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# Developing an extramural e-learning environment to bridge the digital divide

A dissertation presented in partial fulfilment of the requirements for the degree of Doctor Of Philosophy in Computer Science at Massey University, Palmerston North, New Zealand.

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# Abstract

The research presented in this thesis conceptualises a strategy for designing e-learning systems to bridge the digital divide between those who have access to – and know how to use – high performance information technology, and those whose do not. It describes the prototyping of a system to test this conceptualisation, and the subsequent evaluation of the prototype in a realistic setting.

From a review of existing research, eight guidelines were synthesised for developing effective extramural e-learning environments. In addition, three broad user-centred strategies were identified as showing promise as possible ways to implement such an environment. These strategies emphasised localised over centralised functionality, specialised over general-purpose tools, and user-initiated adaptability over system-initiated adaptivity. It was hypothesised that by following the design guidelines and combining these three strategies – without making any presumptions about technological platform – a workable way could be found to meet all the requirements for an extramural e-learning environment that offers a significant improvement over correspondence-based courses.

Incremental prototyping was used to evaluate and refine the main elements of the design specification and then to integrate them into an operational system. This prototyping confirmed that the method proposed for developing a computer-based learning environment was workable. The prototype was then installed and tested, first over a LAN, and then over a rural telephone-based communication system where it was tested it with users.

The system performed very favourably under these conditions. The volunteers' response to the learning computer was enthusiastic, contrasting what they could accomplish with it to the difficulties they faced with conventional systems. It was concluded that the user testing gave strong support to the thesis that distributive, specialised and adaptable strategies can be successfully combined to provide a widely-accessible and usable computer-based learning environment.

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