Rhizomatic Learning Paths of Education Researchers: Assemblages and Becomings

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ABSTRACT

Aim. The aim of the research – to highlight the assemblages and becomings in rhizomatic learning of research methodologies among education researchers, identifying rhizomatic learning paths.

Methods. *Thinking with theory* approach. This research is based on Gilles Deleuze and Félix Guattari's (2004) poststructuralist philosophy and assemblage theory, as well as Alecia Y. Jackson and Lisa A. Mazzei's (2023) *thinking with theory* approach. Cartography. The learning trajectories of education researchers have been depicted in rhizomatic maps based on Deleuze and Guattari's (2004) rhizome principles: connectivity and heterogeneity, multiplicity and rupture, and cartography. Rhizoanalysis. Rooted in Deleuze and Guattari's (2004) concepts and the principles of the rhizome, rhizoanalysis (Masny, 2015) was applied to analyse rhizomatic paths of education researchers.

Results. The most common assemblages are art-exploration assemblages, more-than-human assemblages, and work-related practice assemblages. The less com-

mon assemblages are material-led assemblages and affective (body and emotions) assemblages. During their learning journey, researchers create various becomings, such as *becoming-explorer*, *becoming-artist*, or *becoming-expert* of research methods. The rhizomatic maps disclosed that education researchers develop their learning through Deleuze and Guattari's (2004) rhizome principles.

Conclusions. The findings of this study show that education researchers should strengthen their learning of research methodologies by engaging in more material-led practice, establishing and working in research laboratories, conducting innovative research, and creating new methods themselves.

Keywords: rhizomatic learning, assemblages, becomings, research methodologies, Deleuze and Guattari

Introduction

Today, rapid changes worldwide, including the development of technologies, especially AI integration, global politics, and the industrial revolutions 4.0 and 5.0, create new demands for higher research quality at the university policy level. These changes in the field of education generate uncertainty, requiring education researchers to adjust, experiment, and find new ways to enhance the quality of their work. In this unpredictable situation, research methodologies undergo a continuous change process; it becomes essential for education researchers to renew methodological competence and learn about new methods when they emerge or are introduced (Penkina et al., 2020). Education researchers conduct research in interdisciplinary contexts, utilise new research tools, and employ novel approaches to data analysis (Lê & Schmid, 2020). For instance, Mirka Koro-Ljungberg (2016) suggests using *methodologies without methodology*, which does not mean that there are no methods; rather, it is about resisting pregiven methodological frameworks and instead allowing research to unfold through the entanglements of theory, ethics, and practice. In addition, Maggie MacLure (2013) critiques the dominance of thematic coding in qualitative research and suggests a new aspect, *the wonder of data*, which usually manifests as surprise. Thus, in this way, the learning of education researchers becomes increasingly rhizomatic.

According to Alexios Brailas (2020), rhizomatic learning is defined as extending, nurturing, and cultivating the development of a living network consisting of knowledgeable agents (both human and artificial) and material objects/resources. In this context, learning is realised as the capacity of these rhizomes to build on existing resources, create new connections and nodes, and expand further in different directions (Brailas, 2020).

In our study, we define an education researcher as a person with a higher education degree who studies educational phenomena, and these researchers can be from various fields (Hostetler, 2005). According to the author, education researchers need to con-

sider, understand, and conduct high-quality research. Thus, for education researchers, learning research methodologies is highly beneficial.

The researchers are exploring rhizomatic learning in educational research (Judijanto, 2025), *becoming rhizome researchers* (Clarke & Parsons, 2013), rhizomatic pedagogy in a study context (Koseoglu & Bozkurt, 2023), constructing nomadic thematic analysis (Brailas & Papachristopoulos, 2023), but not much research on teaching and learning research methodologies. João Filipe Matos et al. (2023) analyse a research-based pedagogical culture in teaching research methods courses in master's and doctoral programmes in education. Mari Murtonen and Erno Lehtinen (2005) disclose how students conceptualise research and what kinds of beliefs they have about the different methodological approaches. As shown, there remains a lack of research on the rhizomatic learning of research methodologies among education researchers from a post-structuralist perspective. As Elizabeth Adams St. Pierre (2014) notes, post-structuralism, postmodernism, posthumanism, and other "post" belong to post-qualitative inquiry. Such a post-qualitative approach is based on a performative paradigm, whereby learning is an ongoing process (Østern et al., 2021). As the authors note, the performative paradigm is provocative; it disrupts established concepts and perceptions, the traditional research position, and the idea of representative truth. In this way, learning becomes increasingly rhizomatic.

The notion of rhizomatic learning is based on Gilles Deleuze and Félix Guattari's rhizome concepts, firstly assemblages and becomings, which are essential components of the rhizome. In the rhizomatic, non-hierarchical plane, becoming occurs – transformations of the Self-Other that a person did not intend to plan to be: "Becoming is not conformity, resemblance, imitation, or identification. Becoming does not take place in the imagination, even when the imagination reaches its highest cosmic or dynamic level [...]" (Deleuze & Guattari, 2004, p. 238). Becoming arises from connecting diverse elements into assemblages. As Deleuze and Guattari (2004) note, "assemblage is precisely this increase in the dimensions of a multiplicity that necessarily changes in nature as it expands its connections" (p.8). Referring to the work of Deleuze and Guattari (2004), Ian Buchanan (2020) defines assemblage as a multiplicity of chaotic elements that can also operate effectively. Researchers also become part of the research assemblage, creating relationships with place, things, matter, people, ideas, and institutions. Nick J. Fox and Pam Alldred (2015), referring to Deleuze and Guattari's (2004) assemblage theory, note that these relations function like "machines" that produce something or accomplish a task. Thus, it is important to explore assemblages and becomings in a rhizomatic learning context.

The aforementioned aspects allow us to formulate research questions: How do assemblages and becomings manifest in rhizomatic learning of research methodologies among education researchers? What are the rhizomatic learning paths of education researchers in learning research methodologies?

The aim of the research – to highlight the assemblages and becomings in rhizomatic learning of research methodologies among education researchers identifying rhizomatic learning paths.

To achieve this goal, we rely on post-qualitative inquiry from a post-structuralist perspective. Applying Alecia Y. Jackson and Lisa A. Mazzei's (2023) *thinking with theory* approach, we think with Deleuze and Guattari's (2004) post-structuralist philosophy. In addition, we apply cartography and Diana Masny's (2015) rhizoanalysis to reveal the rhizomatic paths of education researchers.

Theoretical Background

Rhizomatic learning, as a rhizome spreading its sprouts in unforeseen directions, can occur anywhere, at any time, and in any way in our universally interconnected world (Khine, 2022). Engaging in rhizomatic learning, education researchers create assemblages and becomings.

Silvia Gherardi (2015) introduces agencement (Engl. *assemblage*) as the process of established connections. In this way, the researcher may follow and describe the process by which humans, artefacts, rules, technologies, sensible knowledge, legitimacy, and other practice resources become connected (Gherardi, 2012).

The assemblage is related to becoming. Bryan Clarke and Jim Parsons (2013) discuss the concept of the *becoming rhizome researcher*, describing it as involving personal growth, assemblages, and identity formation. Tone Pernille Østern et al. (2021) analyse the process of *becoming-performative researcher*. As the author notes, in this process, the researcher is de-centred and in-becoming throughout the research process as an affected researcher-body that needs its own sensuous body to engage, analyse, and understand. Anne-Marie Atkinson (2020) describes her journey to *becoming researcher*. Being alongside and *becoming researcher* emerged together with an understanding of the art practices and relationalities that occur in the Venture Arts studio, where she integrates past and present experiences, stimulates memory, engages in creativity and feels transformations – she *becomes a researcher*. Meanwhile, Joseph D. Sweet et al. (2019) disclose the concept of *becoming research*. In this way, *becoming research* manifests through the process of research-creation, that arises from thinking with *shadow-philosophy*, which allows thinking about things that are not noticed, like in "shadow".

To describe assemblages and becomings, Deleuze and Guattari (2004) present three types of line: rigid molar lines, molecular lines, and lines of flight. Referring to Deleuze and Guattari (2004), Thomas M. Leeder (2024) asserts that molar lines are structured lines operating at the macro level within the territory, while molecular lines occur at the micropolitical level through individuality and practice. According to the author, when molecular lines deviate from the norm and cause rupture by creating an assem-

blage through a process of deterritorialisation, they become lines of flight. As Deleuze and Guattari (2004) highlight, lines of flight have the capacity to reconfigure and alter what is accepted and perceived as the norm when they invade a territory. According to Cole (2022), deterritorialisation gives rise to new becomings, unconscious processes, and ways of working, ultimately resulting in a new social and cultural order. Meanwhile, reterritorialisation is the process by which practices are reappropriated and rehabitualised to evoke change and function differently in the returned territory (Bazzul & Kayumova, 2015).

Methods and Materials

Researchers' Positionality

We are three female education researchers with different backgrounds who are exploring how early-career education researchers learn research methodologies. Our team represents an assemblage of different professional identities and experiences: the first author is at an early-stage academic career, undertaking a postdoctoral fellowship, and the other two hold senior roles in academia. Our researcher identity of being *liquid in-betweener*, as described by Garrie-John Barnes (2023), prompts us to think about our positionality as shifting between roles of insiders and outsiders (Goundar, 2025). While engaging in post-qualitative inquiry, we consider our research journey through the lens of Deleuze and Guattari's concepts of the rhizome and Brailas' (2020) rhizomatic learning, amalgamating our disciplinary backgrounds in education, philology, and philosophy into a rhizome that grows in unpredictable directions. Thus, our diverse competencies and experiences allow us to investigate the manifestation of assemblages and becomings in the rhizomatic learning of research methodologies among education researchers.

Participants and Sampling

This study employs purposive sampling, in which researchers use their judgment to select participants who they believe are most representative or relevant to the study (Tiwari & Tripathi, 2024). The participants were education researchers who met the following criteria: a) early career education researchers who have only completed a doctoral degree; b) active engagement in educational research (working as researchers; writing scientific articles); c) from different universities and living in different regions of Lithuania. As John W. Creswell and Timothy C. Guetterman (2018) note, the researchers with doctoral degrees understand the landscape of scientific inquiry, especially methodologies; however, their ongoing professional work requires them

to deepen, adapt, and refine new approaches in response to complex educational issues. According to Creswell and Guetterman (2018), participants from diverse institutional backgrounds contribute a variety of learning experiences. As Creswell and Cheryl N. Poth (2018) note, selecting a diversity of participants enhances the richness of data analysis. Joseph A. Maxwell (2013) emphasises that selecting participants from different contexts reduces the risk of data bias and enhances the validity of the results. Thus, early-career education researchers who study educational phenomena from different universities and Lithuanian regions are well-suited participants for investigating how they learn and apply research methodologies, as well as how they develop their expertise through practice.

The characteristics of all 21 participants are presented in Table 1. Please read the data in the Table from left to right.

Table 1

Characteristics of Participants

Characteristics	**Value (n)**
Participants	21
Conducting research only in the educational field	12
Conducting research not only in education but also in other fields	9
Age (years)	
18-20 years	0
21-40 years	9
41-60 years	12
over 60 years	0
Work experience as an education researcher (years)	
1-5 years	3
6-10 years	8
11-20 years	7
21-30 years	*3*
Number of published articles in peer-reviewed journals *(n)*	
1-5	8
6-15	10
16-30	0
Over 30	3

Source. Created by authors.

About half of the research participants (12) conducted research exclusively in the educational field, while the other 9 researchers conducted research that spanned not only the educational field but also other fields, such as philology, philosophy, and history. Most participants were between 40 and 60 years. Typically, education re-

searchers have published between 6 and 15 peer-reviewed articles, with only 3 having published more than 30. This is because the researchers have spent a long time as academics.

Interview

The interview in post-qualitative inquiry is not simply a tool for investigating researchers' experience, but a dynamic assemblage in which voice, data, researcher and theory are intertwined (Mazzei, 2013). In this study, we employed semi-structured interviews (Adams, 2015) that blended closed and open-ended questions, often accompanied by follow-up "why" or "how" questions. The total interview time amounted to about 20 hours. The interview was conducted until conceptual saturation was reached. As Jackson and Mazzei (2023) observe, recognising philosophical concepts and materials facilitates encounters and entanglements, helping to map what emerges at the threshold with theory to open meaning and new connections. Thus, we reached conceptual saturation, based on quality rather than data saturation, and this helped disclose assemblages and becomings.

Research Ethics

In post-qualitative inquiry, ethics is not a separate methodological step but an ongoing, integral aspect of research. It enables us to understand the research process, requiring a critical examination of established assumptions and structures (St. Pierre, 2024). To ensure an ethical approach to the research, the ethical principles presented by Christine S. Davis and Kenneth A. Lachlan (2017) were applied: a) providing the research participants with all information about the research, and ensuring that their participation is only voluntary, receiving written informed consent from the participants; b) non-harm and benevolence; c) anonymity; d) confidentiality. The semi-structured questions were reviewed by the University's Ethics Committee, and we received permission to conduct this research.

Data Analysis

Referring to St. Pierre (2019), in post-qualitative inquiry, we did not employ coding, categorisation, or thematic analysis. We were engaged in thinking through Deleuze and Guattari's theory (Jackson & Mazzei, 2023), and in every excerpt, we explored their concepts.

These insights allowed us to analyse raw data in such a way:

- Firstly, the transcripts were slowly, carefully, and multiple times read with Jackson and Mazzei's (2023) *thinking with theory* approach. We thought with Deleuze and Guattari's philosophical concepts, with the theory-arising question: what would Deleuze and Guattari say?
- Secondly, the cartography-based Deleuze and Guattari's (2004) principles were applied to disclose education researchers' learning paths. Masny's (2015) rhizoanalysis helped us to read and understand the rhizomatic learning paths of researchers.

Drawing on Deleuze and Guattari's (2004) insights, rhizomatic cartography enables us to create a map where the reader can enter or exit at any point. These maps have different lines that can be interpreted in different ways (Corner, 2011). According to Jasmine B. Ulmer and Mirka Koro-Ljungberg (2014), Deleuze-Guattarian maps are always a becoming, as they "uncover" the unconscious through cartographic performances. Thus, Deleuze and Guattari (2004) invite us to "Make a map, not a tracing. What distinguishes the map from the tracing is that it is entirely orientated toward an experimentation in contact with the real" (Deleuze & Guattari, 2004, p. 12).

Results

Remembering Studies and Engaging in Work-Related Practice

Education researchers with nostalgia fondly recall their doctoral studies. The researchers often feel that doctoral studies have helped them find the direction of their research methodology. It was a time of self-discovery and finding their methodological path as a researcher. As the researcher-participant points out,

> This is mostly my progress; a lot of it occurred during my doctoral studies, as I walked around and analysed how things should be now. I do that less because, like me, I have already found my direction. What interests me and what, how to do what next, and I do not feel the need for it at this point. (participant 20)

During doctoral studies, the researcher engaged in nomadic wanderings "*I walked around and analysed*". Such wonderings helped the learner *become a researcher*.

Many researchers later become teachers of research methods and gain more experience in the methodological field. For early-career researchers, teaching a methodology course is an effective way to learn and prepare for lectures that enhance their understanding of the subject.

Here is how the researcher vividly describes this process.

> I teach a research methodology module for master's students <…>, and in fact, for me, that preparation for that module was probably one of the most excellent parts of training

> because I found out that I would be teaching the module on August twenty-eighth, and the first lecture was, I don't know when, September 4 or 5 <…> . When I came to work there, all my former lecturers became my colleagues. One of my colleagues said, 'teach from intuition'. Oh, my goodness, how can you teach research methodology based on intuition? There is no intuition here. I had a lecture on Thursday, and for half a year, every Thursday, I would get up at 5:00 a.m. and prepare for the lecture <….>, but for me, probably one of the greatest lessons was precisely that preparation for the lectures (participant 14).

In this way, the teaching-self machinic assemblage consists of intuition, time, text, affect (emotions and body), as "assemblages are passional, they are compositions of desire" (Deleuze & Guattari, 2004, p. 399). The contradiction between "teach by intuition" and "there is no intuition" arises tension between the molecular (improvisation and experimentation) and molar strata (confident order in methodology). The practice of preparation enables the researcher to develop new insights in the process of teaching itself.

At the same time, researchers continue to learn in the workplace, gaining valuable insights. The teaching methodology course helps early-career researchers deepen their understanding when they prepare for lectures. Learning occurs in two ways, not only from teachers to students, but also in the other direction, with teachers gaining insights from students. As a research participant notes,

> I learn a great deal from the students' course papers that I supervise, particularly those I assist with research and simple topics. I gain new insights from the methodological aspects. <…> I must review them myself, read them, and understand the methodology better, so that I can advise them correctly. However, I really learn something new from hearing from them on the scientific and methodological side. (participant 3)

From one point of view, knowledge flows from the supervisor to the students. From another point of view, the researcher undergoes a transformation; the researcher *becomes a learner* and gains various new insights from students' works.

The researchers remember unusual collaborative workshops at conferences. These formats included innovative learning approaches, such as discussions, as well as unconventional activities like dance, to create memorable learning experiences. The education researcher remembers a valuable experience.

> And then they split into groups. It is also not divided by topic, but rather by how the research is carried out, starting with the methodology, followed by a presentation on group work, and then, elsewhere, it focuses on the methodology. Then there are about 5 or 6 reports with studies, each one similar to ours, where we present our findings. And then there is always someone who finishes and talks about how important feedback is, discussing the simple methods we know, such as discussions and feedback, and then asks us all to reflect. However, who wants to talk, who wants to write, and here is the moment when one person stood up and did a modern dance to express this. It was very unexpected. I do not know, and that is w

hat was in the group. That is the person who conveyed his professional knowledge through the scientific topics we discussed that day (participant 1).

This event does not follow a logical hierarchical order – it splinters and loops from one place to another. In this way, methodologies seem to appear, disappear, and reappear elsewhere; they are like rhizomes sending off shoots in unpredictable directions. In this way, the assemblage consists of bodies, practices, materials, and affects. When a participant performs a modern dance to showcase their professional skills, this leads to a moment of deterritorialisation – moving away from the traditional territories of, for example, a traditional academic conference, towards affective, embodied expression. This playful and unexpected dance expresses joy, emphasising the ability to think, act, and create.

Art as an Attractive and Meaningful Experience for Education Researchers

The education researchers recall enjoyable experiences that occurred during their doctoral studies, when scholars engage in various assemblages and undergo creative "escapes". As the researcher-participant notes,

> We learned about examples of qualitative research methodology at the Čiurlionis museum, not because it is a created methodology, but because it is conveyed through art. We explored the entire museum, examining the paintings, and the workshop was organised for us. The educator gave a detailed presentation of one of Čiurlionis' paintings. Our lecture explained how the art is related to research methodologies. We were divided into groups, and we worked with it, and we presented our methods through the lens of Čiurlionis› art. (participant 1)

This excerpt demonstrates that scholars learn research methodology through the exploration of Čiurlionis' paintings, which often present art and music assemblages. This learning is presented as the a/r/tography, where researchers, teacher-educators, and lecturers are intertwined into an art-researcher-teacher assemblage, exploring research methods in an artistic environment.

The researchers engage in unusual art activities. The researcher associates lithography with research methodologies. As a research participant notes,

> <….> I visited the lithography school. <…> Lithography as a process is very similar to research methodology. At the same time, we had a lithography class, and at the same time, it was an interdisciplinary meeting, because there were artists from Hong Kong, New York, Los Angeles, who had already completed their studies in art in their own countries and had come to study lithography. I was with them, and we experienced a kind of intercultural moment together. I observed more than I did the lithography; <…>. I associated it very much with learning methodology; that's the impression I have. <…>. I think when you do research,

> and when you do it, and when you write a discussion, or describe it, a second time, or rewrite your conclusions, that moment is already the methodology of writing conclusions, it's like lithography: first, second, third. Essentially, it's like making a stamp on a stone; it's done on a stone and then numbered, starting with the first, and the last <…>. Since the number is limited, and they are all different. I sometimes think that we write conclusions in the same way, and then the first one is the first number, and in the end, we rewrite them, and they are different <…>. (participant 2)

In this way, the researcher creates a *becoming-artist*. The researcher enters a dynamic process of experimentation that is never fully stabilised. Lithography, as a printing technique on the stones, involves Deleuze's (1994) repetition – multiple printing, and difference; each print is different, never an exact copy, due to different materials, paper, and the researcher's ideas. Moreover, lithography can be understood as a machinic assemblage consisting of artists, stones, chemical processes, and a press. Lithography prints as first, second, and third refer to territorialisation, including ordering and coding. On the other hand, the researcher associates it with rewriting conclusions (de/reterritorisation) that creates difference and creativity in a Deleuzian sense.

Affective Rhizomatic Learning of Education Researchers

Education researchers immerse unconsciously in the process of affective learning, engaging their bodies in learning research methodologies. As the researcher-participant says,

> When I conduct thematic analysis, I print out all the material and cover the entire floor. And then I make what I call branches, subthemes, because I need to organise the picture in my own mind.<…> I have to write things down the old-fashioned way, mark them with colours, sleep in that room, get up at night, and physically immerse myself in the study. So, you know, I am such an out-of-schooler (participant 2).

In this way, the researcher does not traditionally interpret themes; the researcher feels and lives with them, touches them, reviews them, and organises them. The affect is embodied – the researcher and data become parts of an assemblage; the body performs many functions, such as remaining with the material, transforming it and returning to it again. The research process is intertwined with bodily activity when sleeping in the room; the researcher allows affect to penetrate the unconscious rhythm, enabling the data to be affective, even when they are at rest. When the researcher gets up at night, her body interrupts the linear time of biological rest, and the researcher engages in relation to the material. The researchers are exploring unusual compositions engaging the body and sensations. The researcher-participant shares experience.

> I was fascinated by the Deleuze and Guattari's conference, it was an unconventional format, in addition to performance and other unusual activities, during the lunch break the art project

> Swedish bread "Knäckebröd" was presented, it was an entire city built from these breads, and there were butter towers on the sides, there were also apple and jam spreads, but the most interesting thing was that on the table there was a description that provided a philosophical description of Deleuze and Guattarian concepts, such as affect, body, etc. related to this art project. During the conference, participants were invited to taste these delicacies. I also came, read the description, which made me smile, spread a piece of Swedish bread with apple jam, and realised that this art project remains in memory. (participant 10)

It is worth noting that conferences devoted to Deleuze and Guattari's scholarship are typically unconventional, performative, and multifaceted, much like an assemblage. This art performance is composed of food (Swedish bread, butter, jam), bodies (conference participants), and actions (reading explanation through Deleuze and Guattari's lens, tasting bread, and performing). The entire city of Swedish bread is presented as a *body without organs*, with many exits and entrances. This city is made of Swedish bread with towers of butter and rivers of jam, which affects the researcher through taste, touch and body interaction.

"More-than-Human" Elements in Rhizomatic Learning

The researchers in learning integrate not only human and non-human elements but also engage with the more-than-human, such as AI, etc. The researcher intensively uses ChatGPT.

> Moreover, I have written a study on the ChatGPT topic, which is expected to be published soon. <…> I use it myself, of course. I use it for all kinds of basic activities, such as writing letters, and sometimes when I need some formal phrases. I also use it when searching. (participant 19)

This excerpt demonstrates that ChatGPT embodies the machinic components of technical assemblages that enhance academic production. ChatGPT becomes not a passive tool but an active participant in rhizomatic practice, engaging in diverse activities such as letter writing and academic correspondence, utilising formal language. The researcher participates in transformation and undergoes a *becoming-AI user*. In the modern digital world, researchers are discovering AI platforms as new "territories".

> I discovered a new artificial intelligence website called Elicit. It conducts systematic literature reviews <...> with a list of literature, everything, and citations. <…> So, when AI develops so rapidly, scientists will need to increase the volume, conducting not 5, not 10, but 100 interviews. I would very much like the scientific world to go deeper and look for why and how these problems can be solved, rather than just stating some facts. (participant 18)

The traditional literature review has its own territory with rituals, searching and 'sedentary' thoughts. Elicit, an AI tool, deterritorialises this space more quickly and analyses literature in an instant. The researcher's idea of conducting more interviews is based on the increase of Deleuze and Guattari's (2004) multiplicity – the number of perspectives and connections. In this way, the researcher expresses resistance to the established norms of striated space and turns to a smooth space, where each researcher can develop nomadic thoughts and engage with the more-than-human. Another researcher develops molecular lines engaging in self-directed activities. As the researcher-participant points out,

> I would say that I am more of a self-taught learner who, when faced with a problem, simply looks for informal sources and listens to and learns from more than one YouTube lecture, because I can say that right away. <…> My work was very independent; it was how much I figured out myself, how much I travelled, how active I was, and that's how much I learned, you know. I even bought courses from Udemy to learn methods which are new to me. (participant 18)

The researcher, through rigid, hierarchical molar lines, escapes from formal and institutionalised knowledge systems by following molecular lines, which gives more freedom and creativity. Through active engagement, the researcher creates assemblages with informal learning platforms like YouTube and Udemy, where there are no institutional boundaries and learning can happen anywhere, at any time, including with people from outside formal settings.

Researchers watch films about scholars and their research, from documentaries to feature films, and learn about research methodologies. As a research participant notes,

> Documentaries, where those orangutans were observed, and so much ethnographic research is done, are so interesting. Of course, how people live there, how scholars live, behave more, I like documentaries from the field of travel, some kind of stuff. Observations, when people talk about their experiences, as shown by this, I paid most attention to their voice, the way they speak, and how they talk about their experiences. And I recommend that you take something, take a travel blogger, influencer, or something like that, and analyse their language and, for example, how men and women speak, and that is how ideas arise from such linguistic areas. (participant 16)

Notably, the education researcher watches documentary films that are related to the researcher's ongoing ethnographic research. The documentaries function as media assemblages, interweaving human (scientists) and non-human (representations of orangutans, cameras) elements. By watching documentaries about travelling, the researcher focuses on the language and how people speak. In this way, Deleuze and Guattari's deterritorialised language touches not only researchers but also other thoughts.

Material-Led Practice of Education Researchers in Rhizomatic Learning

The education researchers create material-led assemblages very rarely. As the research participant notes,

> We, together with my student, apply the Identical Elements Theory and the transformative learning theory, which means that if, for example, in a sector such as the maritime sector, it is very applicable, there is a simulator, and you can imagine it as a tool in which seafarers are trained. Navigational competencies, how to manage time without any danger to people, cargo, and the environment, and all operations as on a ship – you are the future captain and part of the process of becoming a seafarer. Therefore, our challenge is to identify the simulator elements that closely resemble those on the ship. Moreover, when you find those identical elements similar to those elements through transformative learning theory, you can transfer those competencies to the ship. Very quickly, you don't have to waste time on the ship and repeat learning those competencies (participant15).

This example shows how objects and materials, such as the elements of the navigation simulator on the ship, can become parts of material-led research, which means that researchers work with materials such as elements on the ship and the simulator. On the one hand, the simulator and the ship operate in the striated plane (the ship is full of formal rules and commands, while the simulator imitates the ship). In this way, the researcher and student transfer identical elements. On the other hand, the simulator becomes an experimental space, and an active machinic assemblage, where humans (seafarers, instructors, researchers and non-human materials (details, elements) interact to form assemblages.

Learning Methodologies as Engaging into Reading and Writing Assemblages

The researchers create reading and writing assemblages by reading books, which is one of the major activities in studying methodologies. As the research participant notes,

> I am learning from books. From books, from authors, and from practice, I am gaining knowledge myself. And you won't find everything in books, especially since I'm like, let's say, a bookworm. Details are important to me. I want to understand why it's so important to me. (participant 20)

Describing independent and self-directed learning through engaging in deep reading, the researcher uses a saying about becoming a bookworm, which is a vivid expression of distinct affective and, at the same time, meticulous relation to reading. Famous scientists inspire other researchers. The research participant is fascinated by Marie

Curie's biography. Her life story reveals the process of *becoming-woman-scientist* and the challenges she faced during her scholarly career.

> It was Marie Curie, a biography. Well, a special educationist, a physicist. But still, from a woman's perspective, or even from a prism, what a difficult path it was in that period and how she still achieved it. Such things really inspire a lot. (participant 8)

The researcher, inspired by her life and achievements, sets the goal to *become a scientist*. It discloses that the researcher is engaged in scientific work as Marie Curie.

Also, the researchers learn research methodologies through writing books, monographs, and articles. As a research participant notes,

> My supervisor helped me publish a monograph based on my dissertation. And that monograph had to be written, I will emphasise that the text from the dissertation had to be adapted to the publishing house's requirements into a book, more like a book. But some things had to be updated there? Yes, it was necessary, and we included how the phenomenon changed for researchers during and after the pandemic (participant 19).

In this way, the researcher, the supervisor, the potential editors, the academic publishing house and the post-pandemic context come together as an assemblage. The researcher creates a line of flight by incorporating updates on their research into phenomena during and after the pandemic. Such movement leads to deterritorialisation of the subject and the phenomena being studied.

Rhizomatic Learning Paths of Education Researchers

The shared experiences of education researchers enabled us to create rhizomatic learning maps. These maps were created using Deleuze and Guattari's (2004) principles of the rhizome: connectivity and heterogeneity, multiplicity and rupture, and cartography. In addition, Masny's (2015) rhizoanalysis was applied to disclose the learning paths of education researchers according to the mentioned Deleuze and Guattari's (2004) rhizome principles and Deleuze-Guattarian concepts.

Figure 1 demonstrates the learning paths of the researcher-participant 6.

The principle of connection and heterogeneity means that in this learning process, the types of learning and the researcher's activities are connected. Human (students, academics, etc.), non-human (computers, books, articles, etc.), and more-than-human elements (the Internet, algorithms, AI) are also intertwined.

The principle of multiplicity and *rupture* means that the researcher creates various heterogeneous assemblages, such as: art-exploration, thinking-rethinking, practice-experience, philosophy-theory, Internet-AI, problem-research, affect (body-movement), work-practice, studies-exploration, famous people and others (Figure 1, written in dark blue).

If we look at a work-practice assemblage, it is evident that the researcher loves research methodologies and teaches research methodologies.

> I also taught research methodology to master's students, although the essence is very similar to that of undergraduate and college students. Until now, I've only taught research methodology. Now I probably don't even teach methodology, but methodological requirements. I try to explain it to students. (participant 6)

As the researcher teaches research methodologies at the university, it shows the process of territorialisation (a stable, organised, and codified plane), but when the researcher attempts to engage into a new research subject (methodological requirements), this can be seen as deterritorialisation. Upon examining the assemblage of philosophy and theory, it becomes evident that the researcher was prepared for methodological studies by reading philosophical books. Interestingly, the researcher becomes immersed in the assemblage of moving bodies affect; the researcher stayed in the streets and bars observing and counting the young people moving from one bar to another. Collaboratively, the researchers learn research methodologies by conducting research in unusual settings.

> I helped a colleague conduct a study. It may sound unusual, but during the nightlife, students move from one bar to another. It was a study about that, because in a spatial sense, she was counting the concentration there. Every hour at a bar, for example, most people start the evening in such cafes, then, closer to midnight, there is movement. They go to a nightclub, and after midnight, the concentration disperses to other places, such as other bars, and the town is where we studied. The old town is small, but it's purely student-oriented with many universities and nightlife. It's very, very busy, and she counted, and I helped her. We stood near those bars and counted the people. The concentration changes during the week because, for example, on Tuesdays, there were Jazz days. The concentration was greater near that bar. I remember on Wednesdays, you know, now it's Thursday, it's purely a student day. And I don't even know her methodology, what the concentric circles were drawn there, where the concentration was (participant 6).

It indicates Deleuze and Guattari's (2004) concept of deterritorialisation; when people leave their territory and move from one bar to another, they reterritorialise themselves within new atmospheres and interactions. Each bar represents a micro territory with its own rhythms, affect, and flow. The social assemblage is created of jazz, nights, rhythms, and urban rhythms. On Tuesdays, Jazz days, the assemblage is reterritorialized by jazz culture: different people arrive, different energies flow, and the bar undergoes a *becoming jazz*.

Moreover, the researcher *becomes an expert* of the method; the researcher learning from world-class scholars, phenomenologists and ethnographers, attending their lectures, reading their books, and travelling to other countries to learn research methodologies. However, while the researcher was attending lectures on research methodolo-

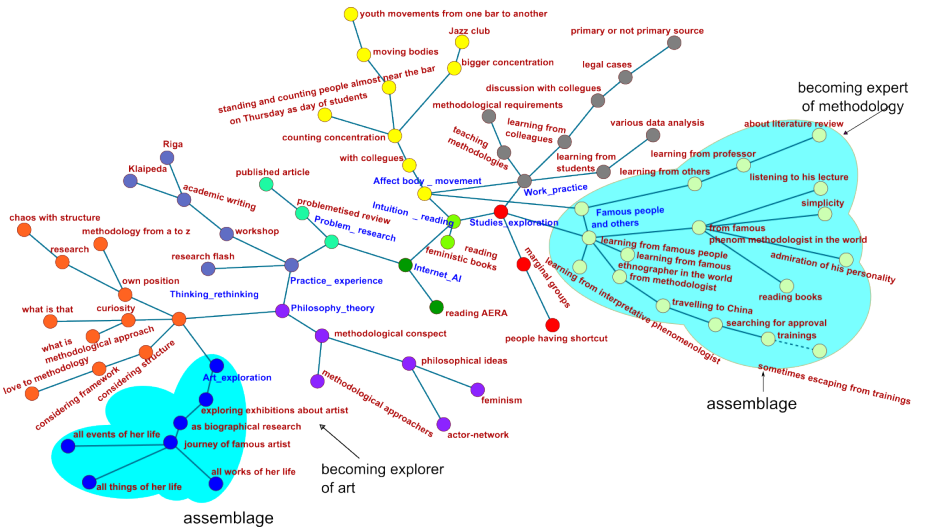
gies in another country, she would sometimes escape from lectures with a colleague, deterritorialise herself, and look for another, freer, less sedentary territory and space.

> The whole time the training was going on, because it was from the very basics of all the basics, we allowed ourselves to slip away from time to time, because we already had a lot of information. (participant 6)

A line of rupture is emerging, helping them to transition from one territory to a nomadic space full of differences, new activities, and thoughts.

Figure 1

Rhizomatic Learning Paths of Education Researcher 6



Note. Marking: Different colours are used to highlight activities. Assemblages are marked in light blue. The light blue indicates the area of the assemblage in which it operates.

Lines:

———	– a strong relationship between activities.	- - - - - - - - - - -	– a rupture, line (a broken link between activities)
----------	– an escape line (an escape from traditional learning)	———	– line of flight (toward becoming Self-Other).

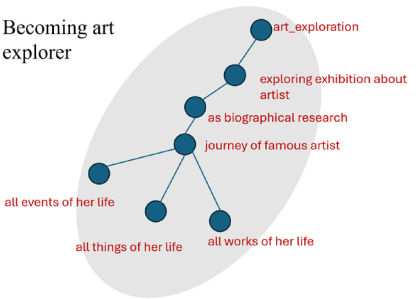
Source. Created by authors.

Figure 2
The interactive rhizomatic map of participant 6

The interactive version of the map is presented here.
Source. Created by authors.

Art-exploration assemblage draws lines to the researcher's transformation into *becoming-explorer* of artistic exhibitions (Figure 3)

Figure 3
The Assemblage of Art Exploration



Note. Marking: – the researchers' activities.–(line) – the way of the researcher.

It was a personal exhibition of one artist and her work. The result is not a study, but an exhibition about her, about her growth, about the events in her life, and everything was included, from photographs to books to diaries, and, incidentally, the results of her master's thesis were also presented, and that's how it turned out. It's like a biographical study showing how life events influenced the formation of her personality, career, and creativity. (participant 6)

Source. Created by authors.

It reveals that during the nomadic journey, the researcher delves deeply into this exhibition, disclosing the artist's evolution and growth, including all aspects of life and work. The researcher also explores materials such as the artist's photos, diaries, and master's thesis. By exploring the exhibition, the researcher sees a relationship with biographical research.

The principle of cartography shows that the researcher creates her own learning map, which is non-hierarchical and opposite to rigid structure (decalcomania). The researcher travels unpredictably along her own learning paths, which, according to Deleuze and Guattari (2004), involve constantly moving, developing new connections, creating assemblages, and searching for new becomings.

Discussion

This study is unique, as it shows how early-career researchers, holding a doctoral degree, learning research methodologies in various environments. In addition, it illustrates how representatives of different paradigms learning research methodologies in a rhizomatic way. On the one hand, it calls into question the tension of inconsistent methodologies with rhizomatic learning; on the other hand, it discloses unique rhizomatic learning paths of each education researcher with free choice of research methodology. The integration of Jackson and Mazzei's (2023) *thinking with theory* allowed us to think with Deleuze and Guattari's (2004) philosophy. This study disclosed that education researchers create various heterogeneous assemblages, such as art-exploration, work-related practice, etc. The researchers *become connoisseurs* of the method and even *become experts* and teach research methodologies. They are learning from colleagues, students, and themselves, especially when preparing for lectures. Their learning with students develops as an event; the students' learning from education researchers, and education researchers sometimes learning from the students. Also, the researchers are usually *becoming explorers*. They notice methodological features when exploring artistic exhibitions, reading books, or observing people. It happens unexpectedly; they are engaging in rhizomatic learning, moving across materials and making connections. Artistic expositions, conversations, or casual observations, deterritorialising conventional epistemology, become intensities, making nodes in assemblages where various human and non-human elements are composed. The researchers become scholarly readers and writers. They are deeply engaged in reading not only scientific texts or articles, but also reading fiction, and they notice scientific elements.

The rhizomatic learning paths of research methodologies among education researchers we depicted in rhizomatic maps. The maps represent Deleuze and Guattari's (2004) rhizome principles: connectivity and heterogeneity (various learning activities, researchers, learning types are connected one), multiplicity (creating various assemblages as thinking-rethinking, more than human, work-related practise etc.) and rupture (escaping from traditional learning of methodologies and seeking for new territories), and cartography (developing rhizomatic learning paths in an unpredictable way). This approach enabled us to uncover the directions of the rhizomatic learning journey of education researchers rather than imposing predetermined analytical categories.

This study is similar to Ahsan Ullah and Muhammad Rafiq's (2021) study, which analyses researchers' learning, reading, writing and publishing, enrolling in research study programs, learning from peers, expert advice and participating in seminars. On the other hand, this study revealed that education researchers appreciate non-traditional forms of learning, as they demonstrate deep engagement in unconventional conference formats that challenge the norms within academic conferences. Moreover, disrupting the conventional conference, they integrate performance art, bodily movement, collaborative interaction with colleagues. Their experience is related to Angelo Benozzo et al. (2019), who disrupted the traditional academic conference landscape, resulting in a more fluid and dynamic exchange and experience among participants. This study shares similarities with Alexia Cameron and Anna Hickey-Moody's (2024) concept of creativity, which can be an active force of becoming, emerging from resistance, rather than being used solely to delineate the arts and action. They enjoy exploring art, seeing how paintings are created, learning about the lives of artists, and relating it to research methods. This study shows that researchers learn by engaging in assemblages, where thoughts, materials, and bodily experiences are intertwined.

One of the more than human elements is AI. This study demonstrates that AI is not always a reliable partner of researchers. Usually, researchers do not use AI, as they have tried but received the wrong answer, as there is a lack of ethical standards, and they are not confident in it. Researchers who use AI, usually use it for simple tasks: to search for ideas, to generate themes, and to make references, but they predict that in the future, AI will be a researcher's assistant, and even do tasks instead of an educational researcher. It is assumed that, due to the power of AI, researchers should consider new methods in methodological contexts.

The education researchers consider their doctoral studies as the most valuable period for learning research methodologies. Most research participants became lecturers, and they developed competencies in teaching subjects such as research methodologies. Mainly, researchers value the methodology they are engaged in and seek to learn in an area that interests them. Thus, researchers are eager to accept challenges and develop innovative research methodologies in a new, rhizomatic way.

Conclusions

The education researchers create various assemblages that include human (students, academics, etc.), non-human (computers, books, etc.), and more-than-human (Internet algorithms, AI) elements. The most common assemblages are art-exploration assemblages, more-than-human assemblages, and work-related practice assemblages. The less common assemblages are material-led assemblages and affective (body and emotions) assemblages. During their learning journey, researchers create various becomings – at times they *become explorers* seeking new directions, at other times

they *become artists*, experimenting with creative ideas, or even they *become experts* or *connoisseurs* of research methods. Also, they *become readers* and *writers*, making reading and writing assemblages.

The rhizomatic learning maps revealed the learning of education researchers and showed Deleuze and Guattari's (2004) principles. Connectivity and heterogeneity emerged when various elements, such as researchers, methods, articles, and lectures, were connected. They delineated multiplicity when researchers created art-exploration, more-than-human, thinking-rethinking, work-practice, and other assemblages. This study revealed a rupture that occurred when researchers occasionally left traditional learning to seek new ideas. The principle of cartography revealed that education researchers created individual learning paths. This shows that education researchers collect, combine, and reconfigure methodological knowledge through a rhizomatic learning process. They expand the current understanding of methodological learning by emphasising its dynamic, non-hierarchical nature.

This study revealed that education researchers could enhance their learning of research methodologies by engaging more with material-led practice, working in research laboratories, conducting innovative research, and creating new methods themselves. The revealed rhizomatic learning of research methodologies among education researchers demonstrated that teaching programmes should incorporate opportunities for self-directed learning that recognise the creative and networked realities of today's life.

AI Use for Research Purposes

Deepl and Grammarly tools helped authors to proofread the manuscript text and enhance academic writing.

Acknowledgement

This article is a part of the national research project Rhizomatic Learning of Scientific Research Methodologies Among Education Researchers: Trajectories of Assemblages and Becomings, funded by the Lithuanian Research Council (LRCLT), Contract No S-PD-24-116.

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