Paradigm paradoxes and the processes of
educational research: Using the theory of logical types to aid clarity.

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Abstract

This paper examines possible areas of confusion that may arise in
discussions of educational research. The authors present a theoretical
construction of the research process, based on Russell and Whitehead's
(1923) Theory of Logical Types. Such a construction aims to clarify the
 similarities and differences between the various paradigms (for
example the positivist, post-positivist, critical theory and
constructivist) and key aspects of these paradigms (such as their
ontology, epistemology, methodology and procedural canons). The
acknowledgment of these distinctions would aid integrity and rigour in
research, an issue especially relevant to educational research with its
growing propensity to qualitative methods. Due to the relative youth
and constant evolution of such methods, explicit reference to
paradigmatic, ontological and epistemological issues (typically
predetermined and thus unquestioned by positivistic science) are vital.
Examples from the literature are used to illustrate how failure to
acknowledge appropriate logical levels in such discussions can
contribute to uncertainty and confusion.

Recent Trends in Educational Research

In the past thirty years educational research has grown and developed
beyond the psychological foundations that once dominated (Schumacher &
McMillan, 1993). Educational research is now establishing itself as a
separate entity that, while sharing many features with the existing
disciplines (for example anthropology, sociology, psychology), has a
unique and distinct character (Carr & Kemmis, 1986). One of the
features of current educational research is its proliferation of
research paradigms. Masterman (1970) described a science such as this,
where several viable paradigms compete unsuccessfully for dominance, as
`multiple paradigm'. In this way, educational research differs
significantly from the physical (natural) sciences, which essentially
have a single dominant paradigm (for example, Newtonian physics). It
has more in common with the social sciences where a number of paradigms
co-exist, with each laying claim to a number of supporters.
A problem inherent in multiple paradigm sciences is that supporters of
the different paradigms must devote time and effort in the
justification of theirs (Skrtic, 1991), and the criticism of others.
Contemporary educational research has particularly been subject to such
`paradigm wars' (Gage, 1989, p4), a notable casualty of which seems to
have been a cohesive notion of what constitutes appropriate research

methodology (Carr & Kemmis, 1986). Another problem is that communication within the science becomes problematic because disciples of each paradigm tend to adopt idiosyncratic terminology and meaning. Phillips (1987, p.203) suggested: `If two paradigms are rivals, they are incommensurable - statements from one paradigm are not fully translatable into terms appropriate to the other (for they `carve up' reality differently, so that even if they use the same words, the words have different meanings in different contexts).'
For educational research to develop a cohesive, practical body of knowledge then, communication between researchers adopting the different paradigms needs to be made possible. There are three options for achieving this: choosing one paradigm for all research; learning about all paradigms so that communication is consistent within

whichever paradigm the discourse occurs; or developing a way to work above paradigmatic influences. The first would be counterproductive to educational research and the second not possible for most researchers. Hence commensurability of research findings must be achieved by assuming a meta-paradigmatic level.

Before examining a way through which this could be achieved, some examples of terminology usage to illustrate the above points seem timely. Some authors use the terms `ethnographic' and `phenomenological' interchangeably (Krathwohl, 1993, p. 311; Patton, 1980) although the methods come from quite different backgrounds (anthropology and philosophy respectively). Others go as far as to say `qualitative research is naturalistic inquiry' (Schumacher & McMillan, 1993, p. 372). This is a clear example of paradox since qualitative data, although a common feature, are not exclusively bound to naturalistic methodologies. Some have acknowledged this, going to great lengths to separate the terms, and to define them with clear references. For example `naturalistic' is defined by Guba as being `a paradigm for inquiry, not a method'' (1981, p. 76) and he adds to his definition with examples of other paradigms such as the legal and the rationalistic.

For the experienced reader of qualitative research such blurring of terminology may be immaterial, but for the novice the possibility for confusion is boundless. To clarify the differences and similarities between the various research paradigms in educational research, and to highlight the paradoxes in terminology use, the authors have applied a logical types structure to aspects of the research process. This is not to say that there should be one definition to every term used in research, as previously discussed, this is not possible or practical in a multiparadigmatic science like educational research. What is needed is a filter through which all terminology may be interpreted, regardless of paradigmatic influence, such that the respective factions may have some independent criteria with which to judge their study and present findings such that they may contribute to a unified body of

knowledge in education.
Background to the Theory of Logical Types
The theory of logical types was developed by Bertrand Russell in
collaboration with Alfred Whitehead in 1910, and was an attempt to deal
with problems of paradox in formal (mathematical) logic. A commonly
known paradox is that of the Cretan, Epimenides, who stated `All
Cretans are liars'. The problem is of course that Epimenides is both a
member of the class of `all Cretans', and therefore ` a liar', and a
commentator on the class. Without more information, the problem is
impossible to resolve since any attempt to reason the logic of the
statement leads to its own denial. The usual result of this is
confusion for the reader.
In reaching a solution to such self-referential paradoxes, Russell and
Whitehead proposed `whatever involves all of a collection must not be
one of the collection' (1927, p37). In other words, no class of items
can be a member of itself. In the case of Epimenides then, the theory
of logical types entails that his status as a Cretan bears no impact on
his statement that all Cretans are liars. To compare the logic of these
two premises simultaneously results in a paradox, but the theory's
principle allows his statement about all Cretans to be acceptable since
his own status as a Cretan becomes arbitrary.
The theory contains implications relating to the nature of truth. By
definition, the truth of a statement about an object is treated
independently to the truth of a statement about a class of objects of
which the original is a member. The latter argument deals with a higher
logical level than the former. For example, the identification of an
object which has four legs, a back and is used for sitting on may lead

to us asserting that it is a chair; but those same criteria could not
be used to describe the class of all chairs, since not all chairs may
be defined by them (i.e. a stool may have three legs and/or no back but
may generally be acknowledged as a `type' of chair). Similarly, `types
of furniture' can account for the set of all chairs, but the set of all
chairs cannot account for all types of furniture since a hat stand, for
example, is clearly not a type of chair. Gregory Bateson, in applying
logical types to communications, summarised the theory with the
following three assertions `. . . no class can be a member of itself; a
class of classes cannot be one of the classes which are its members;
(and) a name is not the thing named' (1972, p280).
Returning to research then, paradoxes may easily occur in a number of
ways. If terminology typically used to represent a particular logical
level is used for another or if a particular level is skipped and links
between the higher and lower order ones unquestioned, irregularities
arise and lead to confusion. The typical response to this is to expand
personal meanings for words so as to assimilate the message. However
this results in the excessive blurring of boundaries of meaning that
mark many modern discourses on methodology. Perhaps the term paradigm,
more than any other, has led to confusion in discussions of research.
Even Thomas Kuhn, the person who is credited with its introduction, is

thought to have used it in over twenty different ways (Guba, 1991, p17).

As previously suggested, to those experienced with research this apparently carefree use of terminology is usually unproblematic. This is because personal constructions are developed sufficiently to make understanding from such vagaries. Some would even argue the intellectual process of deconstructing and making meaning out of the chaos that exists is necessary. However, it is the authors' contention that beginning or naive researchers tend to avoid this process and thus contribute to the lack of rigour which occasionally pervades educational research. Furthermore, it is argued that paradoxes can be perpetuated - and even created - through confusion about terminology. It is just as convenient for a beginning researcher to expand or constrict their personal meaning of `paradigm' to reflect the intended logical level, as it is to create or commit to a different word. Further examples of paradoxes within the literature are abundant. As a result of utilising terminology to represent concepts across a range of logical levels, writers of research texts (especially regarding qualitative methods) can often be accused of `eating the menu rather than the dinner' (Bateson, 1972, p251). The word `qualitative' itself is often used as an overarching category of research, a type of data and a method of interpreting data. The words naturalistic, constructivist, grounded theory, interpretive, descriptive and qualitative are often used to represent similar concepts - certainly all have been referred to as paradigms. The term `ethnography' is often used to represent all forms of qualitative research, though some have thought it to be at a much lower level (Anderson, 1994).

By using the theory of logical types paradoxes, such as those mentioned above, can be avoided. By being aware of the logical level to which the statement is applied, the reader is assisted in interpreting the argument and assimilating its message. The authors' intention is not that terminology be consistently used (this may not be possible or practical) but that meaning be consistently interpreted.

Applying Logical Levels to the Research Process

Schumacher and McMillan define research as that which `systematically describes or measures reality' (1993, p3). Since `reality' (regardless of how we view or represent it) is the basic unit, then the set of statements regarding the research process can be comprised by multiple logical levels of abstraction from this concept. Since the name given

to an object or phenomenon is not the `reality' itself, the first level of abstraction is how that phenomena is represented or named - the data (of course some paradigms, such as constructivism, imply this step does not exist: in other words the data is reality). Further levels of abstraction, as shown in Figure 1, include how the data is collected, analysed, interpreted, represented and so on. It must be remembered that these levels represent conceptual, rather than procedural or

temporal, abstractions.

Figure 1 Table of Logical Levels Applied to the Research Process
Guiding set of principles which entail certain beliefs about the nature of reality and the way/s in which we can access that reality (Paradigms - principles and beliefs guiding research)
 e.g., Positivist, Constructivist, Critical Theory
8
Personal belief about the nature of reality which leads to beliefs about the way in which that reality can be accessed (Ontology - nature of reality)
e.g., Realist, Critical Realist, Relativist
7
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Personal belief guiding choice of principle which in turn guides way in which reality is observed, recorded, interpreted, and represented (Epistemology - knowing reality)
e.g., Objectivist, Subjectivist
6
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Principle guiding way in which reality is observed, recorded, interpreted, and represented (Research Design)
e.g., experimental, nonexperimental; case study, analytic
5
_
Process of representing interpretations of records of observations of reality (Product of Analysis)
e.g., Formal Theory, Substantive Theory, Change, Contextualised Description
4
_
Process of interpreting records of observations of reality (Data Analysis)
e.g., descriptive, inferential statistics; concept analysis
3
_
Process of observing and recording reality (Data Collection)
e.g., structured observations, tests; ethnographic interview, document analysis
2
_
Representation of reality (Data)
1
_
Phenomena (`Reality')

The Significance of the Application

The authors have attempted to provide the reader with a possible map with which they may choose to navigate their way through the burgeoning

field of educational research. The map, being based on the Theory of Logical Types, provides clear signposts for comparing different research paradigms and the methods adopted. It also allows for the recognition and avoidance of paradoxes, which we consider to be the dead-end roads of educational research, they slow down the progress and

needlessly draw out and complicate the journey.

This is not to say that we espouse only set paths in the research process, far from it. One of the virtues of the qualitative approaches is their flexibility and this should be maintained. However, it would be helpful for readers if educational researchers in reporting their studies preserve a level of consistency in their use of terminology and meaning, or at least identify where and why they have deviated from the beaten track.

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Logical Types and Research Process