Identifying Critical Indicators to deal with Research Integrity

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Samevatting

In hierdie artikel word op die rol van etiek in die navorsingsproses gefokus. Die navorsingsproses sluit alle aspekte (akademies, kommersiëel en administratief), wat verbandhoudend tot die navorsing is, in. Die outeur beredeneer dit dat die heersende denke oor etiek in navorsing heel dikwels verspreid voorkom, en tot sekere dissiplines (byvoorbeeld die gesondheidswetenskappe) en aktiwiteite (soos plagiaat) beperk is. Dit word ook aangetoon dat navorsingsetiek nie slegs op die werklike uitvoering van navorsing van toepassing is nie, maar ook op die prosesse wat met navorsing verband hou, soos toesighouding en die kommersialisering daarvan binne die openbare domein. 'n Aantal kritieke indikatore word geïdentifiseer, ten einde met etiek in die navorsingsproses te handel.

1. Introduction

Two recent research incidents in South Africa placed research integrity in the spotlight again. The allegation of possible plagiarism and the questioning of the quality of a doctoral study signal that good science is not limited to the design of theories or the application thereof only, but that the creation of new knowledge should meet required standards and practices as well. These standards and practices are not limited to quality standards only. One immediately calls to mind issues such as the expenditure of the research grant, the modules included in the research studies, the support offered to the student whilst doing the research, the interaction with research data, and so forth. Penslar *et al.* (1995) adds to this list in referring to topics such as the challenge involved in being a professional scientist, science misconduct, authorship, data alternation,

ethics of screening and testing, ethics and eugenics, animals, human subjects, administration of alcohol, deception in research, behaviour control, science and coercion, etc. This underlines the requirement that the entire research process should be ethically sound. Linked to this, one may refer to Letherby and Bywaters (2007:20) who rightly state that researchers have a moral obligation to take into account the impact of their work on others. This view is supported by Dillemans (2006:13), who says that ethics should be applied in scientific methods and results. Science *is* the responsibility of the university.

Following on this deduction is the simple, yet powerful, question: *How much integrity is there in the research system?* (Although integrity and ethics are often used as synonyms in literature, each signals a particular behaviour. In this study ethics will be reserved for norms and values and integrity for the behaviour as a result of norms and values – see section 6.) This question intentionally suggests that the research cycle and its *processes* have to be subjected to normative actions. There is a growing concern that numerous ethical frameworks exist, but that the ethical behaviour (integrity) is not always found in the research process. Certainly nobody denies the need for this. To limit the evidence to the South African situation only: In *literature* there are several references to research ethics (Mouton, 2001; Lues & Lategan, 2006; Lategan, 2007; Strydom, 2005; Silverman, 2006). In *legislation* strict guidelines are formulated on how researchers should interact with human subjects and tissue (see http://www-cdp.ims.nci.nih.gov/brochure.html, Schuklenk, 2002). In research grant applications and awards, questions with regard to ethics are asked and guidelines on how to deal with ethical issues are provided (for example NRF guidelines on the acceptance of grant conditions). University ethics committees deal with the research applications in medicine and animal research.

Another observation also emphasises the need for integrity in the research process. Teichler (2007:244) notes a "spread of post-industrial values" in universities. These values are well reflected by growing hedonism, general apathy and withdrawal. The concerning consequence of such a development is that academic staff can either focus only on those activities of interest or benefit to themselves, or they can become less and less committed on their core activities. The emphasis on third stream income and the problems associated with postgraduate supervision are representative of these post-industrial values.

Based on this overview it would be safe to say that a general awareness exists regarding the reasons for maintaining integrity in research. The concern, however, is that this awareness is often a paper exercise only. Based on this assumption a more *comprehensive integration* of normative guidelines into the research process is needed to direct researchers and

postgraduate students.

2. Problem statement and aim of study

The problem statement of this study is the apparent lack of comprehensive ethical indicators to deal with unethical research practices in the research cycle and therefore to sustain a culture of research integrity.

This article challenges the assumptions (1) that research ethical frameworks sufficiently address the ethical demands of the research cycle, (2) that research ethics are catered for when researchers comply to the grant statements and/or research contracts and (3) that research ethics are primarily concerned with health issues only. Although various research ethical frameworks exist, they do not sufficiently address all ethical activities associated with the research cycle (which is broader than the research process). Consequently research ethics is seen as a coincidence.

The problem statement is authenticated by Macnee (2004:212), who defines a research problem "as a knowledge gap that warrants filling and can be addressed through systematic study". Research problems are derived from either theoretical or practical problems.

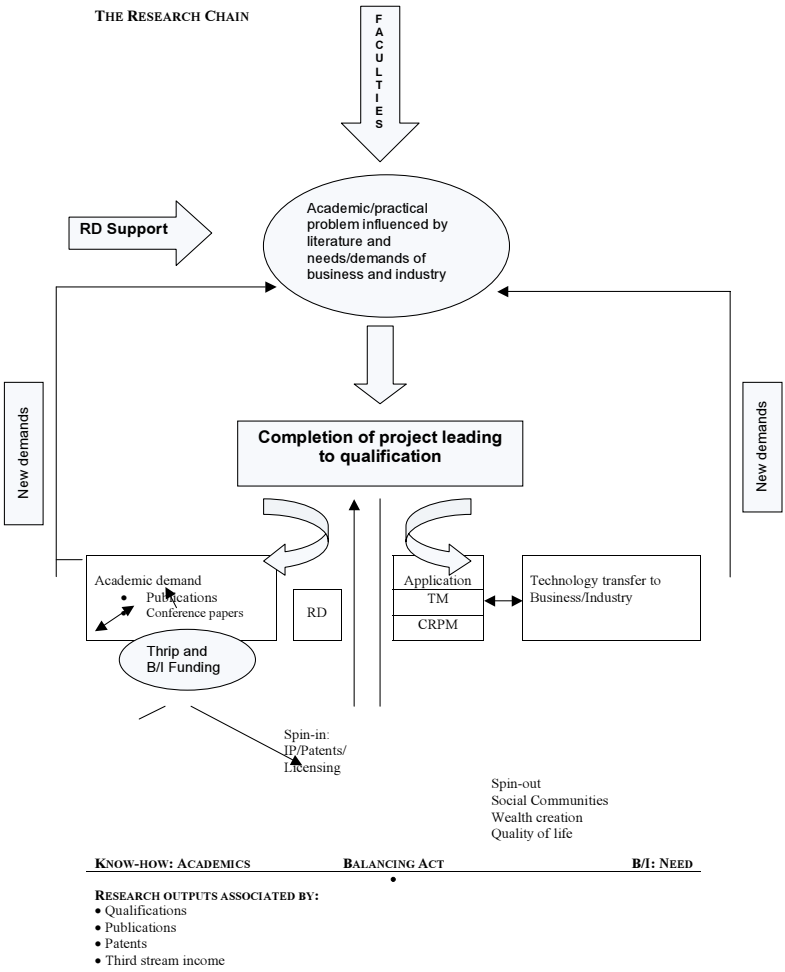
The aim of this study is to identify critical factors that will deal with research integrity in the research cycle. The identification of the critical factors is based on a literature review as part of the qualitative research methodology.

3. Contextualisation of research problem

The research cycle can be described as the process of taking the research problem through various academic stages (such as enrolment for postgraduate qualifications, publication writing, conference papers, supervision) *to the process of patenting* (intellectual property), *commercialisation* (spin-in to business and industry and first step towards third stream income) and *eventually production* (spin-out and sustained third stream income). The research cycle includes both academic practice and technology transfer. The cycle designed for the Central University of Technology includes an academic-research and academic-support focus. This cycle encapsulates the philosophy that research management should be viewed from a four-quadrant view. Firstly, research management is about steering the research process to provide a solution to the identified research problem. This is based on the four pillars of the research process, namely problem identification, methodology in support of creating an understanding of the problem and the derivation of a possible solution to the problem, evidence in support of the problem and solution and conclusions based on the research conducted. Secondly, resources must be identified in support of the research. The resources range from financial support, human resources development, infrastructure, and so on. The

utilisation of these resources should be managed. Thirdly, environmental impacting factors must be understood to steer research in meeting national policy directives, institutional strategies and identified needs. Fourthly, research should be in service of social communities to improve the quality of life and end users (business, industry, government) to create wealth. The next figure portrays this cycle.

THE RESEARCH CHAIN



Just looking at the cycle immediately identifies ethical pitfalls (this doesn't mean that the cycle doesn't harmonise ethical behaviour as well!). The author lists the following pitfalls:

- Supervision challenges, such as managing the overall research cycle.
- Publication challenges, such as plagiarism.
- Management challenges, such as meeting ethical standards.
- Technology transfer challenges, such as improving living conditions.

This cycle depicts, among other things, a moveaway from the isolation of the benefits of research for society. Patrick Cunningham, Chief Scientific Advisor to the Irish Government, indicates the positive move between research spin-ins to the university and research spin-outs to business, industry, government and the broader society. He argues that people, money and ideas contribute to research. Research rolls over to publications, citations and patents. Capital investment and startups lead to products and services which contribute towards the benefit of society (Cunningham, 2007). This move away from the "ivory tower" image of research and the ethical challenges associated with this new approach to research is well articulated by Duderstadt (2004). He says that research reaches every aspect of human society. The wide range of research activities urges the landing of more grants, which in turn, leads to staff competition. As a result it has an unavoidable impact on the morale of people. Duderstadt (2004:76) remarks:

> The peer-reviewed grant system has fostered fierce competitiveness, imposed intractable work schedules, and contributed to a loss of collegiality and community. It has shifted faculty loyalties from the campus to their disciplinary communities. Faculty careers have become nomadic, driven by the marketplace, hopping from institution to institution in search of higher salaries, more generous research support and better colleagues.

These new developments lead to the changing nature of research and scholarship. The changes are noticeable (Duderstadt, 2004:77-81):

- Continuous knowledge explosion – specialisations about dark matter and quantum entanglement suggest another revolution (similar to Einstein's theory on relativity and introduction of quantum mechanics).
- Lots of data available.
- Developments bigger than disciplines.
- Continuous debate on basic (curiosity-driven or Baconian) and applied (mission-oriented or Newtonian) sciences and their link.
- A move away from individual research to team research, from single discipline to multidiscipline research.
- Research must have an international character: "Scholarship is a global enterprise in which nations must participate both for their own benefit and that of the world."
- Tools of research continue to evolve, increasingly dramatically in power, scope and, of course, cost.

- Although research and education must be closer the innovation of research is not yet integrated with education.
- Government shifted from partner to becoming a procurer of research.
- Growing commercialisation of academy.

As a result there is a "new intellectual architecture" servicing: All these new developments have changed the face of the university and its activities. This change is evident especially in the urge for third stream income for a university – a process not without ethical concern. Pattyn and Van Overwalle (2006) investigate the niche market for universities: They ask whether it is only the creation of new knowledge immaterial of the possible economic value thereof, or whether there is a preference for the commercialisation of research through the creation of new knowledge. Regardless of the answer, it will have ethical implications for science.

Bok (2003), in his study on the commercialisation of higher education, makes important remarks for the integrity of the research process. He asks:

> Was everything in the university for sale if the price was right? If more and more 'products' of the university were sold at a profit, might the lure of the marketplace alter the behavior of professors and university officials in subtle ways that would change the character of Harvard for the worse? … Observing these trends, I worry that commercialization may be changing the nature of academic institutions in ways we will come to regret (Bok, 2003:x).

Bok (2003:59) identifies important ethical challenges in the shift towards commercialisation of higher education. One such an example is the increase in the number of science papers based on industrial problems. Although co-operation with industry may be to the advantage of research, the conflict of interest arises when financial or personal decisions influence the conduct of research. Examples are reported of researchers who promote the medicine of companies in which they have shares – without revealing any negative results. Favourable results lead to the rise of prices. In addition more new drugs or medical procedures are tested where human subjects are involved. There are also examples of researchers who are engaged with companies, but who do make bad or hazardous results known. Commercial activities may have good intentions, but can easily lead to conflict. Commercial incentives have succeeded in encouraging universities to do a much better job of serving the public interest. Universities, however, have paid a price for industry support through excessive secrecy, periodic exposés of financial conflict and corporate efforts to manipulate or suppress research results (Bok, 2003:59-73).

> Most universities have not done all they should to protect the integrity of their research (Bok, 2003:77).

It is not always only the outcome of the research that challenges the integrity of research but also the research that researchers are engaged in

or the continuation of a project just to get the funding. Another problem is universities investing in companies started by their own faculties. Conflict of management interests can arise. Universities have then to pick and choose between own scientists (Bok, 2003:146-154). Bok remarks:

> Worst of all, universities with a financial stake in work of their professors may be influenced, or may be thought to be influenced, by commercial considerations rather than academic merit when they decide on promotions, salaries or other sensitive personnel questions (Bok, 2003:154).
>
> It is unhealthy for universities to have their integrity questioned repeatedly by reports of excessive secrecy, conflicts of interest, and corporate efforts to manipulate and suppress research (Bok, 2003:156).

It is therefore evident that the way in which research is practised calls for strict ethical behaviour. The ethical challenges are not limited to the engagement with research only: the challenges from the communities external to the universities must also be borne in mind. Silverman (2006:415) articulates researchers' responsibility well when he questions whether researchers are contributing to the common good of society and whether the people they are studying are protected.

4. Methodology

This study will primarily be a qualitative literature study. The authenticity of this study is guided by Macnee's (2004:219) observation:

> The literature review is guided by the variables that have been identified in the research purpose and aims to give the reader an overview of what is known about those variables, how those variables have been studied in the past and with whom they have been studied.

Burns and Grove (2007:161) expand on this by saying that a literature review is a summary of current knowledge about a problem and includes what is known and not known about this problem.

5. Understanding the complexity of scientific misconduct

Scientific misconduct is normally viewed as a fabrication and/or falsification (including plagiarism) of data (Altman, 1997). But, Altman says, it cannot be limited to these two acts only. She refers to the US National Academy of Science (1992) which distinguishes between misconµduct and "questionable research practices" as those which "violate traditional values of the research enterprise and may be detrimental to the research process". Researchers may not be guilty of misconduct, yet guilty of carrying out questionable research practices. The US National Academy of Science (1992) questions the integrity of practices such as failing to retain data for a reasonable period, maintaining inadequate research records, conferring or requesting authorship on the basis of a specialised service or contribution that is not related to the

research listed in a document, refusing peers reasonable access to unique material or data that supports published articles, using inappropriate statistics or methods of measurement to enhance significance of research findings, inadequately supervising research subordinates or exploiting them, misrepresenting speculations as facts or releasing preliminary research results in media without allowing peers to validate them.

Burns and Grove (2007:196, 203, 231) refer to *unethical research* as scientific misconduct, violation of subjects' rights and the publication of inaccurate scientific information. They further group scientific misconduct into *fabrication* (making up results and reporting on them), *falsification* (manipulating results or omitting results) and *plagiarism* (appropriation of other's ideas, processes, results or words without giving credit). They also emphasise the normative value that research should protect human rights.

Macrina (2000:1-2) supports this sentiment by saying that integrity is expected in science – science is built upon a foundation of trust and honesty. Science is seen as a definitive vehicle for uncovering truth: "Bogus results cannot make a contribution to our understanding of a problem." There is a difference between sloppy science and misconduct. Although the public doesn't always understand why and when scientists differ, there is an obligation upon scientists not to deliberately mislead the public.

> Preventing misconduct is key in science as in the other professions, and it is logical to argue that emphasis needs to be placed on education and appropriate socialization. But even the most rigorous efforts in this regard are not likely to affect someone who is intent on deliberate deception or misconduct (Macrina, 2000:9).

Lester and Lester (2002:123) join this debate on scientific misconduct. Credibility in the research process is warranted. They refer to ethics of research especially in following matters:

- Using sources to establish one's credibility.
- Using sources to place one's work in proper context.
- Honouring property rights.
- Avoiding plagiarism.
- Sharing credit and honouring it in collaborative projects.
- Honouring and crediting electronic sources.
- Seeking permission to publish material on one's website.

Cherulnik (2001:374-375) devotes a chapter to the researcher's responsibilities as scientist, colleague and citizen – something much needed to combat scientific misconduct. Researchers therefore have a *scientific responsibility* (valid research findings, scientific integrity), *social responsibility* (ethical conduct, societal pressures) and *professional responsibility* (publication of research, cooperation with colleagues). Cherulnik (2001:374) also says that one of the best ways of maintaining

high scientific standards of quality is to be responsible towards society.

Another problem very often overlooked in the debate about scientific misconduct is the supervision of students, which goes beyond the student-mentor relationship. Both staff and students have to balance rights and duties. Supervisors complain that their students are not always committed to their research and expect the supervisors to do the research on their (the students') behalf. Students in return argue that their supervisors are not always prepared for their task, lack sufficient time to interact with the student and leave students to deal with the research on their own (see Lues & Lategan, 2006:27-34). It is for these reasons that James and Baldwin (2006) emphasise a personal commitment in terms of the work of the postgraduate student. Such a commitment underpins the foundations of scholarship.

Based on this overview it is evident that research integrity should be integrated in all aspects of the research cycle in order to avoid scientific misconduct. It is also obvious that it is a one-sided perspective to limit the ethical evaluation of the research to the completed project only.

6. Conceptualising research ethics and integrity

Ethics is broadly defined as the science of norms and values. Research ethics is the science of norms and values in the research cycle. Norms are the identified principles according to which the researcher operates. Norms are the application of these values. One's orientation towards a norm is influenced by a world and life orientation. Research integrity is the behaviour expressed by the researcher on the basis of identified values and applied norms.

The application of this broad approach to research ethics and integrity is articulated by Pojman (1990:3), who says that ethics are concerned not with *what is but what ought to be*. Ethics are not laws, although they may be closely related. Laws are instituted to promote well-being. The law does not cover all ethical issues, however. Physical sanctions are a means of enforcing the law but only the sanctions of the conscience and reputation enforce morality (Pojman, 1990:3).

- In applying ethics to the research process one may be guided by Minogue (2006:12-13), who asks four basic questions associated with (research) ethics:
- What makes actions right?
- What makes actions good?
- How are conflicts between society and the individual to be reconciled?
- How do these answers give us procedures for addressing our bioethical problems?

These questions call for ongoing action and involvement by all stake-holders (the university and its stakeholders) with research. Macnee

(2004:128-129) echoes this sentiment. She states that "It is unethical and illegal to implement a research study using animal or human subjects without institutional review board approval" and "The goal of research with human subjects is always to minimize the risks and to maximize the benefits." She lists the American Nurses Association's five rights for human subjects in research (Macnee, 2004:128):

- Right to self-determination
- Right to privacy and dignity
- Right to anonymity and confidentiality
- Right to fair treatment
- Right to protection from discomfort or harm

At the basis of these five human rights in research lies the *responsibility* of the researcher(s) (Macnee, 2004:131). Basic problems associated with research ethics are ignorance about informed consent, complying with informed consent, bias in subject recruitment, selectivity (to support research focus) and response rate (Macnee, 2004:134-140).

As research ethics cannot be limited to certain aspects of the research cycle only, so can research ethics not be limited to certain disciplines only. In support of this observation one can refer to Minogue (2006:77), who works with the idea of the *expanding circle:* this means that ethics includes more than just the obvious and known fields of research ethics. A perfect example is the common belief that research ethics only applies to fields such as the medical and health sciences and research on animals. Growing fields of interest in research are business, the environment, postgraduate supervision and engineering sciences.

7. Reflection on ethical frameworks to deal with research integrity

7.1 Towsley-Cook and Young

Towsley-Cook and Young (2007:1) write on ethical and legal issues for the imaging sciences. They believe that ethics and the law cannot be separated. They say that the sum of ethical and legal knowledge together with common sense, personal values, professional values, practical wisdom and learned skills "will enable imaging professionals to tackle and solve the problems they will face."

Towsley-Cook and Young (2007:2) define ethics as "the system or code of conduct and morals advocated by a particular individual or group." They also refer to ethics as "the study of acceptable conduct and moral judgment." Values determine professional and personal ethics. Values are defined as qualities or standards that are desirable or worthy of esteem in themselves (Towsley-Cook & Young, 2007:4). Values influence decisions and judgments (Towsley-Cook & Young, 2007:5). Ethics are never remote

from social changes. Twenty-first century ethical developments portray society's needs and professional reactions as major foundations of ethics. (This follows on the twentieth century during which bioethics was born that, W.D. Ross presented his professional behaviours, J. Rawls his theory of justice and L. Kohlberg his stages of moral development) (Towsley-Cook & Young, 2007:5).

In dealing with ethical problem solving, Towsley-Cook and Young (2007) identify three schools of thought and five modules. They divide ethics into three major schools of thought (Towsley-Cook & Young, 2007:9-10):

School of thought	**Meaning**
Consequentialism (teleology)	Decisions based on outcomes or consequences of a given act
Deontology	Decisions based on individual motives or morals
Virtue ethics	Uses practical wisdom and character for emotional and intellectual problem solving More of a holistic approach

Beside the schools of thought they identify five ethical models (Towsley-Cook & Young, 2007:10-12):

Ethical models	**Meaning**
Engineering	Patient is a condition or procedure
Paternal/priestly	Somebody else thinks he/she knows what is best for patient
Collegial	Mutual cooperation between provider and patient
Contractual	Business relationship in which both provider and patient have obligations, rights and responsibilities
Covenantal	Agreement between provider and patient grounded in traditional values

They also refer to the Dowd Problem Solving Model (Towsley-Cook & Young, 2007:12):

- Assessment of problem
- Isolation of the issues
- Analysis of the data
- Development of a plan of action
- Institution of the plan
- Analysis of the outcome

Based on this approach, they identify seven principles for biomedical ethics[1] (Towsley-Cook & Young, 2007:3, 29-31):

Principle	Meaning
Autonomy	Respect for patient as person
Beneficence	Performance of good acts
Confidentiality	Duty to protect the privacy of the patient
Justice	Moral rightness
Nonmaleficence	Avoidance of evil
Role fidelity	Faithfulness or loyalty
Veracity	Obligation to tell the truth and not to lie

In assessing the quality of life, they place it on a continuum between minimal need and maximal need. Issues influencing quality of life are biological functions, intellect, creativity, emotions and contact with others (Towsley-Cook & Young, 2007:124-125). They advocate that the development of a code of conduct is a sign of professionalism (Towsley-Cook & Young, 2007:3).

7.2 Shielda Rodgers

Rodgers (2007:113-114) defines ethics as "actions an individual should take … Ethics are process-oriented and involve critical analysis of actions." She observes that although many ethical decision models exist in literature, there are more commonalities to these models than there are differences. The steps are not always sequential or intended to be rigid. It is a process (Rodger, 2007:132). She summarises all of these models in the following table:

Process	Ethical decision making model
Access	Clarify the ethical dilemma, gather additional data
Analyse	Identify options
Plan	Make a decision
Implement	Act
Evaluate	Evaluate

7.3 Creasia and Parker

Creasia and Parker (2007:275-277) point out that ethics has several meanings:

1 They use bio-ethics as the application of ethical principles in the whole range of health care systems.

- Ethics = practices or beliefs of a particular group of individuals (for example Christian ethics, nursing ethics).
- Ethics = expected standard of behaviour described in the group's code of professional conduct (for example – ANA's Code of Ethics for Nurses (2001)).
- Ethics = also used to refer to a philosophical mode of enquiry that helps us understand the moral dimensions of human conduct. "In this sense, ethics is an activity, a particular method of investigation that one undertakes to respond to particular types of questions about human behaviour" (Creasia & Parker, 2007:275).

Their organisation of the subject matter of ethics is particularly useful:
- Metaethics: analyses connections between conduct and morality, analyses moral language, relationship between rules, principles and theories.
- Descriptive ethics: describes, examines and analyses.
- Applied ethics: application of values.
- Normative ethics: analyses standards or criteria, assesses duties and obligations.

Seen from nursing practice and health care practice, beneficence (do good and avoid harm), justice (just and fair allocation of resources) autonomy (personal liberty) veracity (tell the truth and do not lie) sanctity of human life (do not infringe upon the sacredness of human life) and fidelity (faithful to one's commitment) are important.

Based on their views a representative framework for case study analysis is presented (Creasia & Parker, 2007:291-293):
- What is the story behind the values conflict?
- What is the significance of the values involved?
- What is the significance of the conflicts to the parties involved?
- What should be done?

7.4 Finegold and team

Finegold and his co-workers work in the bio-business. They conducted thirteen case studies on ethical issues in various aspects of their work. All their work is bio-business related, and varies in size, focus, location, ethical issues, and so forth. In their case studies, ten recurring themes are identified (Finegold *et al.,* 2005:331-340):
- Financial pressures
- Developing new technologies
- Research ethics
- Working with regulators
- Marketing and delivery of products
- Value, pricing, access to products
- Doing business globally
- Managing conflicts of interest
- Corporate and social responsibility
- Business ethics and good governance.

Based on these case studies, they build an ethical decision making process. This process has a broad applicability for bio-business although each company faces a unique set of circumstances.

- Put people first
- Start early
- Lead by example
- Build ethics capabilities
- Integrate ethics with business strategy
- Communicate: create an ongoing dialogue (not secrecy but dialogue)
- Build structural protections for ethical behaviour
- Treat ethics as a process not a plaque
- Extend ethics to partners
- Measure effectiveness (Finegold *et al.,* 2005:341-348).

They argue that it is important to engage the public through science and ethics education (Finegold *et al.,* 2005:351). Behaving ethically depends on the ability to recognise the ethical issues that exist (Finegold *et al.,* 2005:354). Ethics are inherently part of doing business in the bioscience sector (Finegold *et al.,* 2005:354).

8. Identifying critical indicators for research integrity

Based on the various frameworks and discussions thus far, the following critical ethical indicators can be identified to assist with research practice in the research cycle:

- Researchers should follow the professional codes of their professions and also the code associated with research (Scott, 1998).
- Responsibility should be at the basis of all research activities. The responsibility is not limited to the research environment only but should be extended to all environments with which the researchers engage (Cherulnik, 2001).
- Responsibility should be extended to research placed in the public domain. Publications (articles) and presentations (oral posters) are one way of going public with research. Researchers must be responsible not only for putting research in the public domain but also for *what* is put in the public domain (Bailey & Burch, 2002).
- Ethical decisions should be evidence-based to make final decisions (Burns & Grove, 2007).
- Ethical concerns should be addressed during the planning phase of research. In the planning stage of research, it is advisable to consider three things. Firstly, plan the research in such a manner that the chance of providing misleading results is minimal. Secondly, projects must meet criteria for acceptability. Thirdly, protect and ensure dignity and welfare of participants as well as those who might be affected by the outcomes of the research (see Spata, 2003).

- Assess benefits and rights. Benefits should be greater or equal to the risks before one proceeds with the project. If risks outweigh benefits then one should not continue (benefit-risk-ratio) (Burns & Grove, 2007).
- Human rights must be respected. Human life must be protected at all times. No researcher can compromise on the safety of a human being during the research process (see Diedericks & Lategan, 1995).
- Participants in research should be protected. Vulnerable participants must be identified. Research ethical codes often tell us what not to do but do not always cater for the effect/impact/outcomes of the research (Giles, 2002).
- Animal rights should be protected in doing research. Animals as research subjects are a growing concern. Two concerns are raised: firstly, should animals be used as subjects and secondly, what mechanisms are available to ensure that they are treated fairly? (Burns & Grove, 2007).
- Research ethics cannot escape a business ethics focus. The value that business ethics can bring to the research environment is threefold: firstly, business ethics can develop researchers as moral individuals. Secondly, they can build an environment in which standards and values are central to the company's strategy, just as economic purpose is. Thirdly, they can formulate and implement policies that support ethical performance while also ensuring that they are observed (see Andrews, 2003).
- The intrinsic value of environmental ethics for research ethics cannot be ignored. Based on claims about something's intrinsic value are claims about how it makes sense for us to care about the thing (McShane, 2007).

9. Conclusion

This study has made it clear that research ethics should be integrated with all aspects of the research cycle to assure research integrity. It has also pointed out that in implementing research ethics in the research cycle, a magnitude of aspects should be acknowledged and upheld if the claim is to be made that research ethics have been applied to all activities in the research cycle.

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