e-PhD:

A new approach for post-graduate studies in developing countries

M. Tarek Shalaby, Ashley Tucker and Beng Yong Tang

School of Computer Science and Information Technology, University of Nottingham, UK

Abstract: In March 2000, The World Bank sounded an alarm that higher education in developing countries was in crisis. It is overcrowded, chronically underfunded, poorly managed, and beset with inadequate faculty and curricula. Additionally, research universities face an array of especially serious problems. The disappearance of a research agenda and postgraduate studies from these universities has serious consequences. The inability to pursue research isolates the nation's elite scholars and scientists, leaving them unable to keep up with developments in their own fields (Task Force on Higher Education and Society, 2000 and UNESCO, 1998).

It can be argued that in higher education there are three main learning activities: taught courses, research, and projects/peer learning. Recent advances in technology have resulted in internet-based learning, which has significantly contributed to the improvement of distance learning in higher education. However, most of the work seems to focus on taught *e*-courses with little emphasis on research. Computing networks, modern communication techniques and digital libraries seem to offer valuable facilities that can assist research students in carrying out their work at a distance. The *e*-PhD is an international collaborative programme run by the University of Nottingham, for developing countries. It started last year with a pilot scheme with Egypt. It is an innovative approach employing modern distance learning techniques and the internet to conduct postgraduate education and joint research studies.

Key words: e-learning, *e*-PhD, developing countries, internet, research, virtual learning, computer networks, distance learning, postgraduate

The original version of this chapter was revised: The copyright line was incorrect. This has been corrected. The Erratum to this chapter is available at DOI: [10.1007/978-0-387-35615-0_52](https://doi.org/10.1007/978-0-387-35615-0_52)

1. INTRODUCTION

According to reports by the United Nations, only about 3 percent of young people in sub-Saharan Africa and 7 percent in Asia attend some form of post-secondary education. This compares with 58 percent in industrialised countries as a whole, and 81 percent in the United States (Bollag, 2001). The state of postgraduate education is even worse. In many institutions, students face difficult conditions for conducting research, including lack of expertise, inadequate libraries, out-of-date laboratory facilities, and insufficient resources. Postgraduate studies in developing countries are falling further behind, and if this continues these countries will be unable to compete in the knowledge economy (Task Force on Higher Education and Society, 2000).

The *e-PhD* initiative, by the University of Nottingham, is designed to improve postgraduate education in developing countries. Two market surveys were conducted to test the level of interest and response to the *e-PhD* programme. Leaflets were mailed to universities, British Council offices, government organisations, and individuals in 27 developing countries, including Kenya, Malawi, Zambia, India, Pakistan, China, Malaysia, Brunei and Hong Kong. The second survey was through an advertisement placed in the main newspaper and media in Egypt. The response from almost all the countries was overwhelming and indicates that there is a very high level of demand for on-line postgraduate programmes.

A feasibility study on the *e-PhD* showed that the objectives of the *e-PhD* programme can be better achieved through collaboration with local institutions and governments. Links were therefore developed with the Information Technology Institute (iTi) in Egypt. The iTi was established by the Egyptian Cabinet as a national centre of excellence, to provide professional postgraduate training for distinguished university graduates and prepare them to be specialists in IT. It forms part of a national network of organisations designed to promote IT research and applications throughout the cities, towns and villages of Egypt. The role of the iTi in the *e-PhD* programme is to act as a centre to provide students with local support and services such as computing facilities, seminars with other research students, and local supervisors. In this way it is thought that the linked organisation will, over time, acquire experience in managing research and building up resources for research studies. From this it is hoped that they could extend this experience and support local research initiatives throughout the country.

The *e-PhD* builds on the structure of an existing part-time PhD programme, but provides an infrastructure that uses the power of computer technology to improve communications and access to facilities at the university, so as to make it available for students not resident at Nottingham. The programme ultimately leads to a doctor of philosophy in topics within

the computer science and information technology discipline, and it is a pilot scheme, being tested with a number of PhD students in Egypt.

2. STUDENT AND UNIVERSITY REQUIREMENTS

The main objective of the *e-PhD* is to provide a system for students in developing countries to study for their degree as though they are full-time students studying at Nottingham University.

Two surveys were carried out to collect information on the required facilities that should be available in the *e-PhD* infrastructure. The first was conducted on current and former PhD students registered as full and part time in the School of Computer Science and IT at Nottingham University, including both home and overseas students. The survey also covered supervisors and other staff usually involved in supervising research students. The second survey was carried out on the University departments, which provide services for PhD students or are involved in managing and administering their studies. Some of these are the Library, the Computer Centre, the Faculty Office, the International Office, and the Graduate School, and as the *e-PhD* is based upon the standard part-time PhD there were no requirements for new or amended degree regulations. A number of academics and students in Egypt were also consulted to give information on local services, local supervisory requirements and student demands.

System analysis techniques were used to analyse data from interviews, together with information on administrative procedures for PhD students. The main objective of this analysis was to develop a procedural and research activity flow diagram. A list of student requirements and system functionality was drawn up (and shown in Figure 1).

Figure 1. Facilities for students in the e-PhD Infrastructure

3. CONDUCTING RESEARCH

The nature of research study depends to a large extent on the academic discipline concerned - for example, what might be expected from a research student in a literature-based discipline may not be the same as is expected of a student in a laboratory-based discipline. However, during their research studies students are expected to achieve certain targets, such as:

- To learn methods and skills for conducting research.
- To develop a critical approach to the collection and interpretation of data, the analysis of texts, and the literature on their subject.
- To make an original contribution to knowledge and understanding.
- To acquire specialist knowledge in their specific field, and general knowledge of the area (University of Nottingham Graduate School, 2000).

To fulfil this, accessibility and availability of 'good' and 'up-to-date' reading material is vital. As discussed earlier, one of the major problems facing postgraduate students in developing countries is inadequate library facilities, and out of date references. However, developments in publishing over the internet are helping to solve this problem, with many scientific journals now available on the web, together with effective searchable databases for abstracts.

A section in the *e-PhD* infrastructure contains a list of digital library facilities including searchable data bases of abstracts such as BIDS and the Web of Science, and full-text electronic journals, to which the university subscribes. Some of these e-journals are available to all registered students whether full or part-time, and others are not available to students outside the Nottingham domain due to licensing regulations. Also provided is help and advice on how to write a research proposal, training material and courses on research methods, advice on writing theses, and useful links to miscellaneous reference materials, on-line courses, and directories.

4. COMMUNICATION AND KNOWLEDGE SHARING

Crane describes scientific communities as forming invisible colleges, which monitor and manage the changing structure of knowledge in their domain (Crane, 1972). Thus, communication with supervisors, colleagues, and experts within and outside the university is essential for successful PhD research. For management purposes, students also communicate with the faculty office, postgraduate school, international office, and student support services.

For the *e*-PhD infrastructure it was decided to use Microsoft Netmeeting and MSN Messenger to provide videoconferencing and e-meeting facilities, as they are cost-effective and offer many functionalities. NetMeeting monitors the different data streams (voice, video, data) and dynamically assigns bandwidth to them according to their needs. It also uses audio and video compression Codecs that minimise bandwidth and optimise quality across the internet.

Figure 2. Example of communications using Microsoft NetMeeting

Communication between students and their supervisor is not confined to the exchange of information. Supervisors can play a major role in building up student confidence, which is instrumental to the successful completion of the degree. An example is generating motivation, which can affect the development of commitment and involvement. Galbraith (1991) discusses the issue of a learning environment in terms of creating a psychological climate. He argued that a successful adult learning process is achieved in a climate that suggests mutual respect, collaborativeness, mutual trust, supportiveness, openness to challenge, risk-taking, pleasure and friendliness.

Chisholm (in Chisholm and Wetzel, 2001) argued that as students gain confidence they can successfully complete the task at hand and their expectation of success increases, as does their self-efficiency. In the *e-PhD* programme it was thought that the role of the supervisor in motivating students might be affected by the lack of personal contact. However, preliminary investigations seem to suggest that despite some limitations, instant communication technology, such as NetMeeting and MSN Messenger have assisted in creating a 'keep-in-touch environment', which can be used for frequent formal and informal chatting, sending short messages including, for example, a list of useful references, or new research findings.

5. CONCLUSIONS AND FURTHER WORK

The *e-PhD* programme is an innovative approach to e-learning, employing modern distance learning techniques and the internet to contribute to the progress of postgraduate education in developing countries. It allows students to be part of a larger section of the international scientific community, and provides them with the opportunity to contact experts in their field of research who may be in other countries.

In the *e-PhD*, students can exchange data with, and meet their supervisor across the internet, from their homes and offices, and can access a wide range of digital libraries, on-line journals, and other electronic sources of information that would otherwise be unavailable. The *e-PhD* infrastructure facilitates synchronous communication between various educational institutions in both developed and developing countries, and thus promotes co-operation in national and international research.

The pilot *e-PhD* project with Egypt shows that local partners are essential for the success of the programme, as they act as nodes for the provision of local student support. Local partners will accumulate knowledge on managing and running research, which helps in improving postgraduate studies and research capabilities in their country. Although the *e-PhD* project is still in its early stages, the amount of interest generated in developing countries indicates that there is a real need for such on-line postgraduate courses.

REFERENCES

- Bollag, B. (2001) Developing Countries Turn to Distance Education. Chronicle of Higher Education, dated June 15, 2001. Available at: <http://chronicle.merit.edu/free/v47/i40/40a02901.htm> (last accessed on 29 Nov 2001)
- Chisholm, I.M. and Wetzel, K. (2001) Technology and Multiculturalism in the Classroom: Case Studies in Attitudes and Motivations. Journal of Research on Technology in Education, 33, (5). Available at: <http://www.iste.org/jrte/33/5/chisholm.html> (last accessed on 29 Nov 2001)
- Crane, D. (1972). Invisible Colleges: Diffusion of Knowledge in Scientific Communities. Chicago: University of Chicago Press
- Galbraith, M.W. (ed.) (1991) Facilitating Adult Learning: A Transactional Process. Malabar, Florida: Krieger
- Task Force on Higher Education and Society (2000). Higher Education in Developing Countries: Peril and Promise. Washington: World Bank. Available at: <http://www.tfhe.net/> (last accessed on 29 Nov 2001)
- UNESCO (1998) World Conference on Higher Education: Higher Education in the Twenty-first Century-Vision and Action, Final Report. Paris: UNESCO. Available at: <http://www.unesco.org/education/wche/index.shtml> (last accessed on 29 Nov 2001)
- University of Nottingham Graduate School (2000) Research Students and Supervisors: A Guide. Nottingham: University of Nottingham. Available at: <http://www.nottingham.ac.uk/registration/pg/rss-guide.pdf> (last accessed on 29 Nov 2001)

BIOGRAPHIES

M. Tarek Shalaby (PhD, MA, BSc) is a lecturer in IT, with multi-disciplinary interests in *e*-Learning for developing countries, cities of tomorrow, and behavioural change. **Ashley Tucker** (PhD, BSc) is a lecturer in IT, interested in international *e*-learning, visualisation and modelling of waste management facilities. **Beng Yong Tang** (MSc, BSc) is a research assistant working on the *e*-PhD infrastructure. He is responsible for the design and maintenance of the *e*-PhD website.