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Yawson, Robert M.
University of Minnesota

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Ethics of Conducting Qualitative Social Science Research in the Emerging Field of Nanotechnology

Robert M. Yawson

*Department of Organizational Leadership, Policy, and Development
College of Education and Human Resource Development
University of Minnesota, 330 Wulling Hall, 86 Pleasant Street SE
Minneapolis, MN 55455*

yawso003@umn.edu

Abstract

In educational research, qualitative studies have varied meanings. This short paper reviews the conceptual underpinnings of ethics in qualitative social science research and its importance to the emerging field of nanotechnology. The paper is aimed at showing a pathway by which the researcher might tackle ethics in a more effective way to achieve the desired results and whether different ethical values are needed in qualitative social science research of nanotechnology.

Keywords: Ethics, Philosophy, Nanoscale, Humanists, Societal implications

Ethics in qualitative research and nanotechnology

Qualitative social science research is going through a time of profound change in the understanding of the ethics of applied social research, especially with the emergence of information and communication technology, biotechnology, cognitive science and most recently nanotechnology and synthetic biology. There are various definitions in the literature on ethics depending on the discipline from which it is defined. However, all these definitions have the same fundamental philosophical meaning.

In this paper the use of ethics is in concert with the definition by the Medical Research Council of South Africa (MRC):

Ethics is the science of criteria, norms and values for human action and conduct. It is engaged in reflection and analysis of morals concerning whether an act is good or bad and how it influences our basic quest for meaning, our search for humanity and our attempt to create a humane society. Its intention is to safeguard human dignity and to promote justice, equality, truth and trust.
In a nutshell, ethics is critical reflection on morality. (MRC, 2006, p. 13)

In educational research, qualitative studies have varied meanings. Borg and Gall (1989), for example, explained that qualitative research as a term is often used interchangeably with terms such as, ethnographic, subjective, naturalistic, and postpositivistic. Savenge and Robinson (2001) defined it “as research devoted to developing an understanding of human systems, be they small, such as a technology-using teacher and his or her students and classroom, or large, such as a cultural system” (p. 1046).

There are several competing theoretical frameworks employed to enrich qualitative research that contradicts each other. Each of these frameworks comes with its certain ethical obligations. These theoretical frameworks have a long history in the social sciences and are being used as an important component in nanotechnology research. Societal values and expectations are required to be met by every nascent field of scientific research and nanotechnology is no exception.

According to the *Project on Emerging Nanotechnologies of the Woodrow Wilson International Center for Scholars*, “an estimated global research and development investment of nearly \$9 billion per year is anticipated to lead to new medical treatments and tools; more efficient energy production, storage and transmission; better access to clean water; more effective pollution reduction and prevention; and stronger, lighter materials” (PEN, 2010). These are just a small portion of the advances and anticipated uses of the technology. However, these novel and emerging applications raise ethical, legal, and safety concerns for acceptable development of nanotechnologies. The most daunting challenge for nanotechnology to reach its maximum potential is having the prescience to develop and use it wisely. This is what makes social science research into acceptable use of nanotechnology very critical.

This short paper reviews the conceptual underpinnings of ethics in qualitative social science research and its importance to the emerging field of nanotechnology. The paper is aimed at showing a pathway by which the researcher might tackle ethics in a more effective way to achieve the desired results and whether different ethical values are needed in qualitative social science research of nanotechnology.

What is nanotechnology?

There are several definitions of nanoscience and nanotechnology in the literature. Many of these definitions are derived by government agencies and have been modified with the passage of time to include the concerns and interests of society as a whole, as expressed through the technological, commercial, populist, legal, social, and ethicist communities (Romig Jr. et al., 2007).

The most cited definition nanotechnology is that of the National Nanotechnology Initiative of the United States: “Nanotechnology is the understanding and control of matter at dimensions between approximately 1 and 100 nanometers, where unique phenomena enable novel applications. Encompassing nanoscale science, engineering, and technology, nanotechnology involves imaging, measuring, modeling, and manipulating matter at this length scale” (NNI, 2009). A nanometer is one-billionth of a meter. To put this measure in perspective using a sheet of paper as an analogy: The thickness of a sheet of paper is approximately 100,000 nanometers thick. The dimensions between approximately 1 and 100 nanometers are the nanoscale (NNI, 2009). At this scale, unusual physical, chemical, and biological properties can emerge in materials. These properties tend to differ in very significant ways from the normal properties of bulk materials and single atoms or molecules (NNI, 2009).

In this nascent era of nanotechnology, there is a growing need for individuals and societies, to be more critically involved in the dialogue surrounding nanotechnology (Yawson & Kuzma, 2010). This is why the need for social science research in nanotechnology is so important. However, I must hasten to add that the involvement of social scientists and the humanists (including ethicists) in what Guston and Sarewitz (2002) referred to as ‘Real Time Technology Assessment’ is not new to nanotechnology. Advances in the medical field and, more

recently, biotechnology, have normally been placed in a broader societal review and deliberation (Shapira, Youtie & Porter, 2010). An example that easily comes to mind is the Human Genome Project (HGP), which the very inception of the project in the late 1980s has been subjected to critical assessment of its ethical, legal, and social implications (ELSI) (Shapira et al., 2010).

Ethical obligations in qualitative research in nanotechnology

According to Lewenstein (2005) the list of social, ethical, legal, and cultural implications of advances in nanotechnology includes “such issues as privacy, avoiding a ‘nano-divide’, unintended consequences, university/industry relationships and potential conflicts of interest, research ethics, and so on” (p. 8). It is generally accepted among the research community that, as a result of the limited understanding and uncertainty pertaining to the anticipated applications of nanotechnology, the ethical issues are also not clear. However, many within the social science nanotechnology research community argue that the social and ethical issues must be addressed now, “before they overwhelm nanotechnology and derail potential benefits” (Lewenstein, 2005, p. 8).

Currently social scientists and humanists seeking to work with natural scientists and engineers on societal and ethical implications of nanotechnology are confronted with two problems emanating from the nascent nature of nanotechnology. The relevancy of the conceptual and social aspect of the emerging nature of nanotechnology cannot be downplayed. Conceptually, the lack of universally accepted definitions of nanotechnology and taxonomical differences relating to the technology have created the current flux that in almost all the science and engineering disciplines researchers are using different nomenclature to describe their revolutionary work "nano", without having much new in common and without showing any

remarkable degree of trans-, multi-, and interdisciplinarity (Schummer, 2004). This situation creates difficulties for humanists and social scientists to decide what research projects should be classified as nanotechnology. Their choices therefore, may not be based on the particularities of the actual research project (Schummer, 2004).

The second important problem is the understanding of societal and ethical implications of nanotechnology. There have been several discussions in the media by anti-nanotechnology groups and some popular science writers on the dangers of nanotechnology and framed the ethical and societal implication in a scary sci-fi visions. How could humanists and social scientists, “bound to their scholarly standards, contribute to a debate that is dominated by such bizarre visions of societal and ethical implications of nanotechnology that are meant to stir the innermost hopes and fears of people?” (Schummer, 2005, html). This creates an ethical dilemma for humanists and social scientists who engage in qualitative research in nanotechnology. These were similar experiences faced by social scientists in the midst of early advances in biotechnology and Genetically Modified Foods especially in Europe.

Having conducted high level qualitative social science research in the field of nanotechnology, I have been confronted with ethical issues which any researcher working in the field will be confronted with. Most of the qualitative studies in the area have used expert elicitation and qualitative survey methods. The ethical issue that normally comes up is the selection of experts. The researcher is faced with who to select as an expert and depending on some preconceived notions the selection of experts can be done to get results in support of particular world view.

While social and ethical issues concerning the conduct of nanotechnology research by scientists and engineers have received several scholarly attentions, little to none has been done

on ethical issues in qualitative research in nanotechnology by social scientists. Generally qualitative research is often more restrained than issues in survey or experimental research (MRC, 2006). It can be explained that these issues are related to the very nature of qualitative research which is usually characterized by interviewing and participant observation which can be long-term and close personal involvement (Lipson, 1994). Denzin and Lincoln (1994) categorized ethical issues in qualitative research into four frames: the absolutist, relativist, contextualist, and deceptivist, perspectives.

The absolutist perspective deal with four realms of ethical concerns, including: physical and psychological protection of participants from harm; avoidance of deception; respect and protection of privacy of research subjects; and informed consent. The absolutist perspective contends that the invasion of privacy may be injurious physically and psychologically and as such only those behaviors and experiences that take place in the public domain should be studied (Denzin & Lincoln, 1994). This perspective is not a major concern for qualitative nanotechnology research at it nascent stages of development. However, as advances in its medical applications increase, the absolutist perspective will become very paramount.

The relativist perspective give free pass to researchers contending that “investigators have absolute freedom to study what they see fit, but they should study only those problems that flow from their own experiences” (MRC, 2006, p. 34). Philosophers of this view further argue that the only rational ethical standard is one ordered by the conscience of the researcher and that no particular collection of ethical standards can be established, since every situation necessitates a different ethical approach. The researcher is however, expected to develop an open, sharing relationships with research subjects (Denzin & Lincoln, 1994).

The deceptivist ethical viewpoint is that as a matter of social good the researcher may use every means at his/her disposal to acquire greater understanding in any particular situation which will contribute to knowledge (Kvale, 1996). “This may involve telling lies, deliberately misrepresenting oneself, 'dumping' others, setting people up, using adversarial interviewing techniques, building friendly trust and infiltrating settings” (MRC, 2006, p. 34).

The contextualist perspective of qualitative research refers to the description and understanding of events, actions, and processes in the natural context in which they occur (MRC, 2006). Nothing is done to generalize the findings to a larger population. A deliberate attempt is made to sample data sources that are the richest sources of information in a specific context.

Lewenstein (2005) have stated that the ability to see principles of fairness, equity, justice, and especially power in several facets of nanotechnology implies that they can provide the platform for a more holistic definition of social and ethical conduct of qualitative social science research in nanotechnology. Any attempt to narrowly define ‘social and ethical issues’ in itself is “an exercise of power that can prevent us from understanding how central social issues are to the development of scientific knowledge and its implementation through technology in the modern world” (Lewenstein p. 13).

I will end this paper by pointing out that nanotechnology may not be unique when it comes to qualitative research by social scientists than any other field of emerging science and technology. This may explain why there is virtually nothing written on ethics of conducting qualitative social science research in the emerging field of nanotechnology. This may, however change in the future as advances in nanotechnology may lead to how qualitative social science is conducted. However, for now every discussion on ethics of conducting qualitative social science research in nanotechnology discussed in this paper would stand if it is discussed in relation to

biotechnology, information science, or cognitive science and for that matter any other emerging technology like synthetic biology. As Lewenstein (2005) stated “social and ethical issues permeate science and technology and only the exercise of power prevents us from seeing that” (p. 15).

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