

Method and Complexity in Educational Sciences

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The pursuit of knowledge

'Method' comes from the classical Latin *methodus* meaning "mode of proceeding", originally used in medicine, in geometry and in rhetoric. It was originally borrowed from the ancient Greek *methodos*, meaning "pursuit of knowledge" or "mode of investigation" (Oxford English Dictionary, 2013). If its initial literal meaning signified "following a path", the use of the term evolved from the observation (the path followed) to a normative use (the path to follow) (Rey, 2000). Through its history and considering its contemporary uses, the term carries two main significations. First, it can be understood broadly as a procedure for attaining an object. Its use can involve a recommended or prescribed treatment (e.g., medical one) or a defined and regular plan (e.g., in business); it supposes therefore the implementation of schemes or a plan of action. In sciences and philosophy, the term usually refers to: "[a] special form of procedure or characteristic set of procedures employed (more or less systematically) in an intellectual discipline or field of study as a mode of investigation and inquiry, or of teaching and exposition" (Oxford English Dictionary, 2013). In the mid 16th century, the term started being used in education to refer to "reasoned procedures grounding the teaching and practice of an art"; a century later, its use in an intellectual context (e.g. Cartesian method) enriched its meaning and favored its spreading (Rey, 2000). The second signification of 'method' evokes the idea of "systematic arrangement, order" (Oxford English Dictionary, 2013). In logic and in rhetoric, the term used to refer to the ordering and arrangement of propositions and arguments for the investigation or the exposition of an argument. In this perspective, the notion of method can be understood as an "orderly arrangement of ideas and topics in thinking or writing" (ibid.).

From reductionist to 'post-qualitative' methods

Referring to the etymology of 'method' helps contextualizing the prescriptive use of this term, in conjunction with the idea of 'order' (or related notions, such as regularity, plan, systematic, etc.), which remains so preeminent in contemporary reductionist paradigms of research. The evolution of philosophy and sciences is marked out by contributions aiming to define 'ordered procedures' in order to help humans discriminating and interpreting their external environment and their intimate life as well. Descartes' influence, reinforced later by Comte's positivism, played a crucial role – during the past three centuries – in the spreading of a conception of scientific inquiry based on methods aiming to *reduce* complexity in order to establish and prescribe *normative* forms of order (Le Moigne, this volume).

In the recent history, considering for instance the development of qualitative research in North American social sciences, this paradigm remained mostly unchallenged until the early 1970s¹. At that time emerged what Denzin and Lincoln (2000) identify as the moment of 'blurred genres' (1970-1986) characterized by the diversity of paradigms, methods and strategies available (e.g., symbolic interactionism, constructivism, naturalistic inquiry, positivism, post-positivism, phenomenology, ethnomethodology, critical theory, neo-Marxist theory, semiotics, structuralism, feminism, various racial/ethnic paradigms, etc.). During this period, "... old functional, positivist, totalizing approaches to the human disciplines were giving way to a more pluralistic, interpretive, open-ended perspective" (ibid., p. 15). According to these authors, a profound rupture occurred later, in the mid-1980s; the 'crisis of representation' marked the beginning of a new period. Research became more reflexive and called into questions the issues of gender, class, and race. This moment – labeled as 'postmodern period' by these authors – is characterized by a "triple crisis of representation, legitimation and praxis" challenging how researchers may capture, evaluate and interpret lived experience and how research may affect the world in spite of its 'textual' nature (ibid.).

In her attempt to describe the evolution of qualitative methods of research in order to locate the current development of so-called "post-qualitative" methods, Lather (2013) refers to four "layers":

[QUAL 1.0] is the conventional interpretive inquiry that emerged from the liberal humanism of sociology and cultural anthropology with a fairly untroubled focus on standpoint epistemologies, a humanist subject who has an authentic voice, transparent descriptions of lived experiences, and the generally untroubled belief that better methods and richer descriptions can get closer to the truth. QUAL 2.0 begins to acknowledge multiple realities and voices, messy texts, reflexivity, dialogue, empowerment, and so on, but remains within the humanist enclosure, grounded in humanist concepts of language, reality, knowledge, power, truth, resistance, and the subject. The field becomes centered, disciplined, regulated, and normalized as qualitative handbooks, textbooks, and journals create "moments" and

¹ Denzin and Lincoln (2000) distinguish a first moment, the 'traditional period' (1900-1945) when "... qualitative researchers wrote "objective," colonizing accounts of field experiences that were reflective of the positivist scientist paradigm. They were concerned with offering valid, reliable, and objective interpretations in their writings." (p. 12). They also identify a second period, the 'modernist phase' (1945-1970), which builds on the canonical works from the traditional period: "In this period many texts sought to formalize qualitative methods..." (ibid., p. 14); this work attempted to make qualitative research as rigorous as its quantitative counterpart. This "golden age" also demonstrated a belief in the contingency of self and society and held to emancipatory ideals.

“designs,” and fix the “research process,” so that it becomes possible *to know it in advance*, for example, to offer a sequence of courses on qualitative inquiry, to teach someone how to “do a phenomenology,” and to teach someone how to analyze data. QUAL 3.0 begins to use postmodern theories to open up concepts associated with qualitative inquiry: validity, voice, data, empathy, authenticity, experience, interviewing, the field, reflexivity, clarity, etc. This work is stalled for years when qualitative researchers turn to the defense not just of the methodology but also of the various epistemologies it carries on its back (feminist theories, race theories, class theories, postmodern theories, etc.). The field continues to be structured, and a kind of “interpretive mixed methods” (Howe, 2004) enters the picture and begins to be normalized.

QUAL 4.0 is *becoming* in the Deleuzian sense as researchers who, weary of a decade of defending qualitative research and eager to get on with their work, again imagine and accomplish an inquiry that might produce different knowledge and produce knowledge differently. This inquiry cannot be tidily described in textbooks or handbooks. There is no methodological instrumentality to be unproblematically learned. In this methodology-to-come, we begin to do it differently wherever we are in our projects. Here, the term “post-qualitative” begins to make a certain kind of sense (St. Pierre, 2011). (Lather, 2013, pp. 634-635, emphasized by the author)

These attempts to describe the recent evolution of qualitative research methods offer interpretations that are stressing a double movement, characterized by (1) the on-going challenge of the normative dimension of research methods and the recognition of the contextual and contingent nature of any scientific inquiry; and (2) the increase of ‘disorder’ produced by the multiplication of paradigms, methods and strategies of research available. It is legitimate to believe that this double movement appears at the core of some of the contemporary challenges faced by researchers in education (and beyond) whenever they have to choose how to pursue their investigations.

Method and complexity

The two narratives above mentioned (Denzin & Lincoln, 2000; Lather, 2013) summarize well how ‘disorder’ reentered in the arena of research methods after centuries marked off by systematic attempts to exclude it. In the contemporary context, conceiving the notion of ‘method’ through the lens of ‘complexity’ requires taking into consideration the holistic, global or non-linear form of intelligibility needed to comprehend a phenomenon. The explicit reference to ‘complexity’ also stresses the (sometimes) pathological, dense, and entangled dimensions that characterize the interpretation of a phenomenon (Ardoino, 2000). Because what is perceived as ‘complex’ appears as rebellious to the “normal order of knowledge” (ibid.), it brings one to reconsider the role played by ‘disorder’ in one’s *pursuit of knowledge*. Rather than reducing method to a *quest for order*, the idea of complexity suggests taking seriously the role played by phenomena such as chance, dispersion, perturbation, accident, noise, or error (Morin, 1977/1992; Alhadeff-Jones, 2012) and the tensions, paradoxes, and contradictions they induce in the ways knowledge is produced (e.g., Devereux, 1967; Feyerabend, 1975). The six volumes of Morin’s “Method” (1977/1992; 1977-2004/2008) and the definition of the paradigm of complexity that emerges from this work constitute a powerful demonstration of what a ‘complex method’ may involve nowadays. What is at stake is the capacity to lead an ongoing effort to *organize* the heterogeneous forms of order and disorder, which are constitutive – in complementary, contradictory and antagonistic ways – of any forms of inquiry, teaching or exposition approach. From this perspective, method is about the capacity to *complexify* the modalities that define one’s ‘pursuit of knowledge’.

Method and complexity in Educational sciences

It is frequent – but misleading – to reduce complexity theories to some of their most recent development (e.g., Complex Adaptive Systems) (Alhadeff-Jones, 2008). In order to envision how the idea of ‘complexity’ can help us reconsider the methodological dimension of scientific research in education, it appears therefore particularly relevant to revisit the history of the relationship between those two notions. Jean-Louis Le Moigne belongs to the small group of researchers who led during the past 30 years the effort needed in order to build up the legitimacy of a constructivist understanding of the ‘paradigm of complexity’ as it emerged in Latin countries (ibid.) His contribution to this special issue of *Complicity* plays a crucial role, because it offers a framework discussing the cultural and historical roots of this paradigm in Western cultures. Focusing on Vico’s (1668-1744) critique of Descartes’ method (1637), Le Moigne contrasts the order of the Cartesian’s principles (evidence, disjunction, linear causality and enumeration), with the open rationality of the ‘ingenium’ – a capacity to establish relationships (*reliance*) and contextualize – as it appears more appropriate to grasp and organize the complex interplay between orders and disorders. Acknowledging the teleological character of scientific inquiry – i.e. the fact that research always reflects the intent and the project of the researcher – and the inseparability between ‘subject’ and ‘object’, Le Moigne further explores the relevance of ‘designo’ (intentional design) implemented by Leonardo da Vinci (1453-1519) in order to identify and formulate problems encountered by researchers. Referring to contemporary epistemologists (Bachelard, Valéry, Simon, Morin), his contribution questions the relationships between the ‘ingenio’ (pragmatic intelligence), the ‘designo’ (modeling method) and ethics. From Vico’s “topico-critique” to Morin’s “complex ethics”, Le Moigne finally suggests conceiving a complex method through the relationships it establishes between (pragmatic) action, (epistemic) reflection and meditation (ethics).

Michel Alhadeff-Jones’ paper (this volume) prolongs and illustrates Le Moigne’s contribution. The theoretical framework he develops suggests one to conceive the orders and disorders of research according to a method revolving around ‘programmatic’ and ‘strategic’ modalities of research. His paper defines a ‘system of representations’ aiming to locate and support the actions and reflections of researchers in order to critically conceive the complexity of a scientific process of research. The approach is based on three ‘moments’, which represent recurring stages of the spiraling development of research. The first one focuses on the definition of the research process and its ‘sub-systems’ (author, system of ideas, object of study and method) inspired by Morin’s complex epistemology. The second moment introduces a ‘model’ aiming to represent the research process and nine core methodological issues, according to a ‘programmatic’ and critical approach inspired by Le Moigne’s “general system theory” and Alhadeff-Jones’ own research on ‘critique and complexity’ in education. Using the matrix previously modeled, the third moment suggests one to conceive the research process following a ‘strategic mindset’ that focuses on ‘contingencies’, in order to locate, share and communicate the emerging and unpredictable path followed throughout the inquiry.

Part of the orders and disorders of scientific research comes from – and is expressed through – the heterogeneity of *languages* and *disciplines* used to describe and interpret phenomena. Considering specifically the method framing the process of ‘literature review’, Alfonso Montuori’s contribution (this volume) challenges ‘disciplinary’ forms of order to promote and question the complexity involved in ‘transdisciplinary’ modes of inquiry. As a strategy to organize information and knowledge, transdisciplinarity is ‘inquiry-driven’ rather than ‘discipline-driven’. Drawing on systems and complexity theories, it challenges reductive and disjunctive ways of knowing, as well as fragmentation and separation, in order to contextualize and connect heterogeneous

forms of knowledge. At the same time, transdisciplinary review of literature is not about abstract knowledge; it requires the 'integration' of the inquirer in the research process in order to foster contextualized, articulated and refined dialogue with the 'material' being reviewed. Finally, transdisciplinarity is 'meta-paradigmatic' rather than 'intra-paradigmatic.' Disciplines' core assumptions are not taken for granted. A transdisciplinary strategy conceives research as an active construction of knowledge, focusing on the forms of order and disorder that determine how knowledge is created.

Donald Gilstrap's contribution (this volume) also transgresses the borders that frame traditional modes of investigation used in Educational sciences. In his paper, he explores six *quantitative research methods* informed by chaos and complexity theories (multiple linear regression, nonlinear regression, stochastics, Monte Carlo methods, Markov Chains, and Lyapunov exponents), and he illustrates *post hoc* implications associated with the use of quantitative methods. Entering into the detail of *complicated* procedures, he illustrates how the choice and the use of sophisticated quantitative approaches influence the complexity of the interpretations produced by researchers in order to represent the phenomena they study.

Lindsay Hetherington's contribution to this special issue revisits 'case study' methods through the lenses of complexity thinking. Based on her research around the introduction of a new curriculum in British science education, Hetherington questions the resonances and dissonances between traditional case study approaches and complexity thinking, and examines how a 'complexity thinking' approach to case study might be different from other approaches. She locates at the core of her reflection, the key ideas of 'emergence' and 'complexity reduction' in order to develop the argument that case study enables the researcher to balance the open-ended, non-linear sensitivities of complexity thinking with the reduction in complexity, inherent in making methodological choices. In this paper, the relationship between order and disorder is reinterpreted through the ongoing tensions created by the fact that any attempt to reduce the complexity of a case (to bring order) is at the same time an act producing new forms of disorder. Acknowledging the complexity of a case becomes therefore a commitment to respect complexity, that requires the 'positioning' of the researcher.

The contribution of Nicholas R.G. Stanger, Michele T.D. Tanaka, Vanessa V. Tse and Lisa J. Starr (this volume) provides us with another example of research method questioning the way we build representations, challenge normativity and capture the way people experience the orders and disorders shaping educational dynamics. Privileging a Plains First Nation tradition, this paper describes in detail a *transformative inquiry* using 'winter counts' – a land and place-based knowledge and practice that acts as a calendrical record of memorable and important events. The use of this approach with Pre-service teachers is interpreted through the contribution of 'panarchy theory' (Holling, 2001, quoted by Stanger, Tanaka, Tse & Starr, this volume) – which provides insights into how change occurs as a constantly adaptive process – in order to give meaning to the emotional, mental, spiritual and physical movement students experience in their personal and professional development. Rather than describing the equilibrium nature of a well-adjusted student-teacher, the authors illustrate how humans move and adapt through multiple equilibria of thought and expression.

Publishing a special issue of *Complicity* on 'method and complexity in Educational sciences' is not a fully 'ordered' process. The last research article included in this double issue was not initially written in order to address explicitly questions of 'method'. Its inclusion reintroduces therefore a bit of 'disorder' in the apparent coherence of this collection of articles. In their contribution, Henriette Bastrup-Birk and Danny Wildemeersch (this volume) revisit theoretically the idea of 'democratic education'. In order to proceed, they first introduce and examine Rancière's ideas on democracy. Then, they discuss their implication for education and revisit the notion of 'democratic education'. They focus in particular on how the notions of 'interruption' (Rancière) and

'pedagogic subjectivation' (Simons & Masschelein, 2010, quoted by Bastrup-Birk & Wildemeersche, this volume) may inform the apparition of 'novelty' in non-formal fora where protagonists explore intricate sustainability issues through the disorder inherent to political 'dissensus'. Adopting explicitly complexity lenses, the authors reinterpret the *method* (my word) of democratic education, as a *mode of investigation* (my words) where 'disturbance' and 'differentiation' appear as conditions for 'bifurcation' and 'emergence' to occur in the democratic process aiming to renew the array of responses to a problem and complexify the ways it is represented.

Through their respective entry each of these articles contributes to address some of the key challenges raised when considering the relationship between 'method' and 'complexity'. They should feed our imagination, our curiosity, and our desire to nurture new ways of knowing. They should stimulate critical experiences and daring experimentations in our 'pursuit of knowledge'.

At the beginning the word method signified advancing along a path. Here we must accept to advance without a path, to make the path by advancing. What Machado said: *Caminante no hay camino, se hace camino al andar*. The method can be formed only during research; it can be disengaged and formulated only afterwards, at the moment when the term once again becomes the point of departure, this time endowed with method. Nietzsche knew it: 'Methods come at the end' (The Antichrist). (Morin, 1977/1992, p.17)

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