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Educational research paradigms: From positivism to multiparadigmatic

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Abstract

In this paper we provide an overview of the characteristics of major educational research paradigms shaping contemporary educational research, ranging from the traditional positivist perspective to the latest multi-paradigmatic worldview. Our purpose is to orient students, faculty and beginning researchers to the newer paradigms that enable researchers to undertake uniquely powerful and insightful inquiries that contribute to transforming the landscape of education.

Keywords: postgraduate research, new paradigms, teacher education, transformation, metaphor

Introduction

For decades during the late 20th Century, 'paradigm wars' raged amongst supporters arguing fiercely for the superiority of their chosen paradigm. Over time, this gave way to a 'paradigm dialogue' in which supporters came to accept their differences and realised that every research paradigm is of equal importance. No research paradigm is superior, but each has a specific purpose in providing a distinct means of producing unique knowledge. Thanks to the newer paradigms, educational researchers (including teacher-researchers) are providing empirical and theoretical evidence of ways in which traditional curriculum and assessment policies unduly constrain teaching and learning, and research practices in schools, colleges and universities. And, importantly, these researchers are being empowered to envisage new policies and practices that better meet the emerging educational needs of their rapidly globalising societies.

The term paradigm needs clarification. Willis (2007) explains that: "A paradigm is thus a comprehensive belief system, world view, or framework that guides research and practice in a

field" (p.8). From a philosophical perspective, a paradigm comprises a view of the nature of reality (i.e., ontology) - whether it is external or internal to the knower; a related view of the type of knowledge that can be generated and standards for justifying it (i.e., epistemology); and a disciplined approach to generating that knowledge (i.e., methodology). For educational researchers, there are several major paradigms that govern their inquiries into the policies and practices of education. Each paradigm carries related theories of teaching and learning (or pedagogy), curriculum and assessment, professional development, etc.

TRADITIONAL PARADIGMS

We will not spend much time on these tried and trusted paradigms, as there is a plethora of social science research methods textbooks that serve this purpose. The outlines provided here serve simply as a basis of comparison with the newer paradigms addressed later in the paper.

A positivist fisherman standing on a river bank describes (without getting his/her feet wet) the social properties of a species of fish by observing the general tendency of their group behaviour as they swim around.

Positivist Paradigm

We start with positivism, a research paradigm that is very well known and well established in universities worldwide. This 'scientific' research paradigm strives to investigate, confirm and predict law-like patterns of behaviour, and is commonly used in graduate research to test theories or hypotheses. This is particularly useful in natural science, physical science and, to some extent, in the social sciences, especially where very large sample sizes are involved. Generally its focus is on the objectivity of the research process (Creswell, 2008).The positivist paradigm mostly involves quantitative methodology, utilizing experimental methods involving experimental (or treatment) and control groups and administration of pre- and post-tests to measure gain scores. Here, the researcher is external to the research site and is the controller of the research process.

An example of research in this paradigm is the second author's undergraduate biology research at Central Mindanao University, Philippines, entitled "Anti-diarrheal activity of *M. Pudica* leaf extract on white mice induced with *E. coli* pathogen". This experimental research utilized an

experimental group and a control group. The experimental group was given a treatment (leaf extracts) while the control was left untreated. The ontology of this research was realism, the epistemology was objectivism, and a quantitative methodology governed the research process. The quality standards were validity and reliability, and the data were measured and analysed using statistics.

A post-positivist fisherman supplements his/her quantitative observations of the social properties of a species of fish by wearing a wet suit and conducting structured interviews of a random sample of fish to ascertain their reasons for swimming in accordance with the inferred social pattern.

Post-Positivist Paradigm

Post-positivism, as Willis (2007) describes it is a "milder form of positivism "that follows the same principles but allows more interaction between the researcher and his/her research participants. It uses additional methods such as survey research and qualitative methods such as interviewing and participant-observation (Creswell, 2008). This paradigm is the modified scientific method for the social sciences. It aims to produce objective and generalizable knowledge about social patterns, seeking to affirm the presence of universal properties/laws in relationships amongst pre-defined variables. This epistemology is manifested by quasi-experimental research designs that utilize treatment, outcome measures and experimental units, but do not use random assignment to create comparison from which treatment caused change is inferred. It is very similar to the positivist approach of comparing mean scores but depends on non-equivalent groups that differ from each other in many ways other than the presence of the treatment whose effects are being tested (Depoy & Gitlin, 1998). The quality standards of this paradigm are *objectivity, validity* and *reliability*, which can be modified with the use of *triangulation* of data, methods and theories.

An exemplar is the second author's graduate research at the University of Southeastern Philippines, entitled '*The effectiveness of conceptual approach of teaching on the scores of students in a biotechnology achievement test*'. Two groups were established, the experimental

group was given a conceptual teaching approach and the control group was taught with the traditional board-talk method. To test the achievement of the students, a teacher-made test was designed and subjected to content and construct validity analysis. The two groups were tested and the data were analysed using statistics. Most often, graduate research in the Philippines is designed in this way.

RELATIVELY NEW PARADIGMS

The Interpretive Paradigm

The interpretive fisherman enters the water, establishes rapport with the fish, and swims with them, striving to understand their experience of being in the water.

This humanistic paradigm arrived in educational research during the late 1970s, influenced strongly by anthropology which aims to understand other cultures, from the inside. That is, to understand the culturally different 'other' by learning to 'stand in their shoes', 'look through their eyes' and 'feel their pleasure or pain'. Thus the epistemology of this paradigm is inter-subjective knowledge construction. Interpretive knowledge of the other is produced through a prolonged process of interaction undertaken by ethnographers who immerse themselves within the culture they are studying. Using ethnographic methods of informal interviewing, participant observation and establishing ethically sound relationships, interpretive researchers construct trustworthy and authentic accounts of the cultural other. Applied to educational research, this paradigm enables researchers to build rich local understandings of the life-world experiences of teachers and students and of the cultures of classrooms, schools and the communities they serve.

The quality standards that regulate interpretive knowledge construction are varied, but arguably the most well-known and coherent are those of Guba and Lincoln (1989) who developed standards of trustworthiness and authenticity that are distinctly different but 'parallel to' the validity, reliability and objectivity standards of positivism. The trustworthiness criteria include: *credibility* (did the researcher undertake prolonged immersion in the field, check his/her interpretations with his/her informants, and display a process of learning?), *dependability* (did the researcher engage in open-ended or emergent inquiry?), *transferability* (is there sufficient

rich description for the reader to compare his/her own social context with the social setting of the research?), and *confirmability* (can the research data be tracked to their source?).

The authenticity criteria focus on the ethics of the relationship established by the researcher with his/her participants and include: *fairness* (are the informants represented fairly?), *educative* (did the participants benefit by learning about their social world?), *catalytic* (did the participants benefit by identifying problems associated with their social world?), and *tactical* (did the research empower the participants to improve their social situation?) (Guba & Lincoln, 1989; Josselson, 2007). The authenticity criteria have a strong resonance with the standards of the critical paradigm outlined below

The interpretive fisherman questions his/her methods of interacting with the fish, remains doubtful about his/her ability to fully commune with them, and reflects on his/her own experience of being fish-like in the water.

Recent developments in the interpretive paradigm have highlighted the importance of the researcher's own subjectivity in the (hermeneutic) process of interpretation, and have emphasised its progressive development as a key part of the inquiry process, thereby adding to the emergent and reflective quality of interpretive research. Thus the interpretive researcher would constantly ask him/herself: What is the influence of my own (past and present) values and beliefs in interpreting the thoughts and feelings of the other? What hidden assumptions are constraining (distorting) the way I make sense of the other? Interpretive research methods include' narrative inquiry' and 'writing as inquiry', especially autobiographic and auto-ethnographic methods (Ellis & Bochner, 2000; Clandinin & Connolly, 1998; Richardson, 2000; Taylor & Settelmaier, 2003).

Applied to education, interpretive inquiry engages teachers as reflective practitioners in developing enhanced understanding of the life-worlds of their students by constantly asking questions such as: Who are these students who sit before me? Who is the self that teaches? (Palmer, 1998). A deeper understanding involves a broader focus on the social, political, historic and economic forces shaping the pedagogies, curriculum policies and schooling system in which teachers are immersed. Such an interpretive orientation is essential for teachers wishing to adopt

more student-centred pedagogies such as constructivist approaches to teaching and learning. Rigorous standards have been developed for regulating the quality of reflective interpretive inquiry (or 'self-study') (e.g., Bullough & Pinnegar, 2001).

The Critical Paradigm

To resolve the global crises we are facing today we need to produce graduates capable not only of conducting scientific research reasoned out through objective quantitative strategies or engaging in interpretive research that deepens mutual understanding. The added challenge for educational research is to empower our students and colleagues to become imaginative and critical thinkers capable of addressing the question: 'Whose interests are not being (and should be) served by particular social policies and practices?'The critical research paradigm addresses this issue by enabling the researcher to practice 'deep democracy' (Kincheloe & McLaren, 2000) which involves identifying and transforming socially unjust social structures, policies, beliefs and practices. Its primary purpose is to identify, contest and help resolve 'gross power imbalances' in society which fuel ethically questionable profit-making activities that contribute to systemic inequalities and injustices such as social and economic exclusion of some sectors of society, loss of cultural capital and cultural identity amongst ethnic minorities, and anthropocentric climate change and loss of biodiversity.

The critical fisherman enables the fish to perceive the pollution in the water in which they live, to find its source, and to identify its harmful effect on their being in the water.

In this type of research, the process of writing as inquiry (shared with the interpretive paradigm) has an added critical dimension and becomes a means of critical analysis and ideology critique of established policy and practice. The researcher raises his/her own critical consciousness (Brookfield, 2000) and constructs a moral vision of a better society. This can be done individually or, better still, in collaboration with less empowered others participating in 'critical action research' led by the researcher in the role of facilitator. The researcher's role is

The critical fisherman empowers the fish to organise themselves as a lobby group and protest to the Fisheries' Department, and s/he advocates on their behalf to have the river cleaned up.

one of advocacy, a change agent who argues for and leads the way towards a more equitable, fair and sustainable society. The work of Jose Rizal (the national hero of the Philippines) and Patrick Awuah (founder of Ashesi University, Ghana) are good examples of this type of transformative leadership.

Applied to education, critical inquiry focuses first on raising the conscious awareness of teachers about established values and beliefs that underpin their seemingly natural teacher-centred classroom roles (Taylor, 2008). Once this process is underway, critical theory is introduced (e.g., critical pedagogy, cultural inclusiveness, social justice) that stimulates teachers' creative thinking about designing curricula and assessment that are more student-centred, inquiry oriented, culturally sensitive, community-oriented, socially responsible, etc.

The rigor of this type of research is evaluated in terms of quality standards that are very different from those of the positivist paradigm but which are congruent with the standards of the interpretive paradigm. It is important that the researcher demonstrates *critical self-awareness* and *critical understanding* of the *complexity* of social issues. But critique alone is not enough to nourish the soul, and so it is important for the critical researcher to develop a *vision* of a better way of teaching and learning, and research practices, a vision based explicitly on moral principles that support the 'shoulds/oughts' of a transformed professional practice.

And in order to avoid criticism of being an armchair academic or utopian, the critical researcher is well advised to take direct action, to 'make a difference', by enacting his/her ideals in a principled endeavour to transform the culture of his/her classroom community through, for example, critical action research. This involves evaluating the impact of one's transformative teaching on student learning and, ideally, leads to the teacher-researcher's evolving *praxis*. Critical researchers also choose to write in a way that is designed to elicit critical awareness and critical understanding in their readers, thereby writing for *pedagogical thoughtfulness* (Manen, 1990).

Various literary styles of writing are available to critical and interpretive writers to enable them to impact their readership, and this is taken up in the postmodern paradigm below.

The Postmodern Paradigm

This relatively new and challenging paradigm opens many new and exciting doors for educational researchers as it brings to our attention the very important concept of 'representation' (Denzin & Lincoln, 2005) which holds that what goes on in our minds and hearts is not directly accessible to the world outside us. There is no window in our heads that allows another person to look directly into our minds and see 'exactly what we mean'; the best we can do is 'represent' our thoughts and feelings through various means of communication (e.g., language, art, dance, gesture).

Equally for scientists, there is no window into nature that directly reveals nature's secrets; all scientific observations are 'theory laden' whether conducted using the human eye or technological extensions such as radio telescopes, electron microscopes, cloud chambers, x-ray crystallography, gamma spectroscopy, etc. Thus scientific knowledge is at best a model of the 'unseeable' and its viability (or usefulness) is tested against the human purposes that shape its production. Scientific knowledge remains forever contingent and open to challenge; and in that way it continues to evolve, sometimes making radical departures that overturn established models. Such is the case with our scientific knowledge of the cosmos and the sub-atomic universe (Dosch & Muller, 2010).

When educational research is under the governance of the positivist paradigm the scientific form of representation prevails: research reports are written objectively using the passive voice, past tense and third-person gender neutral pronoun ('it'). However, with the advent of newer paradigms, alternative means of representation are available to us. The interpretive paradigm requires that our personal perspectives, along with those of our research participants, are 'given voice'. Writing narratively (1st person voice) about our unfolding experiences enables us

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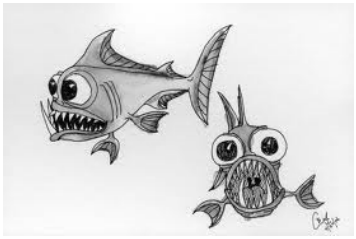
to provide deep insight into the inquiry process and outcomes, demonstrating how we have constructed meaning (or interpreted) and providing rich detail of the context within which it occurred (thereby fulfilling important quality standards of the interpretive paradigm).

And for those who are drawn to the critical paradigm, a major goal of the 'researcher as activist' is to empower self and others by enabling 'critical voices' to be heard; voices of protest that point to personal experiences of oppression and the need for changes to policies and practices to ensure equity, fairness and social justice. Interpretive and critical researchers draw from the full range of pronouns (I, you, she, he, it, they), active and passive voice, and multiple tenses (past, present, future), depending on the (unfolding) purpose of their inquiries. The choice can be overwhelming for the novice researcher and quite confronting for 'elders of the tribe' still steeped in the positivist paradigm.

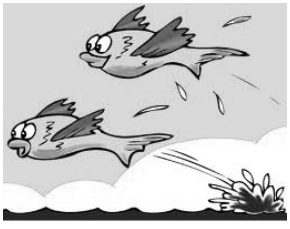


But more so, in celebrating pluralism and difference, the postmodern paradigm opens the door to other disciplines such as The Arts. In recent years Arts-based educational research has flourished, making available many new forms of representation such as:(i) *literary genres* of impressionist writing, autobiographical writing, storying, poetry, ethno-drama, screenplay and fiction, and (ii) *visual imagery* such as film, painting, sketching, dance and photography (Knowles, & Cole, 2008; Prendergast, Leggo, & Sameshima, 2009).

white fish
hold a spirit of the heaven
like indigo blue

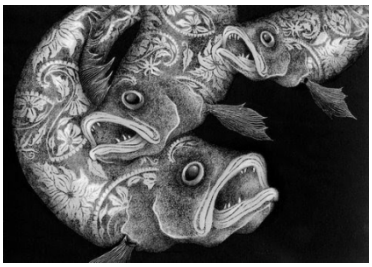
-Ikumi Yoshimura

Another important contribution of the Arts to educational research is the availability of alternative *modes of reasoning*. The positivist paradigm privileges a particular form of reasoning - propositional, deductive and analytic logic- which serves well the purpose of reasoning objectively. However, interpretive and critical inquiries, with their emphasis on representing the progressive development of the researcher's professional practice, require alternative modes of reasoning such as metaphorical thinking, dialectical



thinking, inductive thinking, mytho-poetic thinking and reflective thinking (e.g., Taylor, Taylor, & Luitel, 2012)

Arts-based educational research offers new quality standards for regulating our educational research inquiries. For example, if we write up our research using a literary genre (e.g., narrative, story or poetry) for the purpose of engaging our readers in critical reflective thinking about their own professional practice then the critical paradigm quality standard of *pedagogical thoughtfulness* is relevant (Manen, 1990). The literary quality of our writing that serves this purpose needs to have resonance with the experiences of the reader. In other words, we aim to write in a way that seems to the reader to be realistic, plausible or believable. The quality standard of *verisimilitude* is relevant to this purpose (Barone, 2001). Arts-based research provides many more quality standards for shaping the educative and literary quality of our research writing, thereby enriching the work of interpretive and critical researchers. They direct us to question our writing: Is the story engaging (dramatic, fun, odd)? Does the reader gain emotional appreciation such as empathic appreciation? Does the writing make the topic more complex (subtle, nuanced, deeper)?



Multi-Paradigmatic Research

Rather than standing alone as individual paradigms for framing the design of a researcher's inquiry, as does the positivist paradigm, the newer paradigms can serve as 'referents'. In other words, we can design our research by combining methods and quality standards drawn from two or more of the newer paradigms. It is not uncommon for a research study to combine methods and standards from the interpretive and critical paradigms to create a 'critical auto/ethnography'. And when new literary genres, modes of thinking and quality standards are added from Arts-based research such multi-paradigmatic studies become very powerful means of transformative professional development (Taylor, Taylor, & Luitel, 2012).

One of the second author's co-scholars at SMEC, Curtin University, Berhana Ignacio, conducted a multi-paradigmatic research for her Masters project. Drawing on the interpretive and critical paradigms and using literary genres (poetry, storying), she examined her real-life experiences as a learner, practising teacher and teacher educator. In particular, she excavated and reflected critically on her past experiences of and beliefs towards constructivist teaching. She narrated and storied aspects of her pre-service and in-service teaching experiences and her more recent experiences as a pre-service mentor and Masters student. Theorising about culturally inclusive teaching fuelled Berhana's vision of her future science curriculum, one that includes the indigenous knowledge of students from the local community.

> As my writing evolved I came to understand that culture plays a vital role in promoting a constructivist informed curriculum and classroom practices. With this, I envisage a classroom where my students use their local knowledge (non-Western), such as their culture, beliefs, traditions, in concert with global (Western) knowledge in understanding the environment and in making sense of the world around them (Brickhouse & Kittleson, 2006). However, it will also be a classroom where students are made to realise though science and science education can bring prosperity, it can also bring annihilation depending on whose interest is being served (Beane, 1995). I believe that such type of classroom might help develop responsible decision makers and students who will see science as a means of understanding the inclusivity of both knowledge systems in attaining better lives on earth (Jardine, 1998).
>
> (Ignacio, 2009, p. 74)

Multi-paradigmatic doctoral research studies have been supervised by the first author. These inquiries, which include compelling literary genres (semi-fictive stories, poems, ethno-dramas, screenplays), vivid visual imagery and alternatives modes of thinking, have been conducted by university-based science and mathematics teacher educators in Mozambique (Nhalivelo, 2008; Cupane, 2008) and Nepal (Luitel, 2009). Similar to Berhana's research, these intercultural researchers explored their culturally situated autobiographies as students, teachers and teacher educators. Having developed powerful critical theoretic perspectives, they deconstructed oppressive cultural myths governing the educational policies and practices of their (post-colonial) countries. As significant research outcomes, they developed philosophies of culture-

sensitive curricula for preparing new science and mathematics teachers to take their respective countries forward into a culturally inclusive globalising world (Afonso & Taylor, 2009; Cupane, 2011; Luitel & Taylor, 2009; Taylor, 2010).

In Closing

This has been a necessarily brief summary of the huge and rapidly evolving field of educational research, and much has been omitted, not the least of which is an account of the 'mixed methods' approaches employed by post-positivists who bring qualitative methods into their predominantly objectivist research. Also missing is an account of the new 'integral paradigm' that provides a rationale for drawing upon multiple paradigms to design new hybrid methodologies that involve multiple epistemologies and their accompanying quality standards. For more on this see Taylor, Taylor and Luitel (2012).

Returning to our purpose in writing this paper, we join Paul and Marfo (2001) in calling for graduate research programs to provide diverse philosophies of research and knowledge production. In making our education systems more ethically responsive to the urgent challenges of globalization – designing sustainable development, countering climate change, preventing ongoing loss of biocultural diversity - we cannot afford to simply look to the past for 'know-how'. Educators can learn from new developments in interdisciplinary collaboration (Linger, 2011) that bring together the Arts, Humanities, Social Sciences, Natural Sciences and Engineering in creative endeavours amongst discipline experts, policy makers and the public to engage in new forms of interdisciplinary knowledge production aimed at resolving real-world practical problems. For example, Robert Frodeman (2008) explains how philosophers and environmental scientists have joined forces to create the new interdisciplinary field of 'environmental philosophy' that is enabling local communities to resolve the complex problem of sustainable development, with its competing economic, environmental and socio-cultural interests. We need education systems that actively prepare young people with the social and cognitive skills to engage critically and imaginatively in ethical decision-making about complex issues facing their societies. By drawing on multiple paradigms educational researchers can make a major contribution to aligning curricula, teacher education, and classroom teaching and

learning practices with the complex and challenging needs of the 21st Century. No country can afford not to take seriously the pressing need to produce educational researchers capable of using the powerful new interdisciplinary tools offered by the new research paradigms.

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Dr. Peter Charles Taylor is an Associate Professor of Transformative Education at the Science and Mathematics Education Centre (SMEC), Curtin University, Western Australia. His research focuses on the contextualization of science and mathematics education with/in postcolonial societies, especially culture-sensitive ways in harnessing global forces of modernisation. This research as/for professional development of teachers and teacher educators involves excavating personal education histories and alternative knowledge systems, examining critically the legacy of (neo) colonial education policies and practices, envisioning transformative curricular possibilities for creating *Third Space Classrooms*. Of particular research interest are auto/ethnography, literary genres of narrative, fictive and impressionistic writing, nondual logics such dialectics and poetics, and agentic standards of critical reflexivity and pedagogical thoughtfulness. Dr. Taylor draws on a wide range of theoretical referents, including critical constructivism, reconceptualist curriculum theory, research as reflective/imaginative praxis, the cultural/linguistic natures of science and mathematics and postcolonial theorising.

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