

What do researches on mathematics teaching in schools of the countryside reveal?

Giane Fernanda Schneider Gross¹, Neumar Regiane Machado Albertoni², Érica Oliveira dos Santos³, Marcelo Souza Motta⁴, Marco Aurélio Kalinke⁵

^{1, 2, 3, 4, 5} Universidade Tecnológica Federal do Paraná - UTFPR. Departamento de Matemática. Avenida Sete de Setembro, 3165, Rebouças. Curitiba - PR. Brasil.

Author for correspondence: giane.fer@gmail.com

ABSTRACT. This paper aims to investigate how the teaching of Mathematics has been presented in studies that involve educational practices corresponding to the countryside's reality, through a systematic mapping of dissertations and theses published in the last 10 years on CAPES and BDTD platforms, following Petersen et al. (2008) search procedures. Thus, the researchers were selected, classified and categorized, presenting as main points: (i) technological resources used during application of activities with students; (ii) teachers' approach to the countryside's reality; (iii) rural students' integral formation; and (iv) informal and formal knowledge integration, according to researches that highlight the teaching of Mathematics for the rural reality. Finally, this paper describes how the analyzed publications consider the students' reality, and focuses on the research results, covering the use of different methodologies, the teachers' approach to that reality, and the use of digital technological resources as a way to expand the possibilities of integration between cultural and mathematical knowledge by rural students.

Keywords: Mathematics Teaching, Rural Schools, Knowledge Integration, Research Mapping.

O que revelam as pesquisas sobre o Ensino de Matemática realizado nas Escolas do Campo?

RESUMO. Este estudo se direciona a investigar como o ensino de Matemática vem sendo apresentado em estudos que envolvem práticas educativas de acordo com a realidade do Campo, mediante um mapeamento sistemático de dissertações e teses publicadas nos últimos 10 anos nas plataformas CAPES e BDTD, seguindo os procedimentos de buscas de Petersen et al. (2008). Para isso, as pesquisas foram selecionadas, classificadas e categorizadas, apresentando como destaque: (i) recursos tecnológicos digitais utilizados durante as aplicações das atividades aos estudantes; (ii) a aproximação dos professores junto à realidade do Campo; (iii) a formação integral do estudante camponês; e (iv) a integração dos saberes informais e formais, de acordo com as pesquisas que evidenciem o ensino de Matemática para a realidade camponesa. Por fim, descrevemos como as publicações analisadas consideram a realidade dos estudantes e destacamos os resultados da pesquisa, pontuando a utilização de diferentes metodologias, a aproximação dos professores a essa realidade e o uso de recursos tecnológicos digitais, como um caminho para a ampliação das possibilidades de integração entre os saberes culturais e matemáticos junto aos estudantes camponeses.

Palavras-chave: Ensino de Matemática, Escolas do Campo, Integração de Saberes, Mapeamento de Pesquisas.

¿Qué revelan las investigaciones sobre la enseñanza de las matemáticas realizadas en las escuelas de campo?

RESUMEN. Este trabajo está orientado a investigar como la enseñanza de Matemática viene siendo presentada en estudios que consideran prácticas educativas, de acuerdo con la realidad del Campo, mediante un mapeamiento sistemático de disertaciones y tesis publicadas en los últimos 10 años en las plataformas CAPES y BDTD, siguiendo los procedimientos de búsqueda de Petersen et al. (2008). Para esto, las investigaciones fueron seleccionadas, clasificadas y categorizadas, presentando como destaque: (i) recursos tecnológicos utilizados durante las aplicaciones de las actividades de los estudiantes; (ii) la aproximación de los profesores junto a la realidad; (iii) la formación integral del estudiante campesino; y (iv) la integración de los saberes informales y formales, de acuerdo con las investigaciones que presenta la enseñanza de la Matemática para la realidad campesina. Finalmente, describimos como las publicaciones analizadas consideran la realidad y destacamos los resultados de la investigación, enfatizando el uso de diferentes metodologías, la aproximación de los profesores a la realidad y el uso de recursos tecnológicos digitales, como un camino para la ampliación de las posibilidades de integración entre los saberes culturales y matemáticos junto a los estudiantes campesinos.

Palabras clave: Enseñanza de Matemática, Escuelas del Campo, Integración de Saberes, Mapeamiento de Investigaciones.

Introduction

As the countryside is a cultural place, full of knowledges and also full of work opportunities, the education on this areas aims to assimilate, among other aspects, in what way the comprehension and the valorization of the knowledge that the peasant students already have, can influence in a teaching processes. Education for the students that live in the countryside “challenges the pedagogical thinking” (Santos, 2008, p. 81), because besides considering the particular reality of the peasants, this educational process is also worried with the education of the working population from the countryside, furthermore, the process is worried with the human formation, willing to build an educational process that does not considerate the individual only, but also the collective (Molina & Jesus, 2004).

Involving the students with the scholar practices shows that the school is opened to new possibilities and new challenges for mathematics’ teaching processes, opening spaces for the student’s knowledge to express itself is important (D’Ambrósio, 2009).

Aiming to increase the comprehensions about valuing the knowledge that the students already have, that can be involved in mathematics’ teaching practices, we claim, In this work,

to investigate, by means of a systematic mapping of dissertations and thesis that were published over the last ten years, how does the mathematics’ teaching has been presented in researches that embraces educational practices according to countryside’s reality, starting with aspects like the student’s reality’s integration together with the development of mathematics’ teaching. The results that will be presented are what the main aspects reveled during the researches’ analysis.

The Brazilian common national curricular basis, called in Brazil as BNCC, presents, as one of its specific skills the integration of the student’s reality with the scholar ambient, in a way that makes possible the valorization, ampliation and obtention of new knowledges. While trying to connect the classroom’s practice with the BNCC, mathematics’ teachers face challenges to involve the contents, the culture, the society and the insertion of technologies.

Exclusively on mathematics field, the document describes that the students need “to build an integrated vision of mathematics, also an integrated vision of mathematics with other knowledge areas and a vision of mathematics applied to reality. (Brazil, 2017, p. 471). Knowing this fact, BNCC orients that the curricular

organization should consider the knowledges that students already have, and also consider the reality that students are included in, aiming the integration and valorization of this knowledges.

But what are the knowledges that should be valued? The ones that can be linked to a rich view of skills, culture, science, technology, and the ones that are incorporated to the countryside's scholar curriculum, preparing the student for the personal and professional life in the countryside (Arroyo, Caldart & Castagna, 2011).

Mathematics' teaching is ruled by the precepts of mathematics' education, and it can consider important aspects, such as culture, the reality of the student's and their habits, making it possible for the students to have a bigger engagement. This way, when familiar concepts, that are familiar because of previous countryside experiences, are seen in school content, the students feel more attracted to a theoretical and practical further development in the subject.

In this idea, countryside schools have as one of its higher principles, the valuing of scholar identity, what is done by pedagogical projects, which work together with the school subjects, contemplating different methodologies and aiming to adequate them to the student's needs.

Another relevant principle is the articulation of experiences and studies directed to social, economic, and sustainable developing, according with the world of rural work (Brazil, 2010).

We understand as countryside schools, schools that are located in rural areas, or urban areas, as long as the urban ones have as a main public the population that lives in the countryside. Some schools are called as Rural Familiar center, Community school, Rural school, riverside school, depending on the school's location, and also on the cultures that evolves the society in which they are located. The populations who belong to the communities is composed by:

...familiar agricultures, the extractives, the artisanal fisherman, the riversides, the settled and agrarian reform campers, the rural employees, the quilombolas, the caíçaras, the peoples from the forest, the caboclos among others that produce their material existing conditions by working in rural areas. (Decree no. 7.352, 2010, Art. 1º).

By this perspective, the institutions, that attend the countryside students, present many integration possibilities among the countryside knowledges and the scholar ones, principally when it comes to mathematics' teaching, once the rural activities, normally are fulfilled with mathematical knowledge (Campos 2011). The rural knowledges are not so distant

from education, actually, this information can make possible that advances happen when searching for knowledge, involving different methods to rural production and also cultural growing (Arroyo & Fernandes, 1999).

Finding a work methodology

Knowing the presented objectives and the context that evolves mathematics and the countryside schools, it was opted for investigating researches about mathematical teaching in countryside schools, using a systematics mapping methodology. A mapping presents a selection of researches that brings us closer to our objectives, by describing the main aspects revealed on the selected researches, the ones that bring mathematical teaching in countryside schools.

This way, the mapping allows an investigation that searches in literature, the nature verification, extension, and quantity of published studies (Petersen et al., 2008). At the same time, the systematic mapping can be defined as a study that aims to identify the information and correlations existent in these researches, being an organization of primary studies in a determinate field or knowledge area (Motta, Basso & Kalinke, 2019).

Searching to attend the procedures that refers to the mapping, Petersen et al.

(2008) the researching process is presented, divided in five steps. The five steps are: (i) defining the research questions, (ii) realizing the research about the primary relevant studies; (iii) documents' screening; (iv) abstract's keywording; and (v) data extraction and mapping.

Regarding the first step (i), the research's main question is: how mathematics' teaching has been presented in studies that involve educational practices according to the field's reality? On the second step (ii), that regards to the realization of primary studies, searches were made in the Digital Library for theses and dissertations (BDTD) and also in the Theses and dissertations capes' catalog, regarding dissertations and theses that were published from 2010 to 2019. The period was stipulated, once it is the one in what researches destined to education present a greater pointing variety, or, even coverage different points of view about methodologies and technologies (Pischetola, 2019), principally regarding the countryside schools and the field education (Goulart et al., 2020).

The choice by the two research resources, was made due to the idea of covering as many researches as possible, regarding that some of these researches are only in the BDTD or only on the CAPES.

For the quest realization, the following terms were used “countryside education”, “schools from the/ on the countryside”, “mathematics’ teaching”, “mathematics” and “mathematical education”. The following selection criteria were also chosen: 1- the research must had on it’s title, at least one of the descriptors, or that the title remitted to one of them; 2- that the publishing period was between 2010-2019; 3- that the research showed the application on the basic education and with the countryside students; and 4- that the mathematics’ teaching is pointed, and from the educational practices, or reflections about the countryside culture. Once the criteria are established and the researches are classified, after reading and analyzing the researches, nine researches were selected to be studied.

So, the decision of refining the quest was taken. This refining included other descriptors that were presented in some of the first analyzed researches: “rural schools” or “rural school” and “rural” both as a singular world and as a plural world. Aiming to relate the descriptors, logical Boolean operators were used, in English OR (OU in Portuguese), and AND (E in Portuguese) (Falbro, 2012). The used expressions were “countryside education” OR “education in countryside” AND (“mathematics OR mathematical education

OR mathematics’ teaching); “Schools in countryside” OR “schools on the countryside” AND (“Mathematics” OR “Mathematical Education” OR “Mathematics’ Teaching”); Countryside schools" OR "schools on the countryside" AND ("mathematics" OR "Mathematical Education" OR "Mathematics’ teaching"); "Rural School" AND ("Mathematics" OR "Mathematical Education" OR "Mathematics’ teaching"); "rural schools" AND ("Mathematics" OR "mathematical education" OR "mathematics’ teaching"); "rural" AND ("Mathematics" OR "mathematical education " OR "mathematics’ teaching"); e "rural" AND ("Mathematics" OR "mathematical education" OR "mathematics’ teaching").

After the expression’s definition, the selection criteria, already indicated, were followed. While carrying this research, it was decided to organize the data in an excel folder, which would include the main information, such as the thesis and dissertations data bank (CAPES or BDTD), the research’s title, the author, key worlds, publishing year, the program (academical master’s degree, professional master’s degree or doctor’s degree), institution, research’s abstract, goal to be reached with the research, methodology and results founded.

Going to the next step (iii), regarding the document's screening on the CAPES platform, relative filters were used, regarding the researches that were facing mathematics' teaching for countryside studies, selecting the researches that involve the following great areas of knowledge: agrarian sciences, exacts, land and multidisciplinary sciences. A filter regarding the areas of knowledge was also applied, the selected fields were: Teaching, mathematics, and science teaching, interdisciplinary, mathematics and rural extension.

Starting the quest, 58.450 researches were in at least one of the descriptors, both in the CAPES and BDTD platforms. When the two first criteria were applied, related to the presentation in the title of at least one of the descriptors and that the publishing that must have been in the last ten years, 115 results were totalized. When the researches that appeared double inside the platforms were taken out, the number fell to 77 studies.

This total number of researches refers to both the searching platforms, so, it was necessary to verify if were there duplicity among the two platforms. While making the analysis, it was noticed that 10 researches were presented in both the CAPES and BDTD platforms.

Disregarding these results, we arrived in the final quantity of 67 researches that were selected to be analyzed by the next selection criteria.

After verifying the criteria related to the application in basic education and with the countryside students, twenty six researches were discarded due to the reason that this one's referred themselves to technical courses (1), teacher's graduation (7), and teacher's formation (16). Besides those, other studies that could not be used were found. One with unauthorized disclosure, and another one that was not analyzed because it was not available for downloading. So, a total of 41 researches were selected.

The last inclusion criteria, related to mathematics' teaching from educational and reflective practices about the countryside culture, directed this survey to 24 researches, that will be considered in the present study. The 24 researches selected are classified as master's degree researches. Among them, 10 are from academic's master's degree (MA) and 14 are from professional master's degree (MP). The first chart presents the principal data about each job, following the publication's chronological order.

Chart 1 - Researches relation.

Nº.	Bank	Program	Research's title	Author (year)
1	CAPES	MA	Countryside Students' Conceptions About Learning Mathematics' Resources	Macêdo (2010)
2	CAPES	MP	First Degree Polynomial Function on the Eight Degree of Elementary School: A Job Made with Quotidian Situations.	Seckler (2010)
3	CAPES	MA	Graphic's Interpretation on a Computational Ambient, by Students from a Rural School on the City of Caruaru-PE	Alves (2011)
4	BDTD	MA	The intellectual student's commitment in mathematics classes that instigate the relationship between the mathematical relationship brought from the rural context and the one mobilized in the school context	Lima (2011)
5	CAPES	MA	Ecology of Mathematical Knowledge in a Family Center of Alternation formation (CEFFA): The Method of Reduction to Unities in the Praxeology of the CEPE School	Assunção (2012)
6	BDTD	MP	Mathematical Education, Rural Cultures and Ethnomathematics: possibilities for a pedagogical practice	Strapasson (2012)
7	CAPES	MP	Teaching and Learning of Mathematics and Rural Education: The Case of the Rural Municipal Community School "Padre Fulgêncio do Menino Jesus"	Andreatta (2013)
8	BDTD e CAPES	MP	Mathematical Modeling in Rural Education	Feyh (2013)
9	CAPES	MP	Statistics Teaching in a Countryside School: A Purpose for a 6 Grade from Fundamental School	Pereira (2013)
10	CAPES	MA	Mathematical Modeling with Algebraic Content for the 9 Grade	Santos (2014)
11	CAPES	MP	Potentialities of Photography for Teaching Geometry and Proportion in a Rural School	Frantz (2015)
12	BDTD	MP	The knowledges (Dis)Construction on Countryside Education: Dialogues among Knowledge in Mathematics Education	Alves (2016)
13	CAPES	MP	Monitoring at Countryside schools: Students Helping Students in Mathematics' learning	Camara (2017)
14	BDTD e CAPES	MP	An application of mathematical modeling in rural education	Dufeck (2017)
15	CAPES	MA	Rural Education: Redefining the mathematical knowledge of young farmers in Amazonian communities	Leite (2017)

16	CAPES	MA	Mathematical Modeling projects and Theorems in Action: An Investigation on the Concepts of Area and Perimeter	Preischartd (2017)
17	CAPES	MP	Mathematics for basic education students, in rural schools with family income from milk production	Anna (2018)
18	CAPES	MP	Ethnomathematics and Geometry Teaching at countryside schools, interacting with information and communication technologies	Deoti (2018)
19	CAPES	MP	Mathematical Modeling in Rural Education: Weaving New Paths	Leite (2018)
20	BDTD e CAPES	MA	Field Education and Mathematical Modeling: Greenhouse construction for organic production on the rural area of São Sebastião do Cai	Flores (2019)
21	CAPES	MP	Ethnomathematics: The Know-How of Tankers in the Brazilian Semi-arid Region and their Contributions to the Teaching-Learning of School Mathematics	Freire (2019)
22	CAPES	MP	Rural Education and Mathematical Education: a possible articulation	Lima (2019)
23	CAPES	MA	The Dream of Icarus: Technology-Mediated Mathematics Teaching in High School - City of Manaus	Melo (2019)
24	BDTD	MA	Differences and approaches to mathematical knowledge: scholar and rural	Nascimento (2019)

Source: Own Authorship (2020).

With the researches selection done, we went to the detailed analysis, aiming to verify how does the mathematics' studies were aborded in countryside schools.

Analysis and discussion on the data identified in the mapping

Once the researches were identified, we could go further to the (iv) step,

proposed by Petersen et al. (2008), which refers to abstract's keywording. Initially, we detailed the gathering of the main aspects from the selected studies, aiming to evidence the keywords from the researches. On the figure 1, a word cloud, we present what the main aspects indicated in the selected researches are.

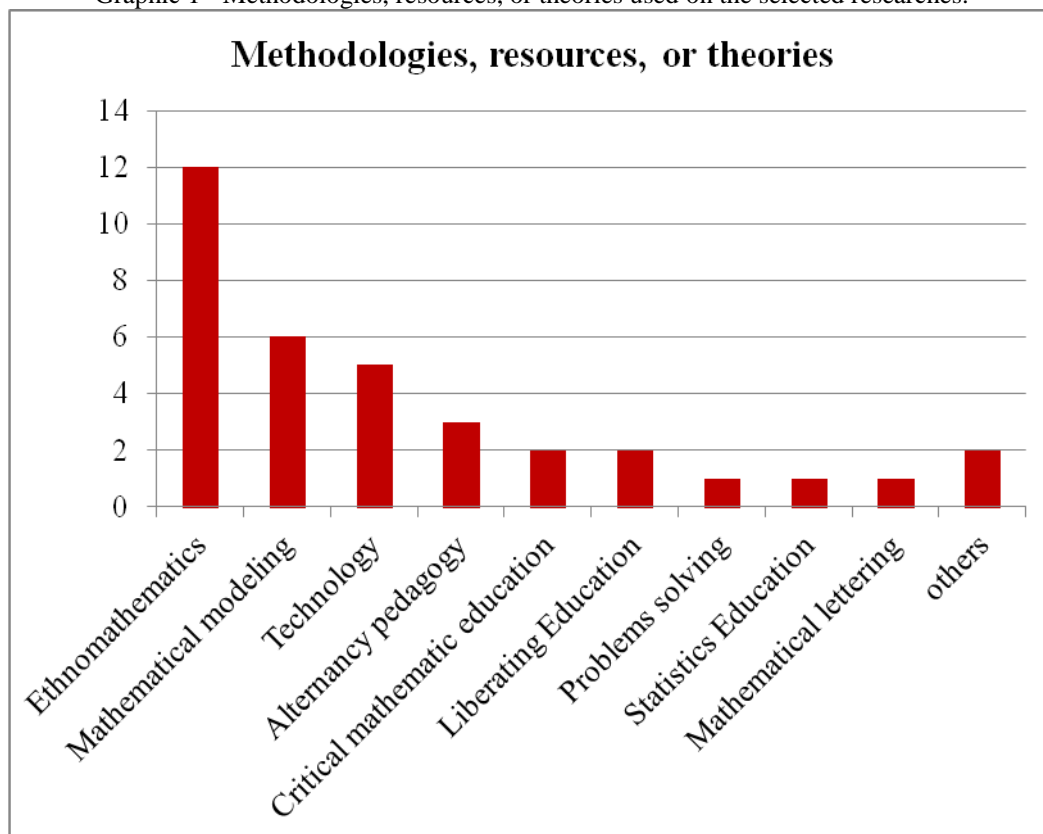
	Nascimento (2019); Strapasson (2012); Macêdo (2010); Lima (2011)	
Mathematics Modeling	Dufeck (2017); Feyh (2013); Flores (2019); Leite (2018); Preischartd (2017); Santos (2014)	6
Digital Technologies	Alves (2011); Deoti (2018); Frantz (2015); Freire (2019); Melo (2019)	5
Alternation Pedagogy	Assunção (2012); Leite (2017); Alves (2016)	3
Liberating Education (Free education)	Flores (2019); Lima (2019)	2
Critical Mathematical Education	Lima (2019); Seckler (2010)	2
Mathematics' Literacy	Lima (2011)	1
Statistics' education	Pereira (2013)	1
Problems solving	Seckler (2010)	1
Others	Macêdo (2010); Preischartd (2017).	2

Source: Own Authorship (2020).

The graphic number 1 brings a demonstrative, for a better viewing of what methodologies, resources or theories presents the higher number of studies, aiming the theoretical, or practical

groundings. It is important to highlight that the same research can appear in more than one methodology, resource, or theory.

Graphic 1 - Methodologies, resources, or theories used on the selected researches.



Source: Own Authorship (2020).

During the reading of the selected researches, it was noticed that the studies that evidence the same aspects, use similar theoretical foundations, following the same analysis way during the applications with students. The methodology, resource or theory that was used the most was the Ethnomathematics, aiming to demonstrate the dialogue between the mathematical knowledge and the rural popular knowledge, and also the contribution given by the scholar teaching to the practices made in the communities that are part of the students' lives. This aspect was noticed in the researches made by Alves (2016), Andreatta (2013), Anna (2018), Assunção

(2012), Camara (2017), Deoti (2018), Freire (2019), Lima (2019), Nascimento (2019), Strapasson (2012), Macêdo (2010) e Lima (2011).

The Mathematical Modeling is indicated in the researches made by Dufeck (2017), Feyh (2013), Flores (2019), Leite (2018), Preischart (2017) e Santos (2014). They present the adaptation of the school contents to the students' realities, and also the contribution from the mathematical related knowledge to the local culture, by using activities done with topics that contextualizes the field area and the mathematical contents.

Related to the digital technologies, they were used as a resource for mathematical teaching on the researches made by Alves (2011), Deoti (2018), Frantz (2015), Freire (2019) e Melo (2019). These ones presented the interest by the practice in activities that evolve the mathematics' discipline and the field knowledges with the use of computers, tablets, smartphones, and other devices. The researches highlight the use of technological resources used to teach how to calculate areas, how to analyze graphics and geometric forms, exploring Mathematics as knowledge together with the field practices.

The researches made by Assunção (2012), Alves (2016) e Leite (2017) present reflections and applications about how does the mathematical knowledges dialogue with the knowledges of agriculture's, specifically about their mathematics knowledge. When referring to scholar mathematical knowledges helping on the developing of the community, the alternation pedagogy aims to involve the countryside student's reality and the school knowledges, making possible an exchange of knowledges, so that this one's contribute to the personal, academical and professional students' life. Agreeing with the Ethnomathematics pedagogy, Alves (2016, p. 89) highlights that:

When this methodology is used on mathematics' teaching in rural contests, it is possible to notice that altering allied to Ethnomathematics was valuable, because this two educational principles consider not only the cultural specifications of the groups, but also the needs to make the community stronger and the emancipation of people.

The critical mathematic education showed itself in the work made by Lima (2019) and Seckler (2010). This aspect has, as a possibility, the involvement of students with situations in which mathematical notions are needed, such as the developing of criticality and developing the society comprehension, focused on decisions making. Seckler (2010) talks about problems solving and presents the way that students solve correctly calculus when this ones are connected with their culture, but the same students show difficulties when the problems bring functions and graphics in the cartesian plane. The author also highlights the importance of reviewing the mathematical contents before the contextualization among knowledges, because, in this way, the students present a higher autonomy in problems solving.

Talking about the Liberty education, the researches have as a goal relating the contribution on the countryside student's formation, to the scholar knowledges. This was detailed on the written made by Flores

(2019) e Lima (2019). Flores (2019) points to the developing of criticality, the societies' comprehension, in what field students are inserted, and also the potential of the decisions making when building a greenhouse for planting vegetables and seasonings, in which the food would be eaten by the own students during lunch at school. Lima (2019) studies the activities produced in the community, such as the growing of sugar cane and other rural practices from the region, analyzing the familiar relation in the context of its involving with the productive activity to guarantee that the scholar necessities are covered. The researcher constated that the countryside students who belongs to the rural families almost do not approximate Mathematics to the countryside school.

The statistics education is pointed by Pereira (2013) when verifying that the subjects aborded on school have a meaning in the daily life of the students. Due to this, information about the agriculture culture emphasized in that region were highlighted, creating a project about the agricultural profile and the tobacco production in Brazil, the impacts of culture and possible solutions by agroecology.

Lima (2011) analyzed the student's texts in the perspective of mathematical lettering, by the intellectual engaging and the relations between mathematical

knowledge and the rural context. Both in discussions and in texts, the researcher could see the mathematical knowledges that refers to the rural context mobilized on the scholar culture, showing that the students already bring cultural knowledges and can articulate them with scholar practices.

On the topic "others", presented on the Graphic n° 1, we have the research made by Macêdo (2010) and the one made by Preischartt (2017). The research made by Macêdo (2010) it is used the social representations theory with the idea of discussing mathematical teaching elements, starting by the countryside student's conceptions about the used resources to learn mathematics. For this, the author identified the student's conceptions, analyzed, and highlighted the resources used for mathematics teaching, clarifying the material and human resources' conceptions on teaching and mathematical learning. Preischartt (2017) uses the conceptual fields theory, aiming to identify how theorems in fake actions manifest themselves on student's answers, in contextualized questions about day to day situations.

Concluding the researchers' synthetization presentation, the last step (v), referring to the extraction of effective data on the mapping. So, we reoccurred to

the detailed reading, and also to the demonstrative made with the words cloud and to the main aspects of each one of the researches, making possible that the categorizations were made according to the directions given by the authors.

The categorization can cover one or more researches, once these ones are related to the objectives proposed here. It was opted by the creation of categories to organize and to make a better classification of the found researches, just as it was suggested by Petersen et al. (2008) and by Okoli (2015), or even also favoring the grouping of messages according to the information's similarities, such as indicated by Motta, Kalinke and Mocrosky (2018).

To the categorization, a reading of the following parts was made: abstracts, introduction, methodology, objectives and final considerations or conclusions established by the researches' analysis, and when this parts that were read were not able to bring the information required, the reading advanced to the other chapters "according to criteria defined by the researcher, willing to attend to the studies objectives" (Motta, Basso & Kalinke, 2019, p. 211). The third chart highlights the categories, as well as the description and the respective researches that fit in any of them.

Chart 3 - Selected researches categorization.

Categorization	Description	Researches
Digital and technological resource	Researches that are directed to this category presents the use of digital technology as a resource to make possible a higher integration of the student with the Countryside schools to the mathematical contents.	Alves (2011); Deoti (2018); Frantz (2015) e Melo (2019).
Teacher	These researches highlight how the involving and the knowledge of the teachers, gathered with the countryside reality make better results to the rural education possible.	Alves (2016); Lima (2011); Strapasson (2012); Lima (2019) e Macêdo (2010).
Formation	The researches included in this category have as their objectives presenting how the mathematical teaching on countryside schools can contribute to student's formation, together with the countryside practices.	Alves (2016); Dufeck (2017); Andreatta (2013); Leite (2017); Feyh (2013); Anna (2018); Flores (2019); Assunção (2012); Seckler (2010); Freire (2019) e Leite (2018).
Knowledge	This category includes the authors that emphasized in their studies the evolving of the formal and informal integrating them on the countryside schools.	Alves (2016); Pereira (2013); Santos (2014); Assunção (2012); Preischaradt (2017); Camara (2017); Strapasson (2012); Deoti (2018); Lima (2011);

Lima (2019); Nascimento (2019); Dufeck (2017); Andreatta (2013); Leite (2017); Feyh (2013); Anna (2018); Flores (2019); Seckler (2010); Freire (2019) e Leite (2018).

Source: Authors (2020).

The smallest quantity of researches is referring to the use of digital technological resources together with the practices on mathematics teaching on countryside schools. This fact happens due to the lack of technological equipment both on schools and on the student's houses, or also by the lack of knowledge or formation to work with these resources presented by the teachers. On these researches, it is indicated that the countryside students do like, and they also participate on the classes when the practices happen with the use of technologies. As an example, on the research carried out by Alves (2011), it is described that there were no difficulties on the use of computers with the rural students, even though it was the first time that a school activity was carried out with this perspective.

The second category highlights the approximation made between teachers and the rural reality, identified on the Chart n° 3 as "teacher". This is a topic that has to be considered, once many teachers that work on Countryside schools are not prepared to act in this context, and know little about

the practices that evolve agriculture, not being familiarized with the knowledges from this reality. That is the reason why it is important for teachers to search for knowledge possibilities, being them in formations, researches or projects that use different teaching methodologies, which cab make possible that the student's previous knowledge is considered. On this idea, it is expected that the pre-established concepts from the students, are investigated, as well as what the practices done in that community are. The teacher does not need to carry out only rural related activities in the classroom, but the teacher needs to relate scholar mathematics with the non-scholar mathematics, determining favorable moments to have connections between both the knowledges (Strapasson, 2012).

The third category links the research practices with the scholar teaching contribution to the countryside's students' formation, in a way that mathematical teaching on rural school contributes to the integral students' formation. According to this perspective, the researches that fit in

this category, analyzed the way that the students learn at school, evidencing the practices such as personal and professional contribution. Focused on this end, the day to day dynamics in formal educational spaces, can consider the cultural characteristics and allow the elaboration of new knowledges, thenceforth the knowledges already developed on the local community social relations (Feyh, 2013).

The greatest part of the highlighted researches in this mapping, in a total of 20, are worried with the integration of the knowledges in activities for decision's taking, contributing to the student's autonomy (Flores, 2019).

The researches that refers themselves to the "Teacher" category, shows researches that describe this category aiming to relate formal and informal knowledges, promoting the learning and a best knowledges integration. With this, we aimed to develop critical thinking and capacitation, pointing that the approximation, the knowledge and the teachers' evolving, together with the rural reality, making a better knowledge's integration with the use of different methodologies, theories or technological resources possible. In this way, so that this integration occurs and make a teaching valorization and mathematical content able, it is necessary an integration of the

cultural, rural, and mathematical knowledges, making possible that the student have an integral formation.

Final considerations

This mapping points to researches that evolve Countryside Schools and mathematical thinking, presenting studies that evolve educational practices according to the rural reality. The researches happened in the ways that were previously described and, depending on the choice, terms or databases, other results can be identified, what makes the Systematic Mapping an open study.

The listed researches in this study, fit in one or more categories, which the descriptions aim to favor the complementation among the researches, according to their characteristics. When abording this categories, Mathematical teaching can present higher students' evolving possibilities, with the contents that are worked in classrooms, making possible a formative teaching, considering that:

...life in the Countryside also teaches Math, because it is not difficult to notice that the rural man and woman use measuring and counting techniques, as well as the geometric teaching and probabilistic in their relation with life, principally, in their relation with work. (Alves, 2016, p. 52).

With this, the school, having as its principal goal the integral students' formation, needs to integrate the knowledges and the scholar practices, evidencing the culture and the informal knowledge that the students have.

Although, we highlight that for a better use and a better teaching promotion, together with the rural schools, an extension of this study can be directed to the teachers that teach in Countryside schools, presenting suggestions and applications of the activities or practices, relating them to agriculture or livestock, as a form of mathematics' knowledges obtention with the goal of contributing to the student's reality. Thus, a research's continuation could evolve Math teachers that are active members from the study local and that present their considerations together with the countryside life.

A second possibility is the followed, continued and constant formation for countryside teachers, objecting to axialite, verify and diagnose how the Agricole job happens and what are the informal knowledges that the students already have that evolve math concepts. With this, it is possible to give opportunities to mathematics' teaching practices with the use of technological resources and varied methodologies, such as, for example, the ethnomathematics and mathematical

modeling that are among the most used ones in the researches that this mapping reveled.

References

Alves, I. M. P. (2011). *A interpretação de Gráficos em um Ambiente Computacional por Alunos de uma Escola Rural do Município de Caruaru-PE* (Dissertação de Mestrado). Universidade Federal de Pernambuco, Pernambuco.

Alves, L. C. F. (2016). *A (des) construção do conhecimento na Educação do Campo: diálogos entre os saberes no ensino de Matemática* (Dissertação de Mestrado). Universidade Federal de Minas Gerais, Minas Gerais.

Andreatta, C. (2013). *Ensino e aprendizagem de Matemática e educação do Campo: o Caso da escola municipal comunitária rural "Padre Fulgêncio do Menino Jesus", município de Colatina, estado do Espírito Santo* (Dissertação de Mestrado). Instituto Federal de Educação, Ciência e Tecnologia do Espírito Santo, Espírito Santo.

Anna, A. C. (2018). *Matemática para estudantes de educação básica, em escolas no Campo com renda familiar oriunda da produção de leite* (Dissertação de Mestrado). Universidade Regional de Blumenau, Santa Catarina.

Arroyo, M. G., & Fernandes, B. M. (1999). *A educação básica e o movimento social do Campo*. Brasília, DF: Editora Vozes. 2ª ed.

Arroyo, M. G., Caldart, R. S., & Castagna, M. (2011). *Por uma Educação do Campo*. Petrópolis, RJ: Editora Vozes. 5º ed.

Assunção, C. A. G. (2012). *Ecologia de um Saber Matemático em um Centro*

Familiar de Formação por Alternância (CEFFA): O Método de Redução à Unidade nas Praxeologias da Escola CEPE (Dissertação de Mestrado). Universidade Federal do Pará, Pará.

Brasil. (2010). Decreto nº 7.352, de 4 de novembro de 2010. Dispõe sobre a política de Educação do Campo e o Programa Nacional de Educação na Reforma Agrária - PRONERA. Recuperado de: http://www.planalto.gov.br/CCIVIL_03/Ato2007-2010/2010/Decreto/D7352.htm

Brasil. (2017). Ministério da Educação. *Base Nacional Comum Curricular (Versão Final)*. Brasília, DF: MEC. Recuperado de: http://basenacionalcomum.mec.gov.br/images/BNCC_EI_EF_110518_-versaofinal_site.pdf

Camara, D. (2017). *Monitoria na Escola do Campo: Alunos ajudando na Aprendizagem da Matemática* (Dissertação de Mestrado). Universidade Federal do Oeste do Paraná, Paraná.

Campos, P. P. (2011). *A Matemática do Meio Rural numa Abordagem Etnomatemática: uma experiência Educacional dos Núcleos-Escolas da Comunidade Camponesa do Movimento Sem Terra no Município de Serra Talhada* (Dissertação de Mestrado). Universidade Federal Rural de Pernambuco, Pernambuco.

D'Ambrósio, U. (2009). *Educação Matemática: da teoria à prática*. São Paulo, SP: Editora Papirus.

Deoti, L. M. L. (2018). *A EtnoMatemática e o Ensino de Geometria na Escola do Campo em Interação com Tecnologias da Informação e da Comunicação* (Dissertação de Mestrado). Universidade Federal da Fronteira Sul, Santa Catarina.

Dufek, L. F. (2017). *Uma aplicação da Modelagem Matemática na Educação do*

Campo (Dissertação de Mestrado). Universidade Estadual de Ponta Grossa, Paraná.

Falbo, R. A. (2012). *Mapeamento Sistemático*. Vitória: Universidade Federal do Espírito Santo. Recuperado de: <http://claudiaboeres.pbworks.com/w/file/fech/133747116/Mapeamento%20Sistem%C3%A1tico%20-%20v1.0.pdf>

Feyh, C. R. N. (2013). *Modelagem Matemática na Educação do Campo* (Dissertação de Mestrado). Universidade Regional de Blumenau, Santa Catarina.

Flores, L. S. (2019). *Educação do Campo e Modelagem Matemática: construção de estufa para a produção de orgânicos na zona rural de São Sebastião do Caí* (Dissertação de Mestrado). Universidade Federal do Rio Grande do Sul, Rio Grande do Sul.

Frantz, D. S. F. S. (2015). *Potencialidades da Fotografia para o Ensino de Geometria e Proporção em uma Escola do Campo* (Dissertação de Mestrado). Universidade Federal do Rio Grande do Sul, Rio Grande do Sul.

Freire, F. O. (2019). *Etnomatemática: O Saber-Fazer dos Cisterneiros do Semiárido Brasileiro e suas Contribuições para o Ensino-Aprendizagem da Matemática Escolar* (Dissertação de Mestrado). Universidade do Estado do Rio Grande do Norte, Rio Grande do Norte.

Goulart, A. J. et al. (2020). *Diálogos sobre educação do campo, resistência e emancipação social e humana: um chamamento para reflexão no/do cenário educacional*. Curitiba, PR: Appris.

Leite, K. C. (2018). *Modelagem Matemática na Educação do Campo: Tecendo Novos Caminhos* (Dissertação de Mestrado). Universidade Estadual do Centro-Oeste, Paraná.

Leite, M. A. (2017). *Educação do Campo: Ressignificando saberes matemáticos de jovens agricultores em comunidades Amazônicas* (Dissertação de Mestrado). Universidade Federal do Pará, Pará.

Lima, F. G. (2011). *O engajamento intelectual de alunos em aulas de matemática que instigam a relação entre o relacionamento matemático trazido do contexto rural e o mobilizado no contexto escolar* (Dissertação de Mestrado). Universidade Federal de Campinas, São Paulo.

Lima, G. M. L. (2019). *Educação do Campo e Educação Matemática: uma articulação possível* (Dissertação de Mestrado). Universidade Federal do Rio Grande do Sul, Rio Grande do Sul.

Macêdo, M. C. (2010). *Concepções de Estudantes do Campo sobre Recursos para Aprender Matemática* (Dissertação de Mestrado). Universidade Federal de Pernambuco, Pernambuco.

Melo, E. R. (2019). *O Sonho De Ícaro: Ensino de Matemática Mediado por Tecnologia no Ensino Médio - Município de Manaus* (Dissertação de Mestrado). Universidade do Estado de Amazonas, Amazonas.

Molina, M. C., & Jesus, S. M. (2004). *Por uma educação do Campo: contribuições para a construção do projeto de Educação do Campo*. Brasília, DF: Editora Vozes, vol. 5.

Motta, M. S., Basso, S. J. L., & Kalinke, M. A. (2019). Mapeamento sistemático das pesquisas realizadas nos programas de mestrado profissional que versam sobre a aprendizagem Matemática na Educação Infantil. *Revista Actio*, 4(3), 204-225. <https://doi.org/10.3895/actio.v4n3.10456>

Motta, M. S., Kalinke, M. A., & Mocrosky, L. F. (2018). *Revista Actio*, 3(3), 65-85. <https://doi.org/10.3895/actio.v3n3.7591>

Nascimento, A. M. R. (2019). *Diferenças e aproximações dos saberes matemático: escolar e rural* (Dissertação de Mestrado). Universidade Federal de Pernambuco, Pernambuco.

Okoli, C., & Schabram, K. (2015). A Guideto Conducting a systematic literature. Review of information systems research. *Communications of the Association for Information Systems*, 10(26), 879-910.

Pereira, L. B. C. (2013). *Ensino de Estatística na Escola do Campo: Uma Proposta para um 6º Ano do Ensino Fundamental* (Dissertação de Mestrado). Universidade Tecnológica Federal do Paraná, Paraná.

Petersen, K. et al. (2008). Systematic mapping studies in software engineering. In *Proceedings of the 12th international conference on Evaluation and Assessment in Software Engineering* (pp. 68–77). Bari-ITA. <https://doi.org/10.14236/ewic/EASE2008.8>

Pischetola, M. (2019). *Inclusão digital e Educação a nova cultura da sala de aula*. Petrópolis, RJ: Editora Vozes.

Preischartt, R. X. R. (2017). *Projeto de Modelagem Matemática e Teoremas em Ação: Uma Investigação sobre os Conceitos de Área e Perímetro* (Dissertação de Mestrado). Universidade Estadual de Maringá, Paraná.

Santos, C. A. (2008). *Educação do Campo: Campo, Políticas Públicas, Educação*. Brasília, DF: Inca/MDA.

Santos, C. M. S. C. (2014). *Modelagem Matemática como Conteúdos Algébricos*

no 9º Ano (Dissertação de Mestrado).
Universidade Estadual da Paraíba, Paraíba.

Seckler, D. M. (2010). *O Ensino de Função Polinomial do 1º Grau na Oitava Série do Ensino Fundamental: Um Trabalho com Situações do Cotidiano* (Dissertação de Mestrado). Centro Universitário Franciscano, Rio Grande do Sul.

Strapasson, A. G. (2012). *Educação matemática, culturas rurais e etnomatemática: possibilidades de uma prática pedagógica* (Dissertação de Mestrado). Centro Universitário Univates, Rio Grande do Sul.

How to cite this article

APA

Schneider Gross, G. F., Albertoni, N. R. M., Santos, E. O., Motta, M. S., & Kalinke, M. A. (2020). What do researches on mathematics teaching in schools of the countryside reveal? *Rev. Bras. Educ. Camp.*, 5, e9727. <http://dx.doi.org/10.20873/uft.rbec.e9727>

ABNT

SCHNEIDER GROSS, G. F.; ALBERTONI, N. R. M.; SANTOS, E. O.; MOTTA, M. S.; KALINKE, M. A. What do researches on mathematics teaching in schools of the countryside reveal? *Rev. Bras. Educ. Camp.*, Tocantinópolis, v. 5, e9727, 2020. <http://dx.doi.org/10.20873/uft.rbec.e9727>

Article Information

Received on June 20th, 2020
Accepted on October 10th, 2020
Published on November, 25th, 2020

Author Contributions: The author were responsible for the designing, delineating, analyzing and interpreting the data, production of the manuscript, critical revision of the content and approval of the final version published.

Conflict of Interest: None reported.

Orcid


Giane Fernanda Schneider Gross

 <http://orcid.org/0000-0002-5225-6484>

Neumar Regiane Machado Albertoni

 <http://orcid.org/0000-0002-3023-3468>

Érica Oliveira dos Santos

 <http://orcid.org/0000-0002-2397-1307>

Marcelo Sousa Motta

 <https://orcid.org/0000-0001-5534-2735>

Marco Aurélio Kalinke

 <https://orcid.org/0000-0002-5484-1724>