

Collaborative Trends in Higher Education

Parwaiz KARAMAT

School of Information Science, The Open Polytechnic of New Zealand
Wellington, New Zealand

and

Krassie PETROVA

School of Computing and Mathematical Sciences, Auckland University of Technology
Auckland, New Zealand

ABSTRACT

The emerging information and communications technologies (ICT) have the potential to strengthen education and make universities more responsive to the needs of their students. The emergence and the proliferation of models for online and flexible learning initiated a process of convergence between the traditionally distinct and separate distance education and face-to-face education as universities are becoming increasingly enabled to collaborate and develop innovative teaching initiatives. This paper explores some of the ways in which institutions can use technological progress to their best advantage and how they can improve the horizontal bonds between them by adapting and implementing Internet based technologies based on the premise that as distance no longer determines the cost of communicating electronically, common interests and experience, and shared pursuits rather than proximity bind stakeholders together. Finally the ways in which the role of the teacher is changing from that of a subject expert to that of a facilitator and counsellor who uses the World Wide Web and high-speed/ high-capacity networks as a vehicle to perform are considered with a focus on how the improved new technologies can be used to support the common interests, experience and academic objectives in different institutions, and to contribute to the creation of a global learning environment.

Keywords

Global learning, Internet-based learning, Open and distance learning, World Wide Web, Teacher role, Online education.

INTRODUCTION

The evolution of the human civilization has witnessed a parallel evolution in the way we learn and establish our teaching institutes. Now we are at the threshold of a new revolution, where the fundamental changes in the nature and application of information technologies in business produce far-reaching implications for not only for business, but also for education and even life itself as we are experiencing a shift in the focus of education from present to future needs: Educating people with the existing skills and knowledge in mind is no longer enough, a new set of skills with a special focus on collaboration is needed - and is not readily available through the prevalent education models.

Most importantly, people need to develop an ability to respond to the ever-increasing demand from society to process and apply new information to solve problems in novel ways and continuously to update their knowledge base. Responding to the challenge, educational institutions have begun adopting a new learning environment, which facilitates continual and flexible learning. It should come to no surprise that this new

environment is largely based on information and communication technologies (ICT) – the very same technologies that revolutionised educational needs.

Recent technological developments which allow peer-to-peer communication, fast access to information and collaborative participation at different levels have opened the gate for a greater cooperation between educational institutions themselves. Distance education is a non traditional system of education in which learner and tutor are separated by distance and some times by time [1]. In order to facilitate the needs of a distant learning system a communication medium is required to automate the education system [2]. The concept of distance education was developed long before the Internet but with the advent of ICT technologies it emerged as a new educational dimension [3]. The use of ICT in education has provided distance education systems with a route towards collaboration and sharing where the knowledge skills and attitudes gained by one institution can be shared by another one located across the country. As in electronic communication cost is no longer a barrier to adoption, common interest, pursuits, and experiences rather than proximity have become the important factors influencing collaboration and cooperation between institutions.

The emergence and the proliferation of models for online and flexible learning [4] initiated a process of convergence between the traditionally distinct and separate distance education and face-to-face education. For some time both Auckland University of Technology and the Open Polytechnic of New Zealand have been involved in various collaborative academic activities. Over the years the meaning of ‘distance education’ has changed for both institutes as the ODL (Open and Distance Learning) model has moved from correspondence study and mail delivery to ICT supported learning. We are trying to explore the many ways in which the two institutions can use the most significant technological changes to their best advantage and how they can improve the horizontal bonds by adapting and implementing Internet supported technologies.

The rest of the paper is organised as follows: The first section provides background information about the stages in the implementation of distance learning related to the changes in the global learning environment, followed by a discussion of the teacher’s role in this process. The next section considers how technology can be used to support sharing and collaboration, and is followed by a brief conclusion.

BACKGROUND

For over sixty years The Open Polytechnic of New Zealand has delivered education in a distance-learning mode. Up to 40 000 students a year may enroll in a variety of programmes ranging from a certificates to a full degree.

As early as 1997 the Open Polytechnic embarked upon an project aimed at determining the viability of Web-based instruction as an accessible and cost-effective delivery system, particularly for students in the fast growing undergraduate degree area. [5].

At the time the dominant form of delivery of resource materials was print-based with mail delivery used for assessment and lecturer feedback. Time delay was a major problem, and it was thought that it could be overcome by going online. As a distance learning institution, the Open Polytechnic already had in place student- support mechanisms including personal and broadcasting email tools, and a free of charge telephone number. Lecturers well acquainted with ICT tools were charged with carrying out the pilot project, which also included adapting for online delivery already existing courses with ICT content.

Similarly, at the Auckland University of Technology (AUT) a pilot in Internet-based teaching and learning in 1998-1999 was started with the introduction of the in-house developed online platform BuisnessOnline in 2000 , which then continued by adopting a commercially available learning management system in 2002 [6, 7]. [7]

Analyzing the work of a lecturer in a typical tertiary institute, it can be seen that they all use a combination of texts, lectures, graphics and video to deliver instruction in the classroom. They supplement the instructional materials with human interaction in the form of discussion and establish a dialogue with students. They give students homework and evaluate their performance using examination papers. Such activities can be replicated or adjusted to be carried out using online communication tools, creating digital teaching content available to students any time and any place. More advanced Web 2.0 tools such as blogs and wikis assist and support collaborative environments for communication and exchange of ideas and for the creation of knowledge artifacts.

Collaborative technologies help to overcome the one-sidedness of tools like e-mail and the educator can use them to provide feedback and motivate and support the process of transforming information into meaningful knowledge [8, 9, 10, 11]. Two main stakeholder groups are actively engaged in collaborative models: teachers and students. Teachers are seen as participants both as course developers and as course implementers while students interact with the online learning platform in the context of the online course and delivery model [7].

THE ROLE OF THE TEACHER

Developing and delivering courses in the new teaching and learning environment has contributed to changing the role of the teacher is from that of a subject expert to that of a facilitator and counsellor who uses multiple teaching platforms as a vehicle both to perform, and to improve. A range of facets characterise the 'new' teacher persona including that of a content expert, student mentor, education manager, learning facilitator, knowledge building generator and motivator, educational leader, and also an ICT industry worker.

The Teacher as a Content Expert

While the teacher will still play a significant role as a content expert, the expertise will also be found resident in other places – embedded in transaction systems, in Web sites, in colleagues The teacher will have to accompany his/her students in the teaching-learning space where 'mutual learning through discourse and critique' will play the most important part in the

journey [12]. Our thinking as educators changes from 'what I can teach now' to 'how I can help the student learn'.

The Teacher as a Mentor

As in more traditional environments, it is the teacher who is responsible for initiating the process of knowledge acquisition as well as for planning the content of an online course and the degree of interactivity. However as observed by Robert Swain in [13] the focus of this role has changed form providing information to '...guiding students wading through the deep waters of the information flood'.

Swain continues to say that 'Professors in this environment will thrive as mentors' and will 'nudge students through the educationally crucial task of processing information, problem solving, analysis, and synthesis of ideas...'. The teacher is still the first point of contact for any new learner, there to provide purpose and give direction to the exploration of the 'information-rich world'. However the new mode of instruction requires the development of a solid theoretical foundation able to support the creation of learning opportunities that are flexible and can provide custom education for each student regardless of the class mix /size and the distance [14].

The Teacher as an Education Manager

The Web and other Internet-supported information sources offer a wealth of information; the teacher must now equip students with the skills needed to use efficiently all available resources. These skills will be essential for the future and today's students become life-long learners, '...stretching the time horizons of learning' [12]. To achieve this goal, Web driven education will require the development of personalised information systems managed at the level of the individual teacher acting also as an educational manager.

The Teacher as a Facilitator/Generator

The ability to prepare classes using Internet-supported platforms will be incorporated in the attributes of the new teacher's profile. The need to acquire new technical skills in course design may be minimal or easily satisfied however there is a need for new pedagogical skills in facilitating learning through delivering a course designed for Internet based delivery. The blurring of the distinction between information and knowledge in Web-enabled education can have profound implications on the role of the teacher as educational objectives move from generating understanding of facts to acquiring functional knowledge about systems [12, 15, 16]. However the construction of education as a 'collection' system is questioned in [16]: There is a need to be aware of the possible social consequences of accepting a collection of information as a substitute for analytical and critical developments.

The Teacher as an ICT Worker

Another change in the role of the teacher is related to the fast occurring progress in ICT which drives an ongoing process of change in supporting educational technologies [17, 18]. The new technology draws teachers into a production process where they become subject to pressures similar to those experienced by production workers in other information industries undergoing rapid technological transformation. Similarly ethical issues related to intellectual property ownership and appropriate use of online materials may arise [17].

The Teacher as an Educational Leader

The teacher of the future will have to address the different learning needs of his or her live students through reaching to

their virtual personalities – not through classroom dialogue but through media-enabled communication. Even though technology-enabled learning supports group involvement, learning is still an individual event [19]. It is therefore imperative to discover and develop instructional strategies that address the relationships between students and teachers in a virtual environment. Based on a scientific method, such strategies should create flexible conditions able to accommodate different styles of learning – from active and co-operative to receptive and analytical. Successful educational leadership in personalised learning can be achieved through the inclusion of strategy development and strategy application in the learning experiences of the student [14]. The teacher will need to research his or her virtual student body and discover which teaching-learning strategies are best suited for the new technologies and which technologies are best for supporting these strategies [20]; a prime example is provided by educators using the virtual space of SecondLife® for innovative experiments in teaching and learning [21].

The Teacher as a Motivator

While students will be responsible themselves for meeting their distance education objectives, motivating the student to follow the instructional sequence is still (arguably so) the teacher's responsibility. Motivation can be defined as "an emotional state that drives a student to engage in activities that fulfil a need – such as learning in order to gain qualifications" [22]. Motivation can be achieved through feedback as in traditional teaching and learning models, but also through research-informed teaching and through involving students in research-related activities embedded in the curricula [23, 24].

The new learning environment forces change not only in the educational systems but also in all teaching processes and techniques. Teachers and students are affected to the same degree, and indeed the changing roles of both teachers and students must be studied further in the light of ICT transforming educational functions and tasks. As competence in teaching is gained through experience, the new roles of the teacher will require strong infrastructural support within the teaching institution for risk-taking and reflection.

USING TECHNOLOGY TO ENHANCE EDUCATION

Earlier collaborative technologies included tools for assessing student work, for incorporating multimedia into teaching content, for facilitation of one-to-one and many-to-many communication (including video-conferencing), and for supporting collaborative workflow. Later developments include the use of blogging, and creating wikis; these new generation tools belong to what is commonly referred to as Web 2.0. The important building blocks for a collaborative environment are briefly described below.

Discussion and Conferencing Supporting Tools

An offspring of bulletin boards and group mailing lists, online discussion forums were one of the first interactive tools to be used in online learning, and are still a major component in both online delivery strategies and managed learning environments. Discussions can be carried out in a guided, open or moderated mode; sometimes individual contributions are assessed, as a means of encouraging participation [6, 7, 25].

While bulletin boards and e-mail are suitable for asynchronous communication, online discussions allow for a synchronous dialogue between a lecturer and a class of students. However

they normally do not support instant notification of a response – such functionality is provided by 'chat' tools now featured by many Web portals and search engines (e.g. Yahoo!, Google) and also by commercial and open access managed learning environments (BlackBoard®, Moodle). A live conference room or a chat room can be set up for all students in a class to log into at the same time. Whatever a student types on his workstation is displayed along with his 'chat' name and is broadcast to all participants of the conference.

If used for educational purposes, chat sessions need to be governed by established protocols which facilitate the orderly flow of discussion. The discussion text can also be stored so that both participants and other parties can later review it. This technology involves high levels of cooperation and needs careful management; motivation of teachers and students is one of the critical success factors, as pointed out in [26]. The learning environment is active and student-centered; it provides work spaces for students to build their own bases of knowledge and understanding. While teachers can use the conference as an environment for collaborative learning, students still 'own' the information base created through their collective effort and feel empowered to contribute and 'be listened to'.

E-mail Communication

Direct e-mail communication is the most common mode of electronic communication we use; students send e-mail messages to teachers directly to seek individual assistance or to comment on some aspect of their learning. E-mail exchange has proven to be one of the dominant uses of the Internet both in academic and business circles. Its advantages are by no means restricted to a learning environment, and include faster, more responsive communication which (unlike voice communication, for example) can be easily archived, and does not require the communicating parties to be all present at the same place or time.

E-mail has also been shown to have an impact on hierarchical structures, and has great potential to make the teacher-student relationship more collaborative and less authoritative. Finally, e-mail encourages peer-to-peer communication by breaking down interpersonal barriers amongst students. This allows a learning culture to form within a class, independent of geographic and social factors, at the same time entailing inevitable extension of working time an intensification of work for teaching staff [17]. Therefore e-mail communication needs careful management to counteract the consequences of the 'e-mail overload' [27].

Workgroup Computing

Workgroup computing is a computing paradigm to enable groups of people to work together, for instance to create publications, reports, or databases. There are some entirely new advantages to be gained by "sharing" data for a particular assignment among a number of applications - and by enabling a number of people to work on the same document at the same time as tasks are split among participants. Workgroup systems are designed to facilitate such an interactive exchange of information and to support collaboration [28].

Microsoft® tools such as MS Outlook (used in conjunction with MS Exchange and the conferencing tool MS NetMeeting or Meeting Space) provide a workgroup platform adopted by the corporate environments today, and could be a good candidate for an academic collaborative tool. However the Web-based blogs and wikis are among the most often used workflow applications in an educational context [29].

Multimedia and Education

With the advance of technologies allowing high-speed and high-volume digital data transfer multimedia becomes an important component in computer-assisted learning. Today, *multimedia* has already reached a level, where it can use the *hypermedia* capability of the Web. Integrating video and audio in a single computer makes it possible to create interactive presentation that offers information on an as-you-need-it basis instead of a whether-you-want-it-or-not basis. Such presentations can be tailored to various audiences - from a group of students with a live presenter to a stand-alone system in a kiosk or a point-of-information environment.

Multimedia provides a fast, reliable and easy-to-use computer interface and presents information in a way that holds a student's attention. It is always fresh, clear and comprehensive. It allows the tutor to control the processing of information and presentation and to tailor the computer's ability to question, analyze, and respond – thus guiding the student along a path that best meets the learner's needs [30].

Computer Assisted Assessment

Computer-assisted assessment (CAA) focuses on objective tests, which are used to assess academic competencies largely in the area of knowledge and comprehension. Normally a complete CAA system will provide:

- Self-testing with immediate feedback.
- Formal and informal graded testing.
- Online submission.
- Assessment Management.

A well designed CAA system could be of benefit to both stakeholders: Self-assessment material can provide students with opportunities to verify their knowledge and understanding of a subject at any time during a course while for academic staff CAA can reduce the amount of time necessary to mark tests. This can improve turnaround time to students. Finally automated testing systems can be tied to record keeping systems to simplify the process and to reduce errors in transcription. Graded testing can use the same systems as the self-testing, but without the supporting collateral material linking the test back to the content. In addition a CAA will be able of managing assignment work (e.g. checking due dates and eligibility to submit, forwarding the work to the appropriate marker, automated testing of programs, plagiarism detection tools and others) [31, 32].

Students learning exclusively online are likely to benefit substantially from a very 'granular' assessment programme with options for frequent feedback. A CCA system will enable to the teacher to focus on his/her role as a subject expert and motivator content without increasing significantly their workload.

New Supporting Technologies

The move to achieve a higher degree of integration between research n teaching and the application of research to learning are defining characteristics is a major driver behind building teaching and learning models based on advanced network technologies such as high speed broadband Internet linking universities. New Zealand universities and many polytechnics are linked to KAREN (Kiwi Advanced Research and Education network) - a next generation telecommunications link providing high capacity, ultra high-speed connectivity between New Zealand's tertiary institutions, research organizations, libraries, schools and museums. International links connect

KAREN to other such networks in Australia and the United States, and through them to Asia and Europe.

KAREN can be used by its members and their partners to collaborate in research and education and is especially suitable for carrying the traffic generated by multimedia and live video platforms. A number of projects are currently using KAREN for collaboration and exchange of data (<http://www.karen.net.nz/home/>).

Web 2.0 Tools

Ten years ago some authors suggested that the new technology could be used only as a supplement to classroom instruction [17]. Others pointed out that “the rules embedded in the technology which makes global virtuality possible are the rules of commerce and capital, not education or knowledge production” but agreed that “the virtual university, like the hyper-real cultures of the postmodern city, will happen - in some form, but in different forms in different places with different histories” [33]. At present the cluster of technologies known as Web 2.0 offers opportunities to develop a ‘hyper-real’ university campus.

More than just a loosely-coupled system of advanced Internet applications, Web 2.0 represents a new social and cultural paradigm, focused on the social creation of knowledge [11]. Technologically, Web 2.0 moves away from portals and professional content creators to searching engines, aggregators and user-based content, which is also open-knowledge and allows increased productivity and creativity. Web 2.0 participants are active content creators and moderators. Wikis, blogging, online office, social bookmarking, video repositories, podcasting, video online, social networking, personal learning environments are the new tools which can be used [and are already used] in education, mostly for communication among students and for social construction of knowledge [18].

CONCLUDING REMARKS

We are participants in a revolution that is changing the way we live, communicate, think, educate and prosper. Around 5,000 years ago our ancestors first learned and taught how to grow crops and put animals to work. This started the agricultural revolution. Around 250 years ago they discovered the power of steam and pioneered the industrial revolution. Over the past 20 or so years, we have entered the age of instant information and education on demand, and the world will never be the same again. A revolutionary new economy is arising based on knowledge rather than conventional raw materials and physical labour.

As elsewhere, new horizontal, networked and globally integrated organizational models are expected to emerge in the education area. As posited in [34] education systems, similarly to any business systems, may gradually become componentized, virtualized and distributed over a system of inter-institutional relationships. However networked academic institutions will face the challenge of maintaining their reputation and identity.

New technologies may help increase both teaching efficacy and learning effectiveness as the significant potential in improving interpersonal communication skills is realized. Increased productivity and reduced educational cost may come into effect once online instruction shifts from replication, distribution and delivery to design and production. Using fast speed networks and Web 2.0 tools will make collaboration feasible.

If tertiary institutions collaborate and develop complementary student support material, the cost per student could be reduced,

as more students will be using the same material. It would also bring instructional consistency between them. Technology based instructional systems do not have bad days or tire at the end of a long day. Instruction can be delivered in a well-tested and reliable fashion that does not vary in quality from class to class or from institution to institution.

With supplementary material on the Web, students are free to ask questions and explore areas that might cause embarrassment in class situation as 'the new technologies allow for a redefinition of the individual as a member of an invisible electronically defined population' [34]

Instructional systems never lose patience - they encourage students to persist in asking questions and reviewing material. What is more, a well designed interactive system need not move on to new material until the current material is mastered to ensure that students have a strong foundation for their continued learning. The very process of interaction provides a strong learning reinforcement that significantly increases content retention over time.

The new teaching and learning environment currently unfolding before us is set to change dramatically the traditional roles of the student and teacher. The role of the teacher will shift from that of subject expert to a facilitator managing the transformation of information into knowledge. Furthermore, in light of the speed of progress, the teacher himself will be cast as a learner, continuously updating his knowledge base and enabling students to do so as well.

As information will be increasingly made available from sources other than the teacher and a new emphasis will be placed on leadership and motivational skills. the Internet is just a communication supporting medium, and even Web 2.0 is just a platform. There is plenty of room to develop different student support services and to make the most of all available technologies, with the teacher's dedication and ability remaining the most important educational tool.

While it may be true that 'time and space' represent dimensions to which humanity is inescapably coupled' [36], technology may still be able if not to substitute then at least to blend creatively and productively with these real-life dimensions.

REFERENCES

- [1] K. Petrova, "Teaching Differently: A Hybrid Delivery Model", Proceedings of the GBATA International Conference, 2001. pp. 717-727.
- [2] P. Thomas, L. Carswell, J. Emms, M. Petre, B. Poniatowska, B. and B. Price, "Distance Education over the Internet.", Proceedings of the First Conference of the Special Interest Group in Computer Science Education and Computer Uses in Education, 1996, pp. 147-149.
- [3] S. Hartley, et al., "Enhancing Teaching Using the Internet: Report of the Working Group on the World Wide Web as an Interactive Teaching Resource", ACM SIGCSE Bulletin, Vol. 28, No. SI, 1996, pp. 218 - 228.
- [4] K. Petrova and R. Sinclair, Chapter VII "E-Learning Value and Student Experiences: A Case Study" . In F. G. Peñalvo (Ed.), *Advances in E-Learning: Experiences and Methodologies*, pp 25-36. Hershey , PA: Information Science Reference, IGI Global, 2008.
- [5] P. Karamat and K. Petrova, "Supporting the New Learning Environment", Proceedings of the 12th Annual NACCQ Conference, 1999, pp. 141-148.
- [6] K. Petrova and R. Sinclair, "Business Undergraduates Learning Online: A One Semester Snapshot", *International Journal of Education and Development using Information and Communication Technology*, Vol. 1, No. 4, 2005, pp. 69-88.
- [7] D. Parry, "What Do Online Learners Really Do, and Where and When Do They Do It? Bulletin of Applied Computing and Information Technology Vol. 2, No. 2, 2004.
- [8] K. Dickinson, "Distance Learning on the Internet: Testing Students Using Web Forms and the Computer Gateway Interface", *Techtrends*, March, 1997, pp. 43-47.
- [9] M. Verhaart and Kinshuk, "Developing a User Centred Model for Creating a Virtual Learning Portfolio. In C. Ghaoui, M. Jain and V. Bannore (Eds.), *Studies in Fuzziness and Soft Computing*, Vol. 78, pp. 203-232. Springer-Verlag, 2005.
- [10] K. Petrova, "The Quest for the Best Mix: An On-Going Project in E-Learning", *Proceedings of the International Conference on Computers in Education*, Vol. I, 2002, pp. 227-228.
- [11] J. Freire, "Universities and Web 2.0: Institutional Challenges", *eLearning Papers*, No. 8, April, 2008.
- [12] P. Shrivastava, "Management Education for the Digital Economy", April, 1998. US Department of Commerce. <<http://www.facstaff.bucknell.edu/shrivast/Digital.html>>
- [13] R. A. Phipps, "Quality Assurance for Distance Learning in a Global Society", *International Higher Education*, No. 13, Fall, 1998. pp. 5-9.
- [14] K. L. Smith, "Preparing Faculty for Instructional Technology: From Education to Development to Creative Independence", *Proceedings of CAUSE96*, 1996. <<http://connect.educause.edu/Library/Abstract/PreparingFacultyforInstru/32555>>.
- [15] M. W. Goldberg, "WebCT and First Year Computer Science: Student Reaction to and Use of a Web-Based Resource in First Year Computer Science", *Proceedings of the 2nd conference on Integrating technology into computer science education*, 1997, pp. 127-129.
- [16] G. J. Jesson, "Virtual technologies and Academic Labour" In M. Peters and P. Roberts (Eds.), *Virtual Technologies and Tertiary Education*, Palmerston North: Dunmore, 1998
- [17] D. F. Noble, "Digital Diploma Mills: The Automation of Higher Education", *First Monday*, Vol. 3, No. 1, 1998.
- [18] A. Bartolome, "Web 2.0 and New Learning Paradigms", *eLearning Papers*, No. 8, April, 2008.
- [19] D. M. Merrill, L. Drake, M. J. Lacy, J. Pratt, and the ID2 research group, "Reclaiming Instructional Design". *Educational Technology*, Vol. 36, No. 5, 1996, pp. 5-7.
- [20] S. C. Ehrmann, "Asking the Right Question: What Does Research Tell Us about Technology and Higher Learning?" *Change, The Magazine of Higher Learning*, Vol. 27, No. 2, 1995, pp. 20-27.
- [21] C. Atkins, "Here Be Dragons: Reflections on a Second Life Journey". *Bulletin of Applied Computing and Information Technology* Vol. 5, No. 1, 2007.
- [22] M. Howard, "How to Teach Adults". Plymouth: Plymbridge House, 1996.
- [23] I. Y. Kwong, "Motivating Students by providing feedback", *CDTL Brief*, Vol. 4, No. 2, 2004.
- [24] R. Lindsay, R. Breen, and A. Jenkins, "Academic research and Teaching Quality: The Views of Undergraduate and

Postgraduate Students, Studies in Higher Education, Vol. 27, No. 3, 2002, pp. 309-27.

[25] D. Parry, A. Holt, and J. Gillies, "Using the Internet to Teach Health Informatics: A Case Study", Journal of Medical Internet Research, Vol. 3, No. 3, 2001, e26.

[26] John Mitchell and Associates, "Educational Videoconferencing: Critical Success Factors". Paper presented at the conference "Delivering Flexible Learning in Training and Education", Sydney, 1997.

[27] D. Fisher; A. J. Brush; E. Gleave, and M. A. Smith, "Revisiting Whittaker & Sidner's 'Email Overload' Ten Years Later", Proceedings of the 20th Anniversary Conference on Computer Supported Cooperative Work, 2006, pp. 309-312.

[28] T. Clear and D. Kassabova, "A Course in Collaborative Computing: Collaborative Learning and Research with a Global Perspective. Proceedings of the 39th SIGCSE Technical Symposium on Computer Science Education, 2008, pp. 63-67.

[29] P. D. Duffy and A. Bruns, "The Use of Blogs, Wikis and RSS in Education: A Conversation of Possibilities", Proceedings of the Online Learning and Teaching Conference, 2006, pp. 31-38.

[30] J. E. Tuovinen, "Multimedia Distance Education Interactions", Educational Media International, Vol. 37, No. 1, 2000, pp. 16 – 24.

[31] D. Taniar, D. and W. Rahayu, "Automatization of Student Assessment Using Multimedia Technology". In J. G. Hedberg, J. R. Steele, and S. McNamara, S. (Eds.), Learning Technologies: Prospects and Pathways, Canberra: AJET Publications, 1996.

[32] B. Armstrong, S. Cimino, and D. Dingsdag, "An Automated Marking System-EXPRES, Proceedings of Open Learning 98, 1998. Open Distance and Learning Association of Australasia.

[33] B. Opie, "Locating the Virtual University in the Antipodes". In M. Peters and Roberts, P. (Eds.), Virtual Technologies and Tertiary Education, Palmerston North: Dunmore, 1998.

[34] R. Straub, "Is the world open?", eLearning Papers, No. 8, April, 2008

[35] P. Fitzsimons, "Electronic Networks and Education in the Postmodern Condition". In M. Peters and P. Roberts (Eds.), Virtual Technologies and Tertiary Education, Palmerston North: Dunmore, 1998.

[36] "Toffler A (1990) "Power Shift" Bentam publication

[37] T. Clear, "Global Collaboration in Course Delivery: Are We There Yet?", Inroads — SIGCSE Bulletin, Vol. 40, No. 2, 2008, pp. 11-12.