Towards mathematics curriculum recontextualisation: developing a rhizocurrere with roma students

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Georgios Kyriakopoulos
Post-doc Researcher
Institution: University of Thessaly
Address: 11, Anatolis street Pallini Athens Greece
E-mail: gvk_6@yahoo.gr

ABSTRACT
Students out of mainstream like Roma students often face problems following the mathematics curriculum which is designed without taking into consideration them and this fact contributes to the reproduction of inequalities. This paper suggests indicatively due to the limited layout an activity in the direction of reconceptualization of the Mathematics curriculum through rhizomatic thinking. The aim of the rhizomatic inquiry is to avoid representationalism often inherent in qualitative research and to challenge the dichotomies apparent in Mathematics education. Roma students’ ideas on parallel and intersecting straight line sections become a smooth space for both knowledge consolidation and application of mathematical knowledge in contexts that allow the restoration of social justice and honor movements against marginalization softening, thus, power relations.

Keywords: rhizocurrere, deleuzian ideas, curriculum, roma students.

1 INTRODUCTION

Introducing their seminal work, A thousand Plateaus: Capitalism and Schizophrenia (1980/1988), Deleuze and Guattari examine the antithesis of arboreal and rhizomatic knowledge structure. Traditional knowledge structures arising from conventional research methods are pre-arranged, hierarchical moving according to a linear progress starting from research question, ending in a definite result. At the opposite is the rhizome which provides a contrast with the transcendent, the stable and the definite knowledge by highlighting the openness and the lack of structure in the unpredictable (Johansson, 2016). Rhizomatic knowledge is centred on heterogeneity as “any point of a rhizome can be connected to any other, and must be” (Deleuze & Guattari, 1980/1988, p. 7) while “a rhizome has no beginning or end; it is always in the middle, between things, intermezzo” (Deleuze & Guattari, 1980/1988, p. 25).

This paper is part of a broader doctoral research aimed at highlighting a different approach to the reconceptualization of mathematics curriculum with 3rd grade Roma students in Athens. This research seeks to move beyond common sense that historical, sociopolitical and socioeconomic forces shape for Roma communities. It seeks to empirically show how mathematics may act as a tool that Roma people
creatively employ and transform these elements to reify, nudge, perturb, alter, and/or transform existing relationships of power (Philip & Gupta, 2020).

2 THEORETICAL SYNTHESIS

Roma students face serious conflicts when invited to participate in formal school settings. The way of teaching as it is suggested through the mathematics curriculum adopts common teaching practices that tend to perpetuate the marginalization of students' cultural identity, thus creating two-speed students (Stathopoulou, 2017). Educational studies show that Roma students have low and inconsistent participation in compulsory education as well as high dropout rates (Alexiadou, 2019). Research on Roma students' perceptions of learning conditions and the opportunities they are offered develop in the school environment, stereotypical beliefs about the potential of Roma students in the school context are highlighted. Greek school practices as well as mathematics curriculum adopt an ideology of assimilation and ignore if not underestimate the fundamental characteristics of children's cultural identities (Gana et al., 2020). Existent approaches to mathematics education end up creating implicit assumptions about dichotomies such as formal and informal education which distort reality and fail to create the conditions for successful mathematics education (Appelbaum & Stathopoulou, 2015).

Giving meaning to a mathematical result derived from the use of Roma students’ knowledge counteracts school dropout and, to that extent, social inequality (Skovsmose, 2019). Towards that direction Paulo Freire (1970) mentions that:

“For apart from inquiry, apart from the praxis, individuals cannot be truly human. Knowledge emerges only through invention and re-invention, through the restless, impatient, continuing, hopeful inquiry human beings pursue in the world, with the world, and with each other.” (p. 72)

Focused on this objective, alternative forms of mathematics curriculum are explored through a rhizomatic inquiry which examines the socioepistemological organization of a mathematics rhizocurrere starting from the student’s daily practice and reaching the symbolic stage gradually (Cantoral, 2019). The fundamental perspective that rhizomatic inquiry makes available is to encourage students and teachers to explore an ever-increasing number of dialogue opportunities that facilitate new ways of thinking about mathematics as framed by students' funds of knowledge. A rhizomatic perspective with its lines and assemblages invents mathematical concepts and reveals a dynamic unified reality in the mathematics education that is open to the unexpected becomings and deterritorializations wishing to counter colonialist

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1 The concept ‘rhizocurrere’ signals the approach of perpetual and dispersed narrative inquiry. This derives from Pinar’s currere, ‘an autobiographical approach to curriculum inquiry’ which ‘transforms curriculum from a noun to a verb’, and Deleuze and Guattari’s rhizome which ‘is a mode of thought that displaces binary logic for open pluralistic thinking’ (Mcphie, 2020).
understanding of mathematics, power issues and fostering thus, deeper awareness of the emancipation power of mathematics (Gutiérrez, 2013).

3 RESEARCH (NON) METHODOLOGY AND (NON) DATA

This research was realised with Roma students attending 3rd grade of a primary school in the suburbs of Athens. Access to the Roma community is very difficult and issues of trust and ethics affect negatively relevant research. Moreover the socio-cultural background of Roma community is blurred and constantly changing so the invention of a rhizocurrere is retained as the most appropriate method able to address the specific circumstances of this research.

Roma students use simple terms in their speech, such as "crooked line" and "straight line", instead of parallel and intersecting lines, resulting in being ridiculed and targeted when in contact with non-Roma people. In order to understand the mathematical concept of parallelism, they are first asked to identify parallel and intersecting lines in their daily lives talking about a Roma community game with a rope where “feet passing over the rope seem like a line that intersects the parallel sides”. Then students observe the lines that exist in the neighboring stump that is currently being constructed and report that there are both parallel and intersecting lines. A student mentions that "Parallel lines are what we do to keep the house from falling. The roof has lines that rest on top of each other so that the rainwater flows. If they are straight (meaning parallel) lines, the water will stay on." In this case we understand that students use the terms ‘straight’ and ‘crooked’ because they have a strong cultural background that gives meaning to this verbal representation of reality. Students connect the existence of parallelism with simple everyday phenomena such as the slope of the roof that helps the rainwater flow.

Examining the concepts of two or more parallel lines intersected by others, we prepare with the students a makeshift loom. This loom is a traditional textile machine where handmade textiles are made. These handmade textiles are familiar to students because they use them in their homes for handmade rugs. The loom consists of some parallel lines between which the students have to pass the colored thread (in a vertical layout) in order to form the handmade textile. Thus, students intuitively understand the value of parallelism but also the importance of intersecting lines feeling impressed by this kind of approach to the patterns. Incidentally when visiting a student's house, the researcher noticed a piece of handmade carpet that seemed to be made on a loom. When the family was asked where they got it from, they answered that the student had made it with her mother at a non-profit institution. The student heard about the existence of this organization in the church and on the occasion of the mathematical activities with which she interacted, she persuaded her mother to participate despite their initial doubts.
Starting from the approach of the parallel lines that are intersected by a third line and giving it meaning through the Roma students’ funds of knowledge, the opportunity is born for a student with her mother to engage in an activity in a social context outside their community. This fact, although it seems simple is a terrible transcendence for both the student and her mother. They overcome issues of racism and prejudice, join a social group where they voluntarily engage in traditional handicrafts, use mathematical knowledge as developed in various discursive plateaus linked and traversed by lines of flight and they can thus become the change of their daily routine by engaging in activities beyond their usual ones.

4 DISCUSSION

A teacher who focuses on the rhizomatic approach to an intercultural classroom will have the advantage of co-creating a mathematics rhizocurren with his students that meets their particular (cultural, social and learning) needs which are not always clear in advance. The students’ real education emerges when they are able to find ways to integrate individual issues by relating them to everyday life, in order to later continue self-regulated learning in the context of lifelong learning. Teacher through the rhizomatic inquiry pays special attention to the procedural side of knowledge, constantly updating his/her methods and leading students to unexpected cognitive fields arising from daily practice. Students develop a research culture trying to identify mathematics in situations which initially do not seem mathematical. They also develop critical thinking which will contribute to the creation of a better world through respect, understanding of intercultural differences and taking action as a consequence of their education.
Figure 1: The rhizoccurre
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