her closer to the reality of an indigenous education guided and coordinated by non-indigenous, a fact that evidenced the multiple forces implied in the indigenous school issue held by non-indians (Corrêa, 2001, p. 6).

From 1995 onwards, she acted as teacher educator and assessor of the Course for the Indigenous Teacher Education of Xingu [7]

[6] Located close to the boundaries among Brazil, Colombia and Peru, this Project was initially developed by Centro Magüta NGO, and it was managed by the General Organization of Bilingual Ticuna Teachers (OGPTB) (Matos & Monte, 2006).

[7] The Indigenous Xingu Park (PIX) houses, in its 2,642,003 hectares in Mato Grosso State, an amazing variety of indigenous groups, which are differentiated from the ethnic, linguistic and sociocultural viewpoint. There are fourteen peoples with estimated population of 4,000 people. The Indigenous Teacher Education Project started in 1994 with the support by Vida e Ambiente Association. In 1996, it started being managed by Socioambiental Institute http://www.dominiopublico.gov.br/download/texto/me002041.pdf

Indigenous Park and as teacher educator of the Course for the indigenous teacher education of Ticuna Teachers from Upper Solimões Region. In this last course, Roseli joined the faculty when the course was in its fifth stage, which would have fifteen stages up to July 2001.

From the implementation of courses at higher education level for indigenous professors in 2001, Roseli acted as Mathematics professor of the first college degree for indigenous professors in Brazil, provided by the State University of Mato Grosso (UNEMAT), in Barra dos Bugres County, MT.

Fig. 1: Roseli and students of the course (2001)

Source: Interviewee's archive.

The words by the Project Coordinator, Professor Elias Januário, well-describe what this first offer by the Higher Education Project for Indigenous teacher education meant:

> Mato Grosso State took a large step forward and it represented a historical landmark in the Brazilian Education with the Indigenous Higher Education Degree, that is now in its IV Stage; it is the national benchmark and offers three major degrees in the Mathematical Sciences fields, as well as in the fields of Nature, Social Sciences and Language, Arts and Literature; there are 200 indigenous teachers from 36 ethnicities and 11 states in the federation. The university is offering open, non-excluding teacher education substantiated by intercultural approaches and by respect to ethno-cultural differences and to societal projects of indigenous peoples (Diário de Cuiabá, 2003, s/p).

Later on, the Federal University of Santa Catarina (UFSC) started offering higher education courses for indigenous teachers from Southern Brazil: Guarani, Kaingáng and Xokleng. The Indigenous Intercultural Degree of South Atlantic Forest proposed the following topic as guiding axis: Indigenous Territories: Land and Environmental Issues in the Atlantic Forest Biome, which was coordinated by the Department of History of Philosophy and Human Sciences Center (UFSC). In 2013, during the fifth stage of the course, Roseli was invited to occupy the seat of discipline "Ethnomatematics", which would address the "Study about the meaning of the coverage and pedagogical dimensions of ethnomathematics in indigenous communities and schools".

These reports shine light on the interviewee's trajectory in indigenous school education, mainly her experience as teacher educator. Next, we will introduce and discuss some of the events experienced by her during her action in the mathematical teacher education of indigenous teachers.

The mathematical teacher education of indigenous teachers: a look at three episodes

Next, we describe and analyze three episodes that clarify the work developed by Roseli in the courses for the indigenous teacher education. The first one – To get to Learn Math – reports an experience developed in partnership with Professor Pedro Paulo Scandiuzzi, at national Xingu Park, and with other teachers from different ethnicities. The two following events depict

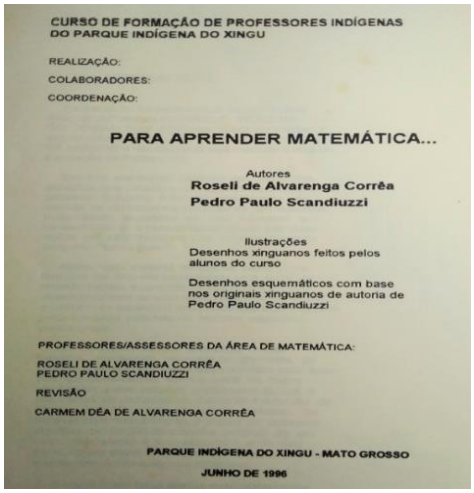
actions taken along with on-going teacher education of Ticuna teachers. They were selected among many other teachers because they represented different moments of their trajectory and because they could provide a view of the planning, development and reasoning process of/about formation actions.

Xingu indigenous Park-MT: to get to learn math

From 1995 onwards, Roseli worked as professor and assessor of the Course for the Indigenous Teacher Education from Indigenous Xingu Park. She worked in partnership with professor and researcher Pedro Paulo Scandiuzzi. "It was a good partnership)" (excerpt from the interview, November 04th, 2021), according to her. Together, they elaborated a work proposal substantiated by the professors and students; it was published in the 4th Newspaper of the Xingu Education Course – Nov./1995. According to her:

> *Based on a more methodological aspect, we aimed at suggesting to the professor some work strategies in his school by starting from a closer look to the reality and to his student; we wanted to understand and to get to know about her. For the next stage, in the coming year, Pedro Paulo and I prepared a handbook that was mainly developed for the students. The activities were weighed and elaborated based on works carried out by him. As for the materials' composition, we used some of his texts, the research they have developed [...] as shown in the pictures"* (excerpt of the interview, November 04th, 2021).

The following images depict the produced material:



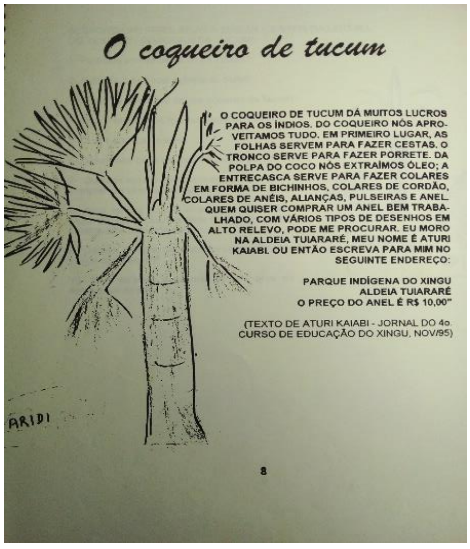
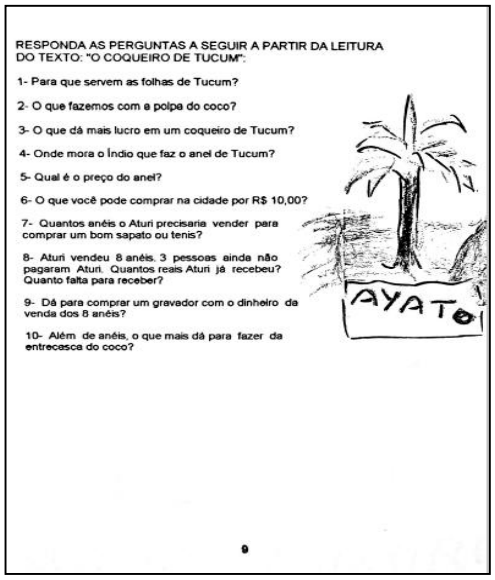


Fig. 2 to 6: Cover, back cover, text example and questions made by teachers.


RESPONDA AS PERGUNTAS A SEGUIR A PARTIR DA LEITURA DO TEXTO: "O COQUEIRO DE TUCUM":

1- Para que servem as folhas de Tucum?

2- O que fazemos com a polpa do coco?

3- O que dá mais lucro em um coqueiro de Tucum?

4- Onde mora o Índio que faz o anel de Tucum?

5- Qual é o preço do anel?

6- O que você pode comprar na cidade por R$ 10,00?

7- Quantos anéis o Aturi precisaria vender para comprar um bom sapato ou tenis?

8- Aturi vendeu 8 anéis. 3 pessoas ainda não pagaram Aturi. Quantos reais Aturi já recebeu? Quanto falta para receber?

9- Dá para comprar um gravador com o dinheiro da venda dos 8 anéis?

10- Além de anéis, o que mais dá para fazer da entrecasca do coco?

Source: Interviewee's inventory.

The initial activities proposed in the produced material/handbook ("To get to Learn Math…") were elaborated by the teachers-students based on situations that approach issues that demanded a new reading of texts they have produced in order to get to the answers, besides research in other sources. The texts approached, among other topics, the ones related to mathematical knowledge, notions of magnitude, position, attribution of quantities and values, in situations of comparison, location, counting, measurement, recognition of shapes, among others.

In its second part, besides the activities focused on "mathematical language", teacher students prepared some topics about geometric concepts based on Kaiabi sieve braiding and on body painting made by the students with pictures and schematic drawings by Pedro Paulo – researcher of Xingu indigenous art. They worked with the sense of Sequence (making a necklace, for example), of Symmetry types from the dynamical viewpoint; in other words, of moves that change in the plane figures emerged from.

During book elaboration, says Roseli, we took into account two basic factors for the formation of indigenous teachers: getting to know and deepening mathematical matters boosted by interest and need, and on those dictated by its actions in the classroom, by suggesting some pedagogical strategies from a closer look over its reality and over that of its students (Interview, November 04th, 2021)

Filadelfia Village, Benjamin Constant County, AM

Roseli's experience with the indigenous teacher education gave her the opportunity to be invited to manage the Course of the Indigenous Teacher Education for the Ticuna people from Upper Solimões Region, from 1995 on. She continued the work in disciplines 'Mathematics' and 'Mathematics Methodology'. According to her:

> *The possibility of also managing the following stages was pleasant, because, overall, in previous courses, the negative aspect lied on the non-continuity of the work. Not returning to the field also meant not counting on a return, by the teachers (…). This fact impaired a reflexive analysis of my own pedagogical action. The idea of continuity in the other stages could favor the conduction of a more reflexive stage, focused on the reality of the indigenous Ticuna community for the education they intended to have and also for the mathematics they wanted to learn* (Corrêa, 2001, p. 6-7).

By recalling the first stage of her work with Ticuna teachers, Roseli disclosed that:

> *I didn't take any material with me and, practically, I almost didn't have a reference for what I was about to develop. It could be about fundamental arithmetic operations, by continuing with the previous carried out work. But, where could I seek the quantitative elements to operate? What would be the situations they would be coming from? What did students know about it? How did they teach their students?... I wandered. My initial concern*

> *was actually to investigate the group of teachers-students of the course: what they knew, how they knew it, how did they use such a knowledge and what would they like to know about specific mathematical subjects. On my side as learner, I aimed at creating strategies that could also help me getting to know them based on their acquired formal knowledge, in their art, history, beliefs, and daily experiences. Most activities carried out with the students at this stage intended to get to know each other better, to develop trust in each other and in our work, to learn to argue, to question, without fearing the cultural differences imposed over us, since we were in contact with cultures – that of the professor and that of the students – that, we almost did not know. In particular, pedagogical propositions situations aimed at creating an environment where students would feel freer in contact with the "figure of the professor", they could trust this character and make it closer and more accessible* (Corrêa, 2001, 7-8).

At this stage, Roseli discloses a concept about teaching and learning that highlights the deep understanding (although not formalized at that time) that all knowledge is situated and that, within this process, all are learners, including the one who teaches. Thus, based on Lave (2015, p. 40):

> [...] the effort of productive observation must focus on the relationships between apprentices (including changes in the participation of all involved ones, in their different forms). It is very useful acknowledging that an apprentice is not a person who does not know, who is learning (knowledge) from someone who knows. Actually, it is the opposite, apprentices are engaged (with others) in learning what they are already doing – a multifaceted, contradictory and iterative process. Besides, it may seem that from this viewpoint "apprentices" are individuals, but they are never only it. They are engaged in daily practices, in multiple contexts, they participate in different ways with each other. The way people learn is something that can be more captured by the sense of changing participants in the on-going practice than by naturalized assumptions about knowledge acquisition.

Thus, getting to know the group better, based on the interviewee, gave her the elements to plan her work for the following stage, which would take place one year later, in 1996, as she reports:

> *I acknowledge the difficulties I faced in this initial stage of the course, since we did not have anything previously structured in terms of mathematical contents and didactic materials, they came up through students' and our enquiries about the assessed reality. Actually, I learned how to make it, by doing and getting inspired by the practices of more experienced professionals* (Corrêa, 2001, p.5).

The 1997 and 1998 stages were previously structured; each one of them was based on a broader knowledge about the group, about pedagogical situations internal and external to the formation course, about internal and external political issues of the Ticuna people, which resulted from municipal, state and federal institutions and from NGOs.

The Ticuna culture found in stories told and wrote by teachers-students: Buriti story

Similar to the previous event, yet, throughout her work with the Ticunas, Roseli always took the opportunity to use the production of students in the Teacher Education Course, be it from the Mathematics classes or that from other disciplines.

As for this event, we approached the

formation actions that come from the text "Buriti[8] Story", which was produced by an indigenous teacher still at the teacher education stage. She tells the story of a Buriti palm tree and relates it to aspects of the history of the Ticuna world, to its social relationships and to its relationship with nature.

Fig. 3. Cover and text of the book 'Buriti Story'

BURITI STORY

Buriti is used by man to be eaten and to make wine. It also works to feed the animals. There is buriti in the buriti crop, in land and in the resting.
People plant buriti by their houses.
The animals who eat buriti are: tapir, deer, tortoise, paca, coati, wild pig, macaw
Buriti does not die when it is in the water.
The fruits, when they get soft, they fall.
Then, the animals eat them, under the buriti tree.
The time of buriti is when the fruits get black.
Then, people go get them.
When buriti is too tall
people cut it down to get the fruits.
Then, people go get the buriti and share it with each other.
They put it in their bag and take it home.
Then they leave it for four days to make it black.
When it is black, it is left in a container with water to make it smooth.
Two hours and it gets smooth enough.
Then people eat it and make wine to drink and eat with flour

Source: interviewee's personal inventory.

We can herein observe the articulation of social practices of the non-indigenous culture and those of the indigenous one in a harmonious way. The written record – non-indigenous culture – was surrounded by a learning/ enculturation process that values and respects the indigenous culture. The social non-indigenous practice of writing and reading was articulated with the history of indigenous social knowledge and practices. If one takes into account that it concerns the indigenous teacher education, it is possible observing similarities with a practice community where authors contribute with their knowledge to build a situated school

[8] Small book written and illustrated by the student Hermelinda Ahuê Coelho, from Canimaru village, in 1996. (Corrêa, 2001, p. 400-410).

knowledge. Roseli recorded her reasoning about these and other matters in her reports, as follows:

> *In order to write the 'Buriti Story', the author also tells a little about the history of her people, she talks about the relationship between the man and the animals, and the forest and this palm tree species that is quite resistant to floods. Through the text, the reader can observe that cutting down the too tall buriti trees to pick up the fruits remain a practice and she also highlights, even in the illustration, some aspects of the village's social relationships when she talks about the division of fruits, about how to deal with it and, finally, about drinking wine [...]*
>
> *Besides the social and cultural issues concerning the relationship between people in the village and their lives in the forest, the text also points towards* ***spatial, temporal and quantitative*** *issues found in this relationship.*
>
> *Where can we find it? When is its time? How many bags of it? How many days? These are the questions that can be made when the aim is to pick up fruits and have them as food. We can make many other questions. It all depends on what we already know about this subject and also on our will and need of knowing it deeper, of making an in-depth search to broaden our knowledge.*
>
> *Thus, the number of texts produced by Ticuna teachers and by their students, to tell the story of their people, of their relationship with the forest and of the animals, their myths and legends, by reporting their celebrations, their craftwork, their cuisine, the manufacture of their artifacts, among others, are, for indigenous and non-indigenous readers, an endless source of knowledge, of learning and questioning, along with other texts, they bring knowledge from other cultures. At this point, we find the books, the newspapers, magazines, among others* (Corrêa, 2001, p.403-404).

Her reflections suggest the care for "learning through practice", based on one's own daily routines and on what is important for one's culture. Broadening the understanding about what is already known and including new knowledge.

> Learning through practice means learning to do what you already know and doing what you do not know, in an interactive way, simultaneously. These relationships, which are multiple and contradictory, are all, together, and at the same time, the relationship" in question – call it "'learning in/as practice" (Lave, 2015, p.41).

Roseli use the text (Buriti Story) to develop mathematical concepts with indigenous teachers:

> *In its second stage, called: "The Text in the Classroom", I point towards the use of interdisciplinary approaches in the "Buriti Story" by the very arguments supported by different knowledge fields to encourage the will to get to know more and the search for new sources and texts. With respect to the particular case of Mathematics, we reasoned with the students that:*
>
> *From now on, we will give this text a direction heading towards mathematical questions found in several of the described situations, without, however, getting far from the thinking that the mathematical concepts that will rise from our questioning are immerse, surrounded and related to ideas that set the basis of diverse knowledge and cultures that, as a whole, can provide us with the dignifying life conditions in the world.* (Corrêa, 2001, p. 406).

This view of both indigenous school education and mathematical knowledge to be approached in the course for the indigenous teacher education came to Roseli through her reasoning and questions: Why do we have to learn mathematics in indigenous schools? What is the mathematics to be taught and learned? How do we work mathematics in indigenous schools? What is the reason of mathematics education in indigenous schools

and for the village's daily life: According to her:

> *The reasoning, the questioning, the critical analysis also lie on my own pedagogical work, on how I aimed at developing it, on what ideals they were supported by or, briefly, on the philosophy forming it and it made the creator of action strategies for different moments, for each situation, for each cultural call by the indigenous group. [...] Writing down the reports did not mean only making a linear report on a daily basis about the development of the work, but it mainly meant a reflection about it, questioning it, exchanging experiences and seeking new ideas in the fields of Mathematics teaching methodology, of Mathematics Education in the indigenous school* (Interview excerpt, November 04th, 2021).

Another important feature of the carried out work lies on the flow and articulation between the work stages and, many times, between the activities performed in different disciplines. The next event depicts such a fact. Besides the book 'Buriti Story', many other books were produced by the indigenous teachers yet in the formation stage. They are the source of inspiration for the development of the work with clay that we describe below

Clay as source of mathematical learning: "it could not be in a way other than chatting and listening"

As mentioned in the excerpt of her memoirs that open her book, Roseli sought her raw material to plan her classes in the surroundings of school, in the forest and the life of its community, as she reported: *'stepping on the mud, of different colors, slippery and fine, on the river beds and flooded pathways, I thought that it was there, under my feet, a raw material that, if worked out in a didactic situation, could provide moments of expression of mathematical culture and thinking of Ticuna teachers,* and that is how it went.

During the activity performed with clay, she started from the stories told and recorded in the books produced by Ticuna teachers, themselves, to create the action strategies. As she has stated in the interview:

> *(...) when we started to work with the geometric concepts, I used the clay from the region. The students sought for it and brought the clay to class, asking: Well, what are we going to do with clay? At this stage, they elaborated small books, due to the schedule of other disciplines in the course, such as the case of the Buriti Story, they told stories of their homes, of the animals, of the farm. Thus, they told stories by writing them down or by drawing them, carefully and in details to form small books. [...] I suggested them: Lets' tell these stories by using clay? [...] And they gathered the groups, five or six, each, and each group chose one story, one book. They set with clay by their sides, reading the book, they used to go back in the reading, page by page, and they got the clay thinking about what to model. As molding objects with clay was common to them, they did wonderful things. After this moment, it was the time to each group show to the others what they had done. Each group told what they did and how they did it. It was just like that. With clay, they made figures in the shape of animals, of animals climbing trees, the palm tree leaves, all in clay. Houses, music instruments, a lot of things were produced. Imagine it, with approximately 100 students in each classroom, it was a lot of material! Still, in this stage, we made a first selection by highlighting to them: look what you have here. We organized a central area in each classroom where each group kept the most significant shapes to tell the chosen story. Carefully, they put the clay shapes on the table reserved for the exposition. A whole world of materials. All this moment was recorded since we expected to use it in the next stage* (Interview excerpt, November 04th, 2021).?

Once more it was clear the understanding that learning through practice demands

"practices that deeply interest its participants, in a direct or indirect way; they concern participants' involvement and move between the contexts of their daily lives, and this is important to understand how the change in participation ends up happening" (Lave, 2015, p.43). Thus, what actually came up at the end of the first stage of the work was the creation of characters represented in the sculptures that told the story written in small books.

Fig. 7. Two moments of the work performed with clay: animals' modeling (1996) and the modeling of geometric forms (1997).

Source: Interviewee's archive

This material is used again in the stage:

> *When returned to the next stage, what did we do? We showed them what was done before through the recordings. We returned to work started in the previous stage. New forms we elaborated and added to the collection. Then, they were subjected to a first classification, but now having in mind criteria focused on forms and on the utility aspects they represented. What can we do with all these things? They asked. At first it was: nature forms and forms of what men do. Then, they separated, but some forms remained, the ones that represented the myths, that they did not select. And what about these forms? I asked. Oh, this is not about nature, or about animals, birds and such, and it is not from there [...] I always question, always make enquires. Questioning is essential at this time. And, thus, the work went on until we started to think about more representative forms of each village, for example, of a water tank, things like that, either of indigenous origin or of things that they compared to the city, water cans that they used to carry water, this is of indians, and this here is not of indians* (Interview excerpt, November 04th, 2021).

This sequence of activities highlight several aspects related to the conception of mathematical teacher education of the indigenous teacher. First, there was the deep respect to the culture of the Ticuna people. Mathematical teacher education was not based on the cold introduction of an Eurocentric Mathematics, but on the valorization of its culture. Secondly, it was possible observing a careful sight over their daily lives and over the Mathematics observed in their social practices.

> *Then we started thinking about this forms' issue, whenever it was possible, look at this pan here, always talking, it could happen in a way other than chatting and listening. And always seeking a systematic aspect, a record, a register is essential, a record it on the board when they made their first classification. I was writing on the board: objects that represent nature, objects that represent the work done by men, things like that so they could have the record in their notebooks. Then we started to work some geometric forms. I used to take newspapers. I got some in Manaus and took some from here to my region. We observed forms in a picture, for example, a box or a building: what do forms that we are doing here with clay look like?, I asked. This way I aimed at triggering their attention to the objects in their tridimensional form, it is sort of a complicated thing, when they are represented in a bi-dimensional way. I projected on the screen with the projector*

> *some of the clay forms and they saw the shade on the bi-dimensional form. They concluded that, what there is in a picture is a bi-dimensional situation, but of a tridimensional thing. At this moment, Ana would get to the didactic book we had to consult... (...) Then, we would go to the book, look, comment: look here, how it is introduced, there is a dashed line, why?* (Interview excerpt, November 04th, 2021).

The combination of these aspects is materialized in a teacher education proposition substantiated by the experience of situations loaded with meaning for the local culture – clay as the basis for the creation of a structure that embodies its myths and surroundings -, in which mathematical concepts are explored in an organic and creative way. Furthermore, this experience is not merely playful, but it brings along the sense that the indigenous teacher learns by experiencing situations close to their culture and daily life, it will have more conditions to recreate these learning situations with its students, as well as to elaborate other propositions just as rich as this one.

This experience reported in the teacher educator´s journal does not end at the conclusion of her time in the village. It – just as all other experiences lived in the villages - is the very basis for further reflections described by her:

> *In the classroom, in the 1997 stage, we returned to the last procedures, and it resulted in a whole amount of classic geometric forms, in a number large enough for all groups of students to handle and observe, with the care and attention necessary for the work to go on. What we had for our class was a large table full of geometric forms that were built by students from both classes. I mentioned that we had a "didactic material" that would be used to go on with our studies. Each one of them knew what was concretely present on that table: a material to be used for didactical ends and that was built by themselves, in other words, representative models of their reality – based on the concept by D'Ambrosio (1993) – and, therefore, they were full of meaning, since they resulted from a continuous and creative process of ideas, procedures and actions.*
> *In opposition to the procedure we had adopted in the activity with clay, we discussed, in the classroom, that classical action according to which the teacher would bring the material ready for the classroom (in this case, solids) to be didactically used, clay, paper or wood. "How would the involvement of students with these objects be? I asked, aiming at triggering the discussion about the didactic procedures in favor of the pedagogical work they developed in the village's school* (Corrêa, 2001, p.195-196).

This report allows inferring that the teacher education action was substantiated by reflection – action – supported by the study and by the intense observation of the environment of the indigenous culture. This action finds echo in the work developed in other regions. Craveiro & Perret (2004, p.115), for example, highlight that "with respect to didactic materials, results are impressive due to the amount and quality of materials produced by indigenous teachers". Nowadays, by recalling such experiences, Roseli stresses:

> *I had the opportunity to reason about this work carried out when, finish the stage, I recorded all experienced moments, I aimed at getting aware of concepts (although in a very intuitive way) that could guide me to the creation of strategies for Mathematics classes and for Mathematics Methodology* (Interview excerpt, November 04th, 2021).

There were these reflection moments that allowed her to seek, or even to return to, some ideas – sometimes, from a new perspective - by researchers and professors in the field we were acting in and investigating. Roseli assumes that the actions taken in her work with clay representation were based on ideas resulting from her own experience in the classroom, with non-indigenous students. Based on D'Ambrosio (1993), she could reflect about alternative

actions through "representations and models", when the idea was to reduce the degree of complexity of a given reality by isolating some parameters and by choosing others to concentrate the analysis:

> Reflecting about the representation means a usual action alternative that reduces the degree of complexity of the reality by isolating some parameters. In essence, it starts from the global reality to the location over which we focus our reflection. This process allows us to reach representations over which we aim at building the action strategies, thus, we aim at starting from the local to reach the global (D'Ambrosio, 1993, p. 11).

A closer look over what we could call the pedagogical proposition developed with the indigenous teachers discloses three core dimensions:

- **methodological,** at the scope of the Teacher Education Course, by creating the opportunity for students to create and recreate, by using clay as the bonding and revealing element of their ideas and representations, and as the source of suggestions for the creation of future work strategies for their students in the village's school. With respect to the analysis and appreciation of each step of the developed work, teachers could observe it, by having in mind the taste for this work and the easy access to raw material in the communities. Based on the reports by the teachers in the following stage, some were already performing activities with clay and with other materials in order to trigger their students' artistic expressions and the learning of geometric concepts;
- **cognitive:** specifically related to mathematics learning by returning to and deepening in the assessed concepts, either of spatial geometry or plane geometry to structure the next stages, the learning of new concepts, mainly the ones associated with the spatial and plane metric geometry, besides the positional;
- **sociocultural:** related to the need of solving problems brought by social practices, mainly by those focused on dimensions of land and calculations of area and volume. This is the factor that actually holds, supports and gives meaning to the previous ones when one seeks answers for questions such as: "why do study geometry?". The viewpoint by Sebastiani Ferreira (1991) supports these statements when one sets the relationship between Mathematical Modeling and Ethnomathematics; he says:

> In the attempt to find a solution for a problem one finds the need of new mathematical techniques and strategies; at this moment the teacher (...) will have to use the pedagogical procedures he thinks more convenient (...). It is necessary to introduce new concepts, mathematical techniques and results unknown by the class. Motivation is high at this moment, because students are willing to get to know new mathematical concepts to solve a problem elaborated by them and that has meaning in their daily lives (Sebastiani Ferreira, 1991, p. 3).

Their experiences, combined to the work of other education professionals who also work in indigenous villages, and to the systematic reasoning about the whole experienced process led to the understanding that

> *A course for the indigenous teacher education must be analyzed, understood, structured and developed from a particular viewpoint, immerse in features of the ethnic group, which must be taken based on its social and cultural relationships, and by taking into account the values that are legitimized by the group in their teaching activity. There are several and complex situations in formal indigenous education that, until past decades, at large scale, were performed based on the most traditional 'school of white'* [9] .(Interview excerpt, November 04th, 2021).

[9] Name given by the indigenous teachers to the non-indigenous schools. Based on this model, the content is the starting point to pedagogical actions. In this case, the student is the passive receptor, and the teacher is the one

By returning to her reports during the interview, Roseli mentions that by reading the answers from her Ticuna students about what they think about teaching Mathematics at the school (records from the late stage in Jan/Feb, 2000), she observed that those were the records of the thoughts of more than 200 teachers who had attended the course. According to the trainer teacher, these writings were her legacy, the outcomes of her work in the teacher education course

> *... Before, we taught to our students through didactic books provided by the Education Secretariat, the carried out activities and the teachers' book had ready answers. Nowadays, the teacher has to search with the students, interview an old man to tell a story. The subject comes up by the teacher along with the students (...). We can work aspects of the culture of our Ticuna life in the math classes (...) we can play a game, sing a song and create activities based on the story told or on any other chosen subject* (Gilberto Alves Tertuliano and Darcy Augusto R. Fidelis apud Corrêa, 2001, o. 179-180).
>
> *We, Ticuna teachers, teach the children in math classes in totally different way from that of white man. It is so, because we don't learn math just through numbers. (...) before, we had few ideas and, now, we are very creative. In math classes we can approach aspects of our own culture by using materials produced by the children or by the community* (Paulo Guedes Farias and Saturnino Jesuino Jumbato apud Corrêa, 2001, p. 179-180).
>
> *...We create mathematics activities to our students...So, the teacher has an easier time teaching the children. We work aspects of our culture, by telling stories to the students and, afterwards, we approach the mathematics based on the stories told by the elderly* (Jesus Caetano apud Corrêa, 2001, p. 179-180).
>
> *... at the Ticuna school, math is not just coming from books. Because Mathematics is around us, at any place where different ethnicities and cultures live* (Esaú Cristóvão Lázaro, Adelson Jumbata and Cacildo Matos Ramos apud Corrêa, 2001, p. 179-180).
>
> *... before, I just taught my students what was coming ready in the didactic book. I never thought in inventing a problem for the students. Nowadays, I am prepared because I learned a new practice. We can work cultural aspects through the text, producing books, creating problems and activities* (Artêmio Bibiano Muratu and Juscelino Tauana Guedes apud Corrêa, 2001, p. 179-180).

These testimonies highlight, among other factors, that teachers are not against the use of non-indigenous didactic books in the classroom. According to the trainer teacher:

> *substantiated by a core idea: what is this people, what is this community, how do they live, what are their ideas, what do they expect for the present and for the future? The questions we make, overall, are the same. The difference lies on the answers, each one in its space, at its own time. Todays' time is not that of 25 years ago, when we worked in the indigenous teacher education (whose memories we try to bring back in this article). (Interview excerpt, November 04th, 2021).*

Such reasoning gets closer to the discussion about recent contact approaches suggested by Tassinari (2001, p.51):

> The current attention given to spaces between peoples and cultures by Anthropology results, somehow, from the special moment we have been living, which is marked by globalization... [...]. Anthropology pays close attention to regions on the borders, to contact and interchange zones, it provides us with a theoretical frame that breaks the concepts (or pre-concepts) that set the demarcation lines between (them" and "us", indians and non-indians, by opening new theoretical horizons to understand

holding the knowledge. Mathematics teaching, besides the early formation of concepts, of the excessive concern with teacher education skills and not understood mechanization, there is one more aggravating factor marked by the high rates of failure (PCN, Mat.,1998, p.19).

situations like the ones in the classroom in an indigenous village.

Similarly, the trainer teacher highlights how these demarcation lines become finer overtime and due to the technological advancements:

> *Based on the most recent experiences I had in this last decade, their teachers and schools have already advanced in the use of technological apparatus, due to the internet. Certainly, my work with the Ticunas, in particular, would likely adopt, at present times, other strategies. So, it is a different time, but the questions we make to get to know each other, maybe not as clear as I say now, these concepts, based on the reflections we make over a life time. And this is how things are built, as a project is elaborated, as a teacher. If I am going to work, for example, with a group of teachers in rural schools, then I have to take into account matters typical of this group. I have already worked with EJA teachers and students in Northern Minas Gerais State, in Jequitinhonha Valley, in cities close to the Alagoas/Sergipe border on behalf of UFOP, as well as in some regions in São Paulo State. Different geographic spaces, they have a great experience, because they are willing to learn, why is reading so important to them, the writing, making calculations? So, all these questions must be made, it has to be known by the teacher who is right there with the group. The answers will give them the ways to build their work propositions, about how to approach mathematical questions, for example: Why do we make calculations? When I went to work with the Ticunas, they used to say that they wanted to go back and learn basic operations. And I, based on fulfilling their expectations, asked myself how to learn the operations, what are them and where do these quantitative data we use to sum, subtract, multiply and divide come from? Then we have another story, a new enquiry.* (Interview excerpt, November 04th, 2021).

FINAL CONSIDERATIONS

The present article was substantiated by the memoirs of a trainer teacher of indigenous teachers. She, along with Sebastiani Ferreira and Marineusa Gazzetta, were some of the first trainer indigenous teachers in the Mathematics field, in our country.

According to Roseli, the Ticuna people (just as peoples in Xingu and all others) have their own space, culture and history. The way they think and want school and school education in their villages is closely related to these particular features of their people, mainly to the way they relate to non-indians, throughout almost 13 years of contact. When one thinks about creating pedagogical strategies specific to a given group, it is essential knowing the aspects of its life, its views of education, its expectations for the future of their people, its beliefs and world concepts, by knowing the changes that, because of the contact, quickly impose new habits and attitudes to indigenous peoples due to a whole series of activities and actions from their daily lives (Corrêa, 2001). Thus, she states that:

> *The impossibility of building a discipline matrix proposition in the Mathematics field for Ticuna schools when we think them in separate. Although specific and differentiated, they bring along all the historical potential of the process to build indigenous education schools in Brazil, as well as the current expectations of indigenous groups for their schools. Expectations that highlight common points and differentiated points based on the features typical of each people.* (Corrêa, 2001, p.24).

Based on this view of education and of indigenous mathematics education, activities that approached topics concerning students daily/cultural routines were elaborated; among them, one finds food recipes, crops,

ornaments, and tururis[10] drawings, the lines of the nets and pacarás,[11] barks, locations, land size, among others. These approaches became the boosting and meaningful elements that, on the one hand, encouraged the development of the Ticuna's mathematical thinking and, on the other, showed the features of a way of thinking and doing education to open space to reinforce and revitalize the cultural identity of indigenous peoples.

In her analysis about the work developed in formal indigenous education, just as Lave, Roseli acted in compliance with the understanding of mathematical situated learning. According to her: "indigenous education, besides matters of educational issues themselves, comprises factors of local/regional order linked to others spheres of the State, of the Country that cannot be set aside in teacher education courses focused on indigenous teachers" (Corrêa, 2001, p.10). It is so because they produce their reflexes on teachers' daily practices and on the village's school. In other words:

> *We cannot expect a "formula" of how to make it. A specific and differentiated school education – indigenous or non-indigenous – cannot work as integral model to another, at different spaces and/or times. Each one is one. The researcher must act in the school education field, investigate, get to know it from different aspects, to be open to the other: listening, chatting and learning* (Corrêa, 2001, p. 96).

Accordingly, the concept of mathematics linked to the formation actions focused on indigenous teachers taken by Roseli are not supported by the Eurocentric and elitist understanding as being the only one, but, actually, by the understanding about the existence of different mathematics, typical of different cultures and social groups. In a coherent and articulated way, it was possible developing a concept of Mathematics teaching that gets closer to the sense of situated learning by seeking the social practices of indigenous peoples (by respecting differences between ethnicities), which is the very basis for learning this discipline. This concept is clearly evidenced by the promotion of actions according to which the 'new' mathematical knowledge (of the non-indigenous culture) was learned through indigenous teachers' engagement and participation in activities that were familiar and relevant to them.

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[10] Tururi: kind of grill made of tree bark fibers used by Ticunas to produce garments/masks used in traditional celebrations, in craftwork and in frames. "The art of tururi" in a video, it shows the whole process, from its harvest to its use. https://iieb.org.br/video/a-arte-do-tururi/

[11] Pacará: a kind of jacá made of braided palm tree leaves. It is coated with banana leaves and used to store local goods such as cassava flour.

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