Applied Informatics Research in South Africa

Rembrandt Klopper

Abstract

This article takes as point of departure the nature of coherent research after which it reviews a number of articles that appear in this volume that report the results of a specific applied informatics research project.

In the last part of the article two contributions are reviewed about research in higher education, one dealing with curriculum reform as part of developmental higher education and the other providing a glimpse for supervisors and prospective doctoral students into the minds at work of three PhD examiners.

The Design of the Informatics Research Projects that are Published in this Issue

The empirical basis of individual research processes is usually explained by only providing information about *data collection and analysis methods*, and the *research strategy* (e.g. experimental, survey based, ethnographic, case study based or action research), scant reference to the research *time horizon* (longitudinal if data is collected over an extended period, or cross-sectional if data is collected over a short period), the research approach (deductive or inductive) or the underlying research philosophy (e.g. positivistic, interpretive, or realistic) and how they relate to the cultural values and beliefs, and the social/ moral norms that predominate societies being studied, or, if pertinent, the professional ethics of a group being studied, or the personal ethics of respondents or interviewees.

Figure 1 on the next page graphically represents the relationship

between research processes in the form of a multi-layered schema to be interpreted from the outside inwards:

1. The inner core of the graphic relates to whether a quantitative method of data collection will be followed that the use of a questionnaire to collect primary data from a representative sample of randomly selected respondents and subjected to the appropriate statistical analysis. Of the empirical projects reported here the articles by Govender & Maharaj, Embaye, Lubbe and Klopper, Ngubane and Lubbe, Ramharuk, Naidoo and Klopper, Rambowan, Lubbe and Klopper, Singh and Bradbury, Miller, Acutt and Lemon, employ survey based cross sectional questionnaire based quantitative research during which the research results are interpreted deductively against a particular theoretical background that is sensitive to the cultural values and social norms of the groups being studied.

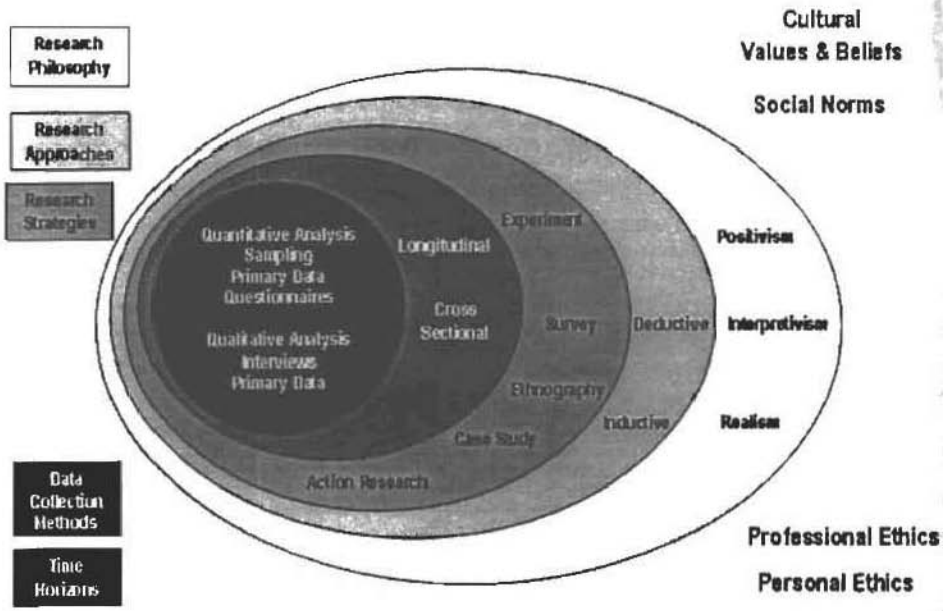

Figure 1: The Research Process from data collection method to its cultural grounding.

2. By contrast the empirical study of Krauss entails a qualitative semi-longitudinal interview based survey of website designers, sensitive to their professional ethics, that used an inductive mode of content and correspondence analysis to determine how they conceptualised end deployed the website design process. The contributions by Remenyi and Price and by Worrall, Klopper and Lubbe, equally constituted a qualitative analysis of respectively the application of Socratic reasoning skills during topic discovery for a PhD, and how external examiners reason while they are examining PhD theses.

Having presenting a generic eagle's eye perspective of similarities and differences between the articles in this volume, the following three sections will characterise each respective contribution in greater detail.

Research in Applied Informatics

Research results reported by Govender and Maharaj investigate the attitudes of educators in the Durban region with regard to the proposed introduction of e-Education in KwaZulu-Natal public schools by 2013 as proposed in the South African Government's 2003 White Paper of e-Education. Their research is opportune because recent studies (Kersaint *et al.* 2003) have shown that the successful implementation of educational technologies depends largely on the attitudes of educators, who eventually determine how they are used in the classroom, and because educators' attitudes are a major enabling or disabling factor in the adoption of technology in the classrooms (Bullock (2004)).

Research results reported by Embaye, Lubbe and Klopper show that as Information Communication Technologies mature, it is expected that the use of powerful, multifunctional networked and wireless computer systems will form as ubiquitous a part of every-day life as the cell phone has already become (Klopper 2002; 2005), also in institutions of higher education. The researchers present a case study conducted on the Westville Campus of the University of KwaZulu-Natal regarding the effective use of the computer systems at a typical residential tertiary institution. Data was gathered by randomly selecting 90 persons, staff members and students of different Faculties at the University who were requested to participate, and of whom

80 respondents completed and returned the questionnaires. The data was analysed and processed using the application software Microsoft Excel. Recommendations and conclusions drawn from the findings were the need for teaching and training in computer hardware, computer literacy and the need for computer access and print services facilities. The combination of the new educational technologies with traditional pedagogical models and the appointment of schools (as an important point of social integration), constitute important conclusions of this research.

The research of Ngubane and Lubbe entails a consultative project in the Emkhambathini community to determine whether there is a need for the provision of a community computer centre (Telecentre) for their village. The team collected data by means of a questionnaire and performed a quantitative analysis that confirmed that there is a real need in the community to access information irrespective of gender or the employment status of the inhabitants of the community.

Ramharuk's research demonstrates how information systems could help solve the shortage of medical experts in rural communities through universal Internet connectivity. Ramharuk shows that information technology is increasingly applied in the health sector worldwide. Applications of information and communication technologies to the health sector include: the capture and use of electronic patient records, health information systems, the setup of Intranets and secure Extranets via the Internet, the sharing of information within institutions and between individual participants in the health sector, the use of public networks such as the Internet to distribute information, health decision support systems, the provision of remote diagnostics via Telemedicine, and a community health information system for local, regional and national health planning. The overall goal of Ramharuk's research was to investigate alternative applications of Telecentres and health information systems to help assess healthcare information. Ramharuk's research identified some key areas that planners of health information systems should include in their strategic planning.

Naidoo and Klopper's research on e-Readiness presents a framework of factors that can be used to assess the effectiveness of government policy, infrastructure provision and training to prepare individuals to use

Information communication technologies for e-Government, e-Business, e-Health, e-Education end e-Entertainment

Naidoo and Klopper state that during the last decade, leaders in government, business, and social organizations around the world have considered how best to harness the power of information and communication technology (ICT) for social development. Experts have pointed out that in order for developing countries to put ICT to effective use, they must first be "e-Ready" in terms of ICT infrastructure, the accessibility of ICT to the population, and the legal and regulatory framework. Leaders in developing countries have been urged to use e-Readiness assessment to measure and plan for ICT integration, to focus efforts from within, and identify areas where external aid is required. Several e-Readiness initiatives have been launched to help developing countries in this area, and numerous e-Readiness assessment tools have been created and used by different groups, each looking at various aspects of ICT, society, and the economy (e.g. Bridges.org, 2005).

The underlining focus of the research project was to look at the potential of being e-Ready in conjunction with the social and economic success that the society can achieve through sustained ICT initiatives. It also includes a comparative analysis of the economic and social statistics of KwaZulu-Natal and South Africa with the statistical calculations of the data collected from a questionnaire to establish the degree of e-Readiness of Informatics honours students at the University of KwaZulu-Natal). The researchers agree with the recommendation of the International Telecommunication Union (2003) that in order to measure the ICT potential of an organisation, a community or a region in full, new multi-stakeholder partnerships will be required, involving not only the statistical agencies that are traditionally responsible for conducting surveys, but also involving policy-makers, the private sector, civil society, multilateral organisations and others involved in the ICT sector. The potential of being e-Ready in conjunction with the social and economic success that the society can achieve in sustaining ICT initiatives is seen to be a difficult but a worthwhile achievement.

The research of Rambowan, Lubbe and Klopper, reports the perspectives of the inhabitants of the Bayview rural community on the

eastern seaboard of KwaZulu-Natal, South Africa. The researchers reviewed various refereed sources from which was concluded that in order to access information prospective, beneficiaries first need to know what information is, what information is available digitally and how the information that they require can be accessed via a Telecentre. A questionnaire was distributed in the community, the data was collated and analysed. The major findings are that the community would benefit if a central information accessing facility were created, provided that people are being taught how to use such a facility and what they need to do to ensure that the facility remains viable and to ensure that inequalities in access are removed.

Singh's research focuses on how African Universities can move beyond the traditional "chalk-and-talk" method of delivering practical computer studies through instructor-led sessions conducted in computer local area networks (LANs). In order for LAN-based training to succeed the design of laboratories has to be conducive to learning. Laboratories that are designed using ergonomic principles tend to be more user-friendly and facilitate the learning process. This raises the question: are University computer teaching laboratories ergonomically designed for the comfort of the student? In order to answer this question, this study was conducted at the University of KwaZulu-Natal's Westville campus in the Department of Information Systems and Technology. A convenience sample of one hundred first year students was used. A simple questionnaire covering the main constructs of the study was administered to the students. It was found that there were a number of significant relationships between the design of the laboratories and student discomfort, some students who were exposed to previous computer training found the University facilities better, although not significantly so. Students found lighting, positioning of the screens, ventilation and the direction that they had to face as some of the poor design features of the laboratories. A number of recommendations were made in order to ensure that the design of new laboratories took a learner centric and ergonomic approach which included: students facing the instructor and a projection screen, use of Smartdesks® , tiered floors and instructors should have control of lighting and room temperatures. Implementing the recommendations requires large investments. However, providing a quality learning environment is bound to produce quality graduates.

Theoretical Research in Informatics

Applied Informatics research is never conducted in a vacuum because it has to employ a specific research approach to obtain empirical results, and then needs a theoretical framework to constrain the interpretation such empirical results. De Villiers presents a metaresearch study that provides an overview of research paradigms for Information Systems (IS) research, after which she describes, discusses and illustrates some interpretive approaches: action research, grounded theory, and the family comprising development research and two forms of design research, namely, design-science research in IS and design-based research in the realm of educational technology. In the current milieu – with its emphasis on interactivity, user-centricity, usability, empowerment software, and e-learning – inquiry processes originating from the social sciences are relevant to IS, particularly for research on human aspects of the design and development of personal computing applications. The five approaches advocated have underlying theoretical and methodological frameworks and reflective methods. Each one can serve as a model to guide the research process, offering a unifying thread, cohesion and internal consistency to a research study.

Research in Undergraduate Curriculum Reform

The contribution of Bradbury, Miller, Acutt and Lemon, reports the results of an investigation into the rates of participation among English first and second-language students in the different components of learner support system in the first-year Psychology programme at the University of KwaZulu-Natal, which has been designed to provide a hybrid mixed-mode offering, in which tutors play a crucial mediational role interacting with students to combine the flexibility of open learning and the essential learner support structures more typical of face-to-face delivery systems.

The research results show that the differentiation of learner support offerings in an open system has been substantially effective in response to the challenge of diversity, that students who would ordinarily perhaps have remained anonymous in a large class or even in workshop sessions, developed strong relationships with tutors, and that it is imperative that the

focus remains on developing students' autonomous academic engagement as opposed to setting up relationships of dependency between tutors and students.

What PhD Candidates and their Supervisors Ought to Know about the Minds at Work of PhD Examiners

A shared concern about the current performance of higher education research and research training which is compounded by a seeming lack of general acceptance among supervisors of the need to improve student completion rates and times be examining the theses, and their perceptions of the *viva voce* the oral defence of a submitted thesis. Their article provides information on postgraduate completions, and provides insights into what PhD examiners look for in dissertations as part of the duties of responsible supervisors and as part of departmental responsibilities towards their doctoral students.

Conclusion

Alternation 12.2 of 2005 has a strong research focus. Of the thirteen articles published in this issue the first one presents an overview of the issue. The next seven present the results of problem based surveys on particular aspects of Information Technology for Development within an applied Informatics framework. One article presents the results of a qualitative analysis of website design, and another one reports the outcome of undergraduate curriculum reform in Psychology at the University of KwaZulu-Natal. Yet another article deals with philosophical and methodological aspects of research in Informatics. Finally, the last article reveals how PhD examiners reason and go about examining PhD theses.

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Rembrandt Klopper
School of Information Systems & Technology
University of KwaZulu-Natal