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ARTIGOS

Access of indigenous peoples to formal education: science education: a challenge, a reality [1] [2] [3] [4]

Acesso dos povos indígenas à educação formal: ensino de ciências: um desafio, uma realidade

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Abstract: Faced with the refuted hypothesis of the reduction and the extinction of indigenous peoples in Brazil, new perspectives and demands have emerged. This research aimed to investigate the access of indigenous peoples to formal education, especially in relation to science education in the state of Rio Grande do Sul. The indigenous schools of the Kaingáng and the Guarani ethnic groups were contextualized from the perspective of spatialization considering the Mesoregions, the municipalities, and the respective Regional Education Coordinators. The aspects investigated include number of enrollments (from 2011 to 2015), number of science teachers and their respective ethnicities, and the contribution of the school libraries. Thus, it is understood that there is a great reflection and consequent application of financial resources, aiming at the inclusion of indigenous peoples. However, demands have been identified, such as the adoption of principles of interculturality and bilingualism, the lack of adequate libraries and collections, the lack of science teachers, and the lack of indigenous teachers.

Keywords: education, science study, training

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Resumo: *Diante da hipótese refutada da redução e da extinção dos povos indígenas no Brasil, surgiram novas perspectivas e demandas. Esta pesquisa objetivou investigar o acesso dos povos indígenas à educação formal, especialmente em relação ao ensino de ciências no estado do Rio Grande do Sul. Foram contextualizadas as escolas indígenas das etnias Kaingáng e Guarani, sob a ótica da espacialização considerando as mesorregiões, os municípios e as respectivas Coordenadorias Regionais de Educação. Os aspectos investigados abrangem: número de matrículas entre (2011 e 2015), número de professores de ciências e respectivas etnias, e a contribuição das bibliotecas-acervo no âmbito escolar. Destarte, compreende-se que há uma reflexão e consequente aplicação de recursos financeiros, visando à inclusão dos indígenas. Todavia, foram identificadas demandas, tais como a adoção de princípios da interculturalidade e do bilinguismo, a falta de bibliotecas e acervos adequados, falta de professores de ciências, assim como de professores indígenas.*

Palavras-chave: *educação, estudo de ciências, formação*

Introduction

Territorial distribution of indigenous peoples

The disappearance of Brazilian indigenous peoples was considered a factual situation until recently. However, since the 1980s, the myth of the extinction begins to be overturned, and the indigenous demographic curve begins to show growth. Many factors promoted the increase of this population, among them, the presence of the State in the communities, as well as the rediscovery of indigenous groups considered extinct. Another factor that favored the increase in statistics was the identification and recognition of dispersed groups, such as villages composed of fewer than ten people, as is the case of the Akuntsu (RO). Currently the indigenous population in Brazil is around 900,000 individuals, distributed among Guaraní, Kaingáng, Xavante, Xetá, Charrua, among others.

According to Castro et al. (2014), the Kaingáng represents one of the top five most populous groups, being present in the states of São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul, totalizing 37,470 individuals. From this number, 31,814 live in indigenous areas, while 2,656 occupy areas or municipalities outside the boundaries of indigenous lands. In relation to the Guarani population, Brand and Colman (2010) affirm that in Brazil there are fifty-two thousand representatives, divided between Kaiowá, Ñandeva, and Mbya, distributed in ten states of the Union. The presence of the Kaingáng and the Guarani groups in Rio Grande

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do Sul occurred long before the arrival of Europeans, and the Guarani are descendants of the Mbya subgroup. In the state of Rio Grande do Sul, the Kaingáng population is larger than the Guarani, with approximately 18,000 people living in one third of the lands demarcated for natives (Ferreira, 2012).

According to Silva and Laroque (2012), currently the distribution of indigenous lands in Rio Grande do Sul is concentrated in nine areas recognized by the Union. In five of them, there are only Kaingáng natives; in the other four, there are indigenous Guarani as well. These areas are located, respectively, in the municipalities mentioned in parentheses: Cacique Doble (Cacique Doble), Carreteiro (Água Santa), Ligeiro (Charrua), Votouro (São Valentim), Cacique Doble (Cacique Doble), Carreteiro (Água Santa), Ligeiro (Charrua), Votouro (São Valentim), Nonoai (Nonoai, Rodeio Bonito, and Planalto), Guarita (Redentora, Tenente Portela, and Miraguai), Inhacorá (Santo Augusto), Rio da Várzea (Liberato Salzano and Nonoai), Iraí (Iraí) (Marcon, 1994). Still in Rio Grande do Sul, more precisely in the Taquari Valley, besides the Glória and the Estrela indigenous lands, the Fochá Indigenous Land, located in the municipality of Lajeado, is also formed by people from Kaingáng ethnic group.

Access of indigenous peoples to formal education

The itinerant characteristics of the indigenous peoples have been changing over the last decades. Many of these itinerant ethnic communities have counted on areas delimited by the government, such as those previously mentioned. Their movement is due in particular to the pursuit of subsistence and/or for religious reasons, the latter of which are more evident, and still today practiced, by the Guarani. In this sense, Hillesheim and Bernardes (2014) affirmed that the indigenous communities circulate in other spaces besides those already delimited, not only to sell crafts, but also for domestic labor. This way, the relationship with the territory is constituted by the time spent with work and the survival needed.

The installation of the indigenous peoples in strategic places, delimited by the government, has generated new challenges, as well as greater expectations for these specific peoples. One of these expectations refers to the education of children and the youth. The inclusion of indigenous peoples in the non-indigenous school environment presents enormous challenges for both groups, since teachers and students experience a true cultural shock, a fact

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that, not infrequently, leads to consequences that are difficult to solve in the school environment. An example of that are the observations of Gonçalves and Rosa (2013, p. 245):

> When her children, still very young, went to the whites' school and were given a soap to take a shower before entering the classroom, since the smell of smoke bothered the teachers, she decided that her children would no longer go back to that school, and that was the right time for them to start having their own teaching within the village borders.[5]

Traditional teaching programs are not friendly to the ancient culture of teaching through experiences, which is carried out by the most experienced members of the villages—those who are the true libraries of the indigenous peoples. Such pedagogical method differs profoundly from the mechanisms and tools practiced by the white man, making the process of insertion of indigenous people in the official formal education very complex.

Some experiences of the inclusion of indigenous people in formal education in Rio Grande do Sul occurred between the 1920s and 1930s. According to Kurrosch, Souza, and Venzon (2012), in 1978 non-indigenous people opened schools with a repressive character in indigenous communities. Such attitude led to actions by indigenous peoples which culminated in a clash that transcended the discourse of inclusion and resulted in the burning of schools by indigenous people. Six decades later, indigenous groups organized protests by camping around schools demanding their participation in the organization and management of these schools. Among their requests, they asked for the formation of their own classes, that is to say, classes constituted only by indigenous students, which later culminated in the formal searching for indigenous teachers.

Pedagogical challenges

The initial proposal of the indigenous school is a consequence of the obligation and the imposition of unidentified official/governmental regulations, recognized or in line with the communities' expectations. According to Baniwa (2013, p. 1), the school had the mission to lead, to force, and to integrate the natives to the 'National Communion':

[5] In this paper, we have translated all quotations from Portuguese into English.

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> For that reason, the indigenous languages, cultures, traditions, knowledge, values, sages, and pajés[6] were persecuted, denied, and forbidden by the school.

In this sense, the principles of interculturality and bilingualism were not yet clearly perceived, both by those responsible for the development of official educational policies and by the non-indigenous teachers responsible for teaching in schools.

From another perspective, in the last decade, we can notice a growing movement of the country's educational authorities to adapt specific demands to the reality of the indigenous communities. Consistent with this perspective, Almeida, Albuquerque, Silva, Silva, and Ferreira (2017) emphasize teacher education as a way to advance the implementation of a differentiated education which is intercultural and bilingual.

Broadening the thinking of the above authors, Niedermayer, Roesler, and Carniatto (2017) understand that there are differences between indigenous knowledge and pedagogical concepts built by official schools, particularly in relation to territory, nature, and human relations, and such practices need to be taken to the classroom. Thus, they highlight the importance of the work of indigenous teachers, including their knowledge of the source language and of Portuguese.

In the broad sense of pedagogy, every indigenous student should be literate in their "mother language" in a gradual way; the remaining contents should be developed in the Portuguese language. However, this has not been happening and has also strengthen the distancing of the indigenous student from his or her "mother language". Maher (2013, p. 22) points to this question when she says:

> while for most students' bilingualism is optional, for indigenous, deaf, and immigrant students, bilingualism is compulsory. The student is required to learn the majority language of the country and to become bilingual.

In view of this perception, it is observed in the state of Rio Grande do Sul that the State Department of Education (SEDUC) works with two types of training: ongoing training and initial training.

[6] For the Brazilian indigenous peoples, the "Pajé" is a member of the community who stands in a respected position as a shaman, a healer, or a religious or political leader.

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Ongoing Training – Network of Indigenous Knowledge in the School can be presented chronologically:

a) MEC Ordinance No. 1,061 of October 30, 2013.

b) Ordinance No. 98 of December 6, 2013 of the Department for Ongoing Education, Literacy, Diversity, and Inclusion (Secadi), regulated the action and defined supplementary guidelines.

The network responsible for training indigenous teachers in the initial years is composed of 24 institutions under the coordination of the federal universities of Amazonas, Rondônia (Unir), Mato Grosso do Sul (UFMS), Goiás (UFG), Minas Gerais (UFMG), and Rio Grande do Norte (UFRN); the Federal Institute of Roraima (IFRR); and the State University of Bahia (Uneb). The state and municipal Departments of Education are partners. This network aims to train and enable indigenous educators in higher education in an intercultural and interdisciplinary perspective, preparing them to work with the final years of elementary education and with the high school of indigenous schools, as well as the development of activities beyond the school sphere, acting in projects, research, and activities directly linked to their communities.

According to Bonin (2012, p. 33):

> indigenous peoples have stated that taking over school education is a great challenge, and the main reason is not the ignorance of didactic procedures or curricular contents, but the fact that the whole logic is distinct from that which supports the organization of the school and the life in their communities.

Hence, new pedagogical challenges have arisen, such as the development of didactic materials (handouts, books, drawings, and others) respecting the socio-environmental and cultural reality of the teachers and the students of indigenous families, as well as the care with the training of the teaching staff. In the Guarani villages, initial and ongoing teacher training are developed jointly with the more experienced villagers and their political leaders. Hierarchically, the teachers are submitted to the *Karaí*—male or female religious leaders—and to the political power of the *Cacique*[7]. Based on the situation described above, this article gathers data on how indigenous peoples' access to formal education is taking place, specifically by identifying the

[7] The term "cacique" refers to the political leader of an indigenous community.

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reality and challenges inherent to science teaching in indigenous schools, in the Kaingáng and Guaraní ethnic groups. In view of the above, this survey aims to assess the access of indigenous groups to formal education, seeing in science education both a challenge and a reality.

Methodology

a) Characterization of the sample space

The data collected covered the state of Rio Grande do Sul (RS) and is based on a database from the State Department of Education (SEDUC / RS), produced from 2011 to 2015. Other sources include field actions, observations, and interviews, conducted during 2015/2016 in schools and indigenous communities of the Kaingáng and the Guarani ethnic groups. Municipal and state schools of the seven Mesoregions of Rio Grande do Sul were quantified and identified, which in turn are distributed in 30 Regional Education Coordination Units (CREs).

b) Quantitative and qualitative analysis of variables

This research's variables were composed by the survey of the number of public and private schools inserted in the state's seven Mesoregions; the number of indigenous villages; the number of non-indigenous and indigenous elementary schools; the number of indigenous registrations; the number of non-indigenous and indigenous teachers who work in indigenous elementary schools and their interrelations; the challenges and the possibilities in the pedagogical effectiveness of teaching science in these school environments.

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Results and discussion

Number of public and private schools in Rio Grande do Sul

In recent years, the number of schools in the state has risen, as is the case in the period of this survey, which ran from 2011 to 2015 and shows an increase of 2.57%. The increase in the number of schools contemplates both standard formal education and indigenous education. Furthermore, 74.42% of the state's educational units were under public scrutiny by 2015 (Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira, 2015). In the same way, it was verified that the majority of the indigenous schools belong to the state education network and correspond to 93.81% of the units.

Dissemination of villages and indigenous schools

The inclusion of indigenous groups, stimulated by governmental and non-governmental actions, has demanded an increase in the number of indigenous schools in the state, especially in recent years. According to Quermes and Carvalho (2013), with the creation of the Ministry of Social Development (MDS) in 2004, policies for the benefit of indigenous peoples were expanded. Programs such as *Bolsa Família* (PBF) and *Eradication of child labor* (Peti), as well as the distribution of food baskets in the villages have allowed a greater number of children to seek formal schooling. In summary, government programs such as the *Public Call for Technical Assistance* and *Indigenous Rural Extension* and the cooperation program *Brazil without Misery* are indirectly contributing to the inclusion of indigenous people in education.

From the 30 CREs in Rio Grande do Sul, 17 concentrate 97 indigenous schools and are distributed in 58 municipalities of six from the seven mesoregions constituting the state (Figure 1).

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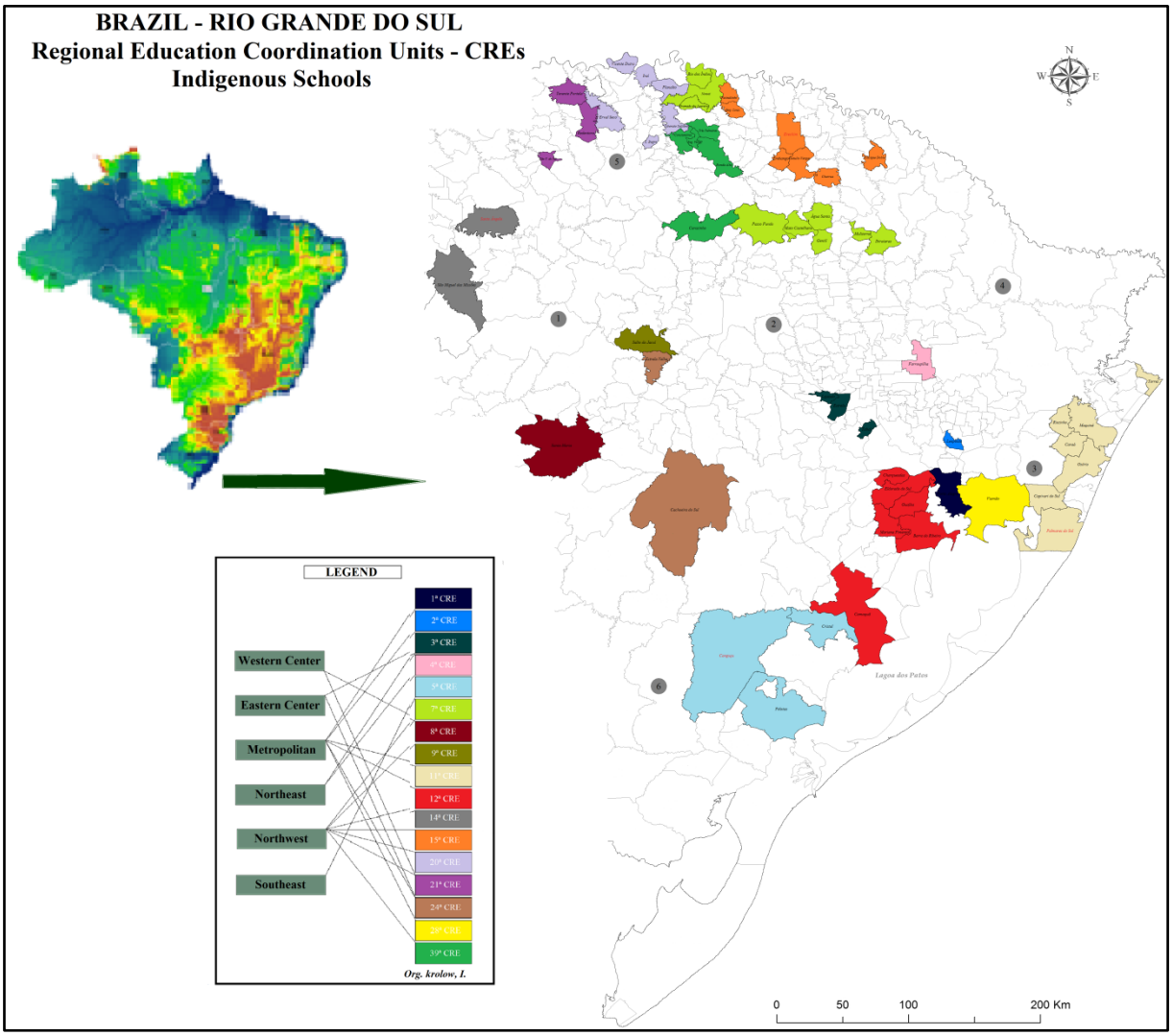

Figure 1 – Mesoregions, Regional Education Coordinators (CRE) and municipalities that make up the network of indigenous education. Porto Alegre/RS, 2017

Among them, only in the Southwest mesoregion of Rio Grande do Sul there are still no indigenous schools. This is due to the current lack of villages and/or camps in this mesoregion.

The lowest number of indigenous schools is concentrated in four mesoregions of the state: beginning with the Western Center mesoregion, with only one municipality, in Santa Maria (2)[8]; the Eastern Center mesoregion with four, in Estrela (1), Estrela Velha (1), Lajeado (1), and

[8] The numbers in parentheses represent the indigenous schools of each municipality.

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Tabaí (1); the Northeast mesoregion with one, in Farroupilha (1); and the Southeast mesoregion with three, in Canguçu (1)[9], Cristal (1), and Pelotas (1) (Table 1).

The smaller indigenous population in these mesoregions is mainly due to the territorial occupation by the Portuguese, Italian, and German ethnic groups from the 18th century, who during the immigration process occupied these lands with the purpose of establishing and promoting agriculture and livestock. European immigrants began to use natural resources in a very different way from what was practiced by traditional indigenous communities, a fact that motivated the displacement of these communities to other mesoregions, such as the Metropolitan mesoregion of Porto Alegre and the Northwest mesoregion. Freitas (2012, p. 70) wrote a brief report on this mobility and these transfer actions stating that

> The forests began to suffer systematic impacts with the entrance of colonization fronts promoted by the province government of which the initial mark is the German Colony of São Leopoldo, in 1824.

This displacement, motivated in part by the circumstances mentioned above, may justify the presence of a larger indigenous population in certain mesoregions such as the Metropolitan mesoregion of Porto Alegre and the Northwest mesoregion.

As a result, it is nowadays observed that the greatest concentration of indigenous schools is in these mesoregions—which together hold 88.65% of the total number of indigenous elementary schools in the state's public education system—is distributed as follows, considering the mesoregion, the municipality and the number of schools respectively: in the Metropolitan mesoregion of Porto Alegre, there are 25 schools located in the municipalities of Barra do Ribeiro (4), Camaquã (1), Capivari do Sul (1), Charqueadas (1), Caraá (1), Estrela Velha (1), Eldorado do Sul (1), Guaíba (1), Maquiné (1), Mariana Pimentel (1), Osório (1), Palmares do Sul (1), Porto Alegre (5), Riozinho (1), São Leopoldo (1), Torres (1), and Viamão (3); and 61 indigenous schools are present in the Northwest mesoregion, distributed in the municipalities of Água Santa (2), Benjamin Constant do Sul (4), Cacique Doble (4), Carazinho (1), Charrua (1), Constantina (2), Engenho Velho (2), Erebango (1), Erechim (1), Erval Seco (1), Faxinalzinho (1), Gentil (1), Getúlio Vargas (1), Gramado dos Loureiros (1), Ibiraiaras (1), Iraí (2), Lajeado do Bugre (1), Liberato Salzano (1), Mato Castelhano (2), Muliterno (1), Nonoai (2), Planalto (5), Redentora (9), Rio dos Índios (1), Ronda Alta (2), Salto do Jacuí (2), Santo Ângelo (1), São Miguel das Missões (1), São Valério do Sul (2), Tenente Portela (3), Três Palmeiras (1), and Vicente Dutra (1).

[9] Although there is no physical environment named as an indigenous school in the municipality of Canguçu, teachers from the Tukã Ju Miri school in the municipality of Pelotas, periodically move to that municipality to teach indigenous students.

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Table 1 – Description of the spatial distribution and of the number of schools in indigenous villages in the state of Rio Grande do Sul. Porto Alegre/RS, 2011/15

Mesoregion(Municipality)	Village	Number of schools						
		Municipality			State			
		Not Indigenous	Indigenous	*Total*[1]	Not Indigenous	Indigenous	*Total*[2]	$\sum_{Total^1+Total^2}$
				2011				
1(31)	2	283	0	283	135	0	135	418
2(54)	2	633	0	633	227	2	229	862
3(98)	20	1,486	0	1,486	799	16	815	2,301
4(54)	1	436	0	436	256	1	257	693
5(216)	80	1329	5	1.334	703	48	751	2.085
6(25)	2	410	0	410	194	1	195	605
7(19)	0	357	0	357	191	0	191	548
Total	*107*	*4,934*	*5*	*4,939*	*2.505*	*68*	*2,573*	
				2012				
1(31)	2	278	0	278	135	2	137	415
2(54)	2	622	0	622	239	2	241	863
3(98)	34	1,505	0	1,505	808	17	825	2,330
4(54)	1	436	0	436	244	1	245	681
5(216)	79	1,326	6	1,332	699	49	748	2,080
6(25)	3	469	0	469	187	1	188	657
7(19)	0	359	0	359	182	0	182	541
Total	*121*	*4,995*	*6*	*5,001*	*2,494*	*72*	*2,566*	
				2013				
1(31)	2	270	0	270	135	2	137	407
2(54)	2	600	0	600	227	3	230	830
3(98)	34	1,509	0	1,509	793	18	811	2,320
4(54)	1	427	0	427	254	1	255	682
5(216)	79	1.307	6	1.313	699	50	749	2,062
6(25)	3	450	0	450	195	1	196	646
7(19)	0	354	0	354	191	0	191	545
Total	*121*	*4,917*	*6*	*4,923*	*2,494*	*75*	*2,569*	
				2014				
1(31)	2	270	0	270	135	2	137	407
2(54)	2	585	0	585	225	4	229	814
3(98)	34	1,522	0	1,522	792	22	814	2,336
4(54)	1	428	0	428	252	1	253	681
5(216)	79	1,307	6	1,313	695	52	747	2,060
6(25)	3	446	0	446	194	1	195	641
7(19)	0	352	0	352	180	0	180	532
Total	*121*	*4,910*	*6*	*4,916*	*2,473*	*82*	*2,555*	

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				2015				
1(31)	2	266	0	266	135	2	137	403
2(54)	2	582	0	582	224	6	230	812
3(98)	34	1,566	0	1,566	790	25	815	2,381
4(54)	1	435	0	435	251	1	252	687
5(216)	79	1.299	6	1.305	697	54	751	2.056
6(25)	3	441	0	441	196	3	197	638
7(19)	0	360	0	360	189	0	189	549
Total	*121*	*4,949*	*6*	*4,955*	*2,482*	*91*	*2,571*	

[1]1- Western Center, 2- Eastern Center, 3- Metropolitan, 4- Northeast, 5- Northwest, 6- Southeast, and 7- Southwest.

The six indigenous municipal schools in the state are found only in the Northwest mesoregion of Rio Grande do Sul, in the districts of Rio dos Índios, Cacique Doble, Iraí, Engenho Velho, Três Palmeiras, and Benjamin Constant do Sul.

Broadly speaking, from the 7,512 public schools in the State until 2011, only 0.97% received funds for indigenous education. In 2012, 55 schools were inaugurated in the state and were concentrated in the Southeast region. From these, five were destined to indigenous education, which then counted with 78 schools.

A seemingly small growth, but with an important meaning, since two of these schools were inaugurated in the Western Center mesoregion of Rio Grande do Sul, in Santa Maria, whose indigenous villages were established in a very precarious way 30 years ago and were not previously attended by the public education network. In the same way, the municipal school network of Benjamin Constant do Sul inaugurated the Ei Gir Si School in that year.

In 2013, it was observed that there was a significant reduction in the number of schools in the state, which by then had 7,492 schools—70 less than in the previous year. Conversely, the number of indigenous schools maintained the growing trend of previous years and reached 81 units. In 2014, the observations of 2013 were once again repeated, with the closing of 21 traditional schools and the inclusion of seven indigenous schools in the state education system. The trend of increasing the number of schools observed in the years 2011 and 2012 is retaken in 2015. In that year, the education network had 7,526 schools, of which 1.29% are destined to indigenous education, and Rio Grande do Sul then counted with 97 indigenous schools.

Thus, in each year investigated in this survey, an increase in the number of indigenous schools was observed, as can be perceived chronologically and with more important details in

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Table 1. It is possible to infer that this increase is likely to be maintained until the number of educational units is adjusted to the equivalent number of indigenous villages in the State, especially those demarcated by the state and/or by the Union.

Undoubtedly, the concern with the proximity of the indigenous school to the villages is perceived in the state. However, there are still difficulties in the pedagogical and legal fields. In the pedagogical field, among others, we can report the sudden displacement of some Guarani groups, sometimes motivated by religious issues according to which they believe that when they move they "take the school with them". In the legal field, we can mention the processes necessary for the implementation of indigenous schools, such as the accreditation that refers to the physical space and the authorization that refers to a pedagogical plan.

However, in the few cases still pending, the students do not lack access to education, being attended preferentially by the closest indigenous schools, which was not previously noticed. During the research, two characteristic examples were found. In the first, indigenous students of Palmares were attended by the E.E.I.E.F school Arandua de Capivari. In the second, the indigenous students of Canguçu were attended by the E.E.I.E.F school Tukã Ju Miri in Pelotas.

In the meantime, the National Board of Education of the National Education Council approved and published the Resolution CNE/CEB No. 5, June 22, 2012, which deals with the National Curricular Guidelines for Indigenous School Education in Basic Education, especially in its article 4, highlighting a basic criterion for the organization, the structure, and the functioning of the indigenous school when, in its Item I, it refers to the school's location:

> I- The centralization of the territory for the well-being of the indigenous people and for their formative processes and, therefore, the location of the schools in lands inhabited by indigenous communities, even if they extend through territories of several contiguous municipalities or states. (Brasil, 2012)

As for the indigenous student population, Mizetti, Teixeira, and Krolow (2015), affirm that the number of enrollments in indigenous schools is increasing in Rio Grande do Sul. According to the authors, this growing trend verified in the last decade in the state of Rio Grande do Sul can be attributed to the fact that this state has been more active in the inclusion of the indigenous communities in the state educational system.

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The numbers identified in this research confirm the trend mentioned by the authors above, since in 2011 municipal and state public schools accounted for a total of 5,716 enrollments, including preschool and elementary education. This performance has continued to grow as can be seen in the number of registrations processed in 2015, which totaled 5,908, represented below in Figure 2.

In relation to the number of enrollments made in the preschool program, it was also possible to verify that more indigenous children are looking for the indigenous school to enter this level of education. In 2014 alone, 459 enrollments were made, and in 2015, 599. These results, compared to 2011, correspond to an increase, respectively, of 1.89% and 4.91%. Thus, the growth observed in the entrance of students to indigenous school in the period from 2011 to 2015 reached the percentage of 350%, regarding previous years (Figure 2).

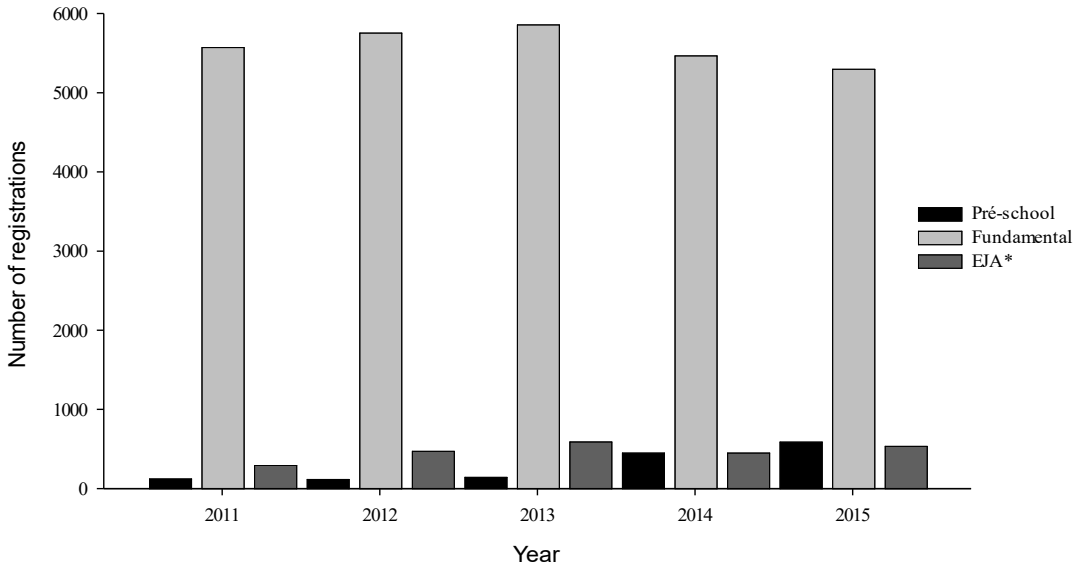

Figure 2 – Number of registrations in preschool and elementary school. Porto Alegre / RS, 2017
Source: State Department of Education.* Youth and Adult Education

Thus, it is understood that if there is a greater demand for formal education in the preschool, consequently, there will be an increased demand in the educational system for subsequent years, in this case, in elementary education.

In general, the observed data on preschool, elementary school, and Youth and Adult Education enrollment numbers allow us to consider that the increase in access to indigenous

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education occurred in the order of 7.21% between 2011 and 2015 (Figure 2). Currently, Youth and Adult Education is present in 22 out of 91 indigenous schools.

Challenges of indigenous education in relation to the teaching of science

The scenario described above revealed the structure of indigenous school education and the spatial distribution of the indigenous school within the state education system in Rio Grande do Sul. Organically, the research sought to investigate the dynamics of the teacher-student joint action at the indigenous school as actors of the learning process of science in Elementary School. The teaching of science was chosen as the focus of this research because among all areas of knowledge that integrate the curriculum of Elementary Education, science is possibly the most attractive for indigenous education, given the intense relationship between man and nature experienced by the indigenous peoples and manifested by their ancient culture.

In this sense, it is considered that science constitutes a primordial area of the teaching and learning process of the indigenous student, around which the other areas can be developed, that is, taught and learned. Among the difficulties faced in the implementation of science education in indigenous schools are: the inclusion of the indigenous culture; the lack of science teachers; the lack of support materials; and the lack of libraries and adequate collections to Kaingángs and the Guaranis. These limitations refute the insertion of science teaching as a pedagogical tool capable of unraveling myths and even preserving indigenous science, as reported in interviews with teachers.

Based on this observation we question how the state, through its educational representatives, should position itself in response to Resolution CNE / CEB No. 5, June 22, 2012, in its article 6, which states:

> Education systems should ensure that indigenous schools have an adequate structure to the students' needs and to the pedagogical specificities of differentiated education, guaranteeing laboratories, libraries, spaces for sports and artistic-cultural activities. (Brasil, 2012).

The state of Rio Grande do Sul, despite the advances, is still far from the adequate structure pointed out by the aforementioned Resolution, since laboratories, libraries, and

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indigenous teachers are not present in all schools. Moreover, some school spaces do not even offer the minimum comfort necessary for the attendance and the development of the students.

Performance of indigenous teachers in indigenous schools

If, on the one hand, the state has advanced in the subject of spreading educational institutions to serve indigenous communities, on the other hand, more precisely in the area of education, there are still many barriers to overcome. The number of schools versus the number of science teachers has been established at a ratio of ≅ 1.51: [91 for the first and 60 for the second], which characterizes a teacher deficit of 66%. Thus, 31 of the schools are not being served by indigenous teachers with specific training in science education.

Another important aspect is related to the ethnicity of the teacher. Of the 60 teachers in the state network, 28.84% are indigenous (Table 2).

Table 2 – Mesoregion, Regional Education Coordinators (CRE), municipalities, state schools, number of indigenous teachers, and ethnicity. Porto Alegre/RS, 2016

Mesoregion	CRE	Municipality	State schools	Indigenous teacher	Ethnicity
5th	7th	Água Santa	Almerão Domingos Nunes	1	*K
5th	7th	Gentil	Hélder Tenh Fy	1	K
5th	7th	Ibiraiaras	Monte Caseros	1	K
5th	15th	Cacique Doble	Faustino Ferreira Doble	1	K
5th	15th	Benj. Const do Sul	Toldo Coroado	2	K
5th	20th	Erval Seco	Sepé Tiaraju	1	G
5th	20th	Iraí	Nãn Gá	1	K
5th	20th	Planalto	Cacique Sy Gré	1	K
5th	20th		Goj Ron	1	K
5th	20th		M'baraká Miri	1	G
5th	21st	Redentora	Davi Rygjo Fernandes	1	K
5th	21st		Rosalino Claudino	1	K
5th	21st	Tenente Portela	Gomercindo Jete Tenh Ribeiro	1	K e G
5th	21st		Bento Pi Góg	1	
5th	39th	Ronda Alta	Fag Kavã	1	K

*K-Kaingáng; G-Guarani

Source: State Department of Education, 2016

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It should be emphasized that ethnicity is not a predominant factor for the effectiveness of teaching science in indigenous schools. However, this theme has been discussed since the 1990s and has generated different points of view, one of them reported by Grupioni (2013, pp. 71-72).

> On the basis of this new model was the idea that it would only be possible and viable if indigenous teachers, members of the respective communities in which the school was inserted, were at the head of the indigenous school …. It aimed, therefore, to restrict the teaching in these schools to these new professionals, considering non-indigenous teachers only for temporary labor, to be substituted in a short period of time.

What has been perceived in the field is that in addition to a greater approximation between the actors of the teaching-learning process—that is, indigenous students and teachers—values, customs, rites, and myths are cultivated in the light of the indigenous culture, without departing in greater magnitude from the precepts emanated by the Ministry of Education and Culture. A majority of teachers of indigenous origin in classrooms can be one of the main tools for the process of social inclusion, through the valorization of customs and, by extension, of the indigenous culture, since they are assured the right to an indigenous education which is differentiated, specific, intercultural, and bilingual according to Matte (2009) and Brand (2002).

In Rio Grande do Sul, science teachers from indigenous schools are concentrated in 5 CREs of the Northwest mesoregion. Among them, CREs 20 and 21 have more indigenous teachers of the Kaingáng and the Guarani ethnic groups than the others.

One of the most used mechanisms to minimize the *deficit* of indigenous teachers which has presented favorable results was reported by Grupioni (2013, p. 77):

> Indigenous teachers training for working at schools in their communities and for the functioning of these schools in indigenous lands, from the paradigm of differentiated education, with the production and consumption of their own didactic materials, led to the arising of formalized—and often ritualized—spaces not only for reflecting on indigenous cultural expression forms, but also for producing formulations about cultural difference. Although they share some common characteristics, different programs for training indigenous teachers are developed today practically all over the country.

In this sense, the State Department of Education (SEDUC) has been working in training indigenous teachers in different areas of knowledge. The production of didactic materials and the reflection on pedagogical procedures have already been tried in the state's Kaingáng schools.

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As an example, the Kaingáng State Schools Collective Regiment, a document elaborated for Kaingáng teacher training, can be cited, which aims to standardize pedagogical rites.

According to Valadares and Silveira (2016, p. 543):

> The coexistence of disparate representations of certain themes suggests the school as a frontier space, as a place of reciprocal exchanges and of the construction of identities.

Another factor that should be considered when elaborating a pedagogical planning for the indigenous school are multigrade classes, a reality experienced by indigenous teachers due to the lack of professionals, according to Maher (2006, p. 28):

> Multigrade classrooms are a present phenomenon in indigenous schools. Because communities are small, their schools have few teachers and pupils, and therefore in the same classroom, students of varying age groups and levels of schooling and of varying skills are often involved.

Didactic support material

In 2015, several political and pedagogical problems were identified in indigenous schools. Among them, the receival of the didactic and supplementary reading material recommended and sent by the Ministry of Education for the teaching of science. The contents of most of the works is not focused on the daily life of the Kaingáng and the Guarani in the state. Mizetti, Teixeira, and Krolow (2015), when investigating the use of textbooks in indigenous schools, interviewed Kaingáng teacher Dorvalino Cardoso, who answered the question: "Do you use the textbook in the classroom?"

> He affirmed: "Just some little things, but very little."

The teacher's response, with the expression "just some little things", expresses the sentiment of part of the teachers who requested pedagogical collections which are more adequate to the daily life of the indigenous schools, since the research noticed teachers hardly ever used the books submitted by the Ministry of Education.

This situation becomes more evident regarding the astronomy classes. The advances of science in the last decades are indisputable and have occurred *pari passu* with technological innovations. Ancient and contemporary astronomy is based on scientific specificities such as geometry, while indigenous astronomy is strengthened and affirmed in sensory elements.

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Among many different examples of indigenous astronomy, one can mention the identification of raining seasons and the arrival of summer by the indigenous people's analysis of stellar clusters in the *Plêiades*[10] and the constellation of the hummingbird which foreshadows the arrival of spring. Such observations further challenge the routine of teachers and students when introducing the study of science. In fact, different ethnicities may still have different readings on the same luminous arrangement of space.

In relation to the works recommended by the National Development Fund for Education (FNDE, s.d.), it was observed that its contents gravitate in a limbo of little use and adaptation to the indigenous reality, who end up learning history, geography, science and even Portuguese, in a very distant way from their indigenous everyday life. According the Ministry of Education (Tokarnia, 2016) "In general, the materials produced are still intended for the literacy stage and for early years of elementary school, with a large gap for the final years and for high school."

The lack of literary works which help in this stage of the construction and identification of knowledge is evident. The extreme standardization of contents disregards the students' reality, the teachers' skills, and/or the environment in which they are inserted. Moreover, there are legal restrictions regarding the rights reserved to the author of the texts; it is not possible for the teacher (at least legally) to edit the content in order to adapt it to a specific need (Souza & Cipriano, 2016). Among alternative books used by indigenous teachers we can highlight: *Book of trees*, published in 2000 by the publisher Global; *Thinking about Kaingáng education*, published in 2010 by UFPel; *Weaving relations beyond the village*: *Indigenous artisans in the cities of the South region*, published in 2014 by OIKOS, among others.

Libraries in indigenous schools

From all 97 indigenous schools in the state of Rio Grande do Sul, only 36 have libraries with a physical space, a collection, and a teacher in charge. This shows a considerable deficit going in an opposite direction to the socialization of knowledge. If there are few libraries in the indigenous school system, there is also an inadequate collection. Regarding the collection, in

[10] Appearance and disappearance of star arrangements.

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several incursions to villages and schools, it was found that most libraries do not have attractive resources to the Kaingáng and the Guarani. There is no habit of researching in the library; students naturally work in field researches in their own traditional places.

According to Corrêa, Dubas, and Silva (2005, p. 243,).

> a library with distinctive characteristics according to the ethnic and cultural traits of the indigenous people should allow the meeting of members of the community and offer a space for orality in storytelling, teaching, and informal conversation. It must be an open place for indigenous culture to be produced and reproduced in its most varied manifestations. The space of this library must be adapted to the space of the village as a whole, respecting in its architecture the physical characteristics of the other constructions of the place where it will be implemented.

Final considerations

In view of the above, it is possible to perceive that there is a great movement of reflection and action occurring on the part of public agents in what concerns the indigenous school education. These findings have been evidenced in recent years in the state of Rio Grande do Sul. In general, the searching for school by indigenous people has increased considerably and the supply of vacancies has met the demand, as can be observed in the five years investigated in this research.

It was found that the efforts demanded by the state have been reflected in new perspectives for indigenous children and youth. However, specific demands were identified such as the lack of adequate libraries and collections for the education of the Kaingáng and the Guarani ethnicities.

Regarding the training of indigenous teachers, especially in the areas of science, very high deficits were observed, associated with a lack of teachers in general and the existence of only few teachers of the indigenous ethnic group in the classrooms of the state education network. As for multiculturalism and bilingualism, we can consider that the process is slow, but it presents positive perspectives, especially regarding the implementation of existing regulatory directives, as well as in the discussion of new legal proposals, more aligned with the demands and realities of the communities, so that the teaching of science is actually carried out in indigenous schools.

In view of the data collected in this research, we can see that there is still a long way to go in order to overcome the challenges highlighted. The parameters considered here show a still

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unequal relationship between schools, libraries and their collections, science teachers, official curricular guidelines, and cultural practices of the school population, a fact that may obscure some of the advances made by indigenous peoples and even perpetuate and/or promote distancing between the indigenous culture and the teaching recommended in schools.

The specificities of the indigenous empirical knowledge must be discussed and brought into the realm of scientific knowledge so that its cultural practices are valued in their peculiarities, thus being able to be used in contemporary science teaching. Referring to the Universal Declaration of Human Rights, in the propositions of 1948, the development of the human personality must be advanced through the teaching of sciences, promoting the formation of citizens, contemplating the positive social relations and engagement in struggles that seek to mitigate social inequalities and discrimination (Organização das Nações Unidas, 1948).

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