

Enhancing Flexible and Collaborative Learning for Pre-service Teachers through a Web-based Learning System

利用網上學習系統提高職前老師的學習靈活性和促進共同學習

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Abstract

Lifelong and life-wide learning are the foci of learning in an information age. The World Wide Web (Web) is thought to be the driving force behind these changes as it is vast, flexible, and accessible with virtually no boundaries. Although there are many claims of the advantages of using the Web for module deliveries and promoting higher order learning, the results are controversial. The author attempted to examine whether a Web-based learning system could enhance flexible and collaborative learning. The thirty- two participants in the study were pre-service student teachers from the Hong Kong Institute of Education taking Information Technology as one of their minor studies. The module materials, discussion forum and announcements were presented on a dedicated Web site. Participants were encouraged to access this site for learning resources and to communicate using an e-forum. Twelve learners volunteered to attend five focus group meetings to share their experiences and opinions about using the Web. It was observed that they greatly valued the opportunity to use the Web, as it was convenient and flexible. In particular, the e-forum was found to be an invaluable arena for collaborative learning during their teaching practice period when they did not meet each other on campus.

摘要

在這個資訊時代，學習的焦點在於終身學習和全方位學習。這些改變的背後，正因為有萬維網的推動。它不但內容豐富、靈活性高、用途廣泛，並且毫無邊界上的阻礙。大部分網上的資訊都能輕易地，快捷地和無拘束地存取。即使網上教學的好處甚多，但研究結果卻是大有分歧的。本文作者嘗試利用網上學習系統，研究其能否提高學習的靈活性和促進共同學習。試驗中有三十二名參加者，他們是就讀於香港教育學院副修資訊科技的職前教師。所有課程材料，討論室和通告全都放於網站上。作者鼓勵參加者瀏覽網站並使用資源和利用討論室傳遞信息。十二名學員自願參加五個關注組會議。會議中他們表達使用網上學習系統的經驗和意見。會後學習者一致認為此系統十分方便，靈活及珍惜此次機會使用網上學習系統，而討論室更被視為一個寶貴的渠道，能讓他們互相溝通以促進共同學習。尤其在實習期間，他們難以在校內見面，但能以討論室作為另一種溝通途徑。

Introduction

The Hong Kong Government has adopted a somewhat “laissez-faire” approach in various policy areas for many years. The importance of information technology (IT) in education had not been actively considered until the changeover in 1997. Realizing the importance of life-long and life-wide learning in an information age, our Chief Executive announced in his 1997 Policy Address the promotion of the use of IT in education. He stated that “The main tasks are to equip our teachers with the necessary IT skills; to apply computer-assisted teaching and learning across the curriculum; and to place students in an environment where they can use this technology as part of their daily activities and grow up to use it creatively” (Tung, 1997, para. 46). A series of interrelated activities have taken place ever since this milestone speech.

In responding to such a requirement, the Hong Kong Institute of Education (HKIEd) has swiftly examined the curriculum of different programmes and identified the areas in which our learners require further education and training (Lee, 2001). The traditional approach in ensuring the literacy of student teachers in the area of IT, was to equip them with the technical knowledge and simply teach IT as an isolated single course. This approach was wholly inadequate and inappropriate. Faculty members in teacher education programmes must model teaching and learning strategies incorporating IT across the curriculum (Harrington, 1991; Bryum & Cashman, 1993; White, 1995). Therefore, the author has attempted to model the adoption of the World Wide Web (hereafter, the Web) as a learning resource to complement the teaching of pre-service student teachers.

The Value of the Web in Education

IT, in particular the Internet, is believed to be an invaluable tool in the promotion of lifelong and life-wide learning. Much of the information on the Web can be accessed easily, promptly and freely as it is vast, flexible and accessible. The flexibility of the hypertext, hypermedia and the enormous resources on the Web appeals extensively to educators. Not only are they able to readily obtain updated information on the Web, but also they can fully utilize the flexibility of the Web by offering complete programmes online or to complement face-to-face lectures (Hiltz & Wellman, 1997; Harasim, 1999). For online courses, announcements, course outlines and schedules, course materials, discussion forums, exercises and quizzes, related hyperlinks are typically available on a Web-based learning system (WBLS) with easy access for course participants. The amount and extent of materials posted on the WBLS depends very much on the intention and motivation of the educators if the Web is adopted to complement face-to-face teaching.

Flexible Learning

The concept of flexible learning has evolved since its inception more than twenty years ago. The initial phase focused on correspondence and radio broadcasts aimed at attracting isolated learners in farming and mining communities (Nguyen, et al, 1996, Peacock, 1995) whereas the fourth phase emerged in the mid-1990s. It supported learner access of computer-based remote databases, hyper- and multi-media information and synchronous communication. Students are in control of the time, place and pace of study (Peacock, 1995) and have direct access to an expanding and dynamic knowledge base and extensive communicative

facilities. The Web possesses the functionality to foster flexible and self-directed learning in this new phase of development. Virtually everyone can access and post any information on the Web at any time and place without restrictions. The instructional materials and teaching methods thus become available to literally anyone in the world and teachers are no longer the only major source of information for learners. The Web transforms the concept of classroom from a physical place to a “virtual” area where teaching and learning occurs at the discretion of the learners. Learning is without any boundary or border!

Collaborative Learning

Cooperative learning has been receiving attention since the 1980s. Many researchers supported the view that learners learn better when they learn in a group (Johnson & Johnson, 1999; Sun et al, 2000; Yu, 2000). Collaborative learning occurs when participants mutually engage “in a coordinated effort to solve [a] problem together” (Roschell & Behrend, 1995, p. 70) that stresses the importance of shared dialogue and inquiry (Berger, 1996). As active participants in the learning process, learners develop a sense of community “that marshals the powers of interdependence” (Brufee, 1999) and shapes the perspectives of the group. In this way the learning or doing defines the process through which new collective knowledge is built. There are five basic elements for maximizing collaborative performance (Johnson & Johnson, 1999): (1) the positive interdependence relationship, (2) personal responsibility, (3) appropriate use of social skills, (4) face-to-face promotive interaction, and (5) group processing. However, there are still many potential barriers which impede group

effectiveness such as lack of sufficient heterogeneity, inappropriate group size and lack of teamwork skills (Johnson & Johnson, 1999).

IT provides an arena for collaborative learning in a “knowledge-building community” (Scardamalia & Bereiter, 1994), “a community of practice” (Lave & Wenger, 1991), “a community of learners” (Brown, 1992), and “a community of reflective practitioners” (Chen, 1993). IT is perceived not only as a ‘product’ but a system through which one learns and is a ‘process’ which channels and captures the flow of learning in these communities. The use of email and online chat was found to facilitate teacher-learner dialogue and reflective inquiry through a mentor-researcher working with a group of student teachers during their teaching practice (Harkrider & Chen, 1998). Moreover, the learning efficiency (capabilities of integration and deduction) of Web-based collaborative learning was found to be superior to that of Web-based traditional learning (Wang, Tzeng & Chen, 2000; Chou & Sun, 1995) when learners were required to demonstrate and explain the contents and knowledge that they had learnt.

The research study

Although there are many claims of using the Web for higher-order and learner-centred learning in the new era, the results of adopting it for learning are controversial (Jacobson & Spiro, 1995; Thuring, Mannemann & Haake, 1995; Garland, Anderson & Noyes, 1998; Ng, 1999, 2000). This research study aims to examine if a WBLS can enhance flexible and collaborative learning. There were thirty- two participating pre-service student teachers studying at HKIED and pursuing IT as one of their minor studies. Participants had taken three modules related

to IT prior to this one - “Computer Supported Learning Environment”.

The learners had to attend a mass lecture and two tutorials each week and the WBLS was adopted to complement this face-to-face learning. During the tutorial sessions, learners sometimes experienced some practice in using IT software and also took turns in presenting topics related to the subject matter. Figure 1 shows the module outlines and materials. A discussion forum (e-forum) and announcements were put together on the Web to facilitate flexible and collaborative learning. The module materials and announcements could be reached by accessing the dedicated uniform resources locators whereas the e-forum was password protected. Student teachers were given the password during the first lesson and were also shown how to use the different functions offered on the

dedicated WBLS. They were asked to post any web site which was pertinent to learning and teaching in primary classrooms on the e-forum as an initial exercise. Furthermore, they were encouraged to use the e-forum to exchange views related to the module content or any issues related to learning and teaching in primary school during the course of the module delivery, i.e. one semester, in order to experience experiential learning.

Data Collection

The data was collected by two means, i.e. from data tracking and from focus group meetings. When participants posted messages on the discussion forum, their actions were recorded throughout the semester. At the end of the seminar, volunteers were asked to join focus group meetings to share their

Figure 1 : Main Page

Lesson Sequence	Lecture Materials	Supplementary Materials
1	Introduction	Assignment
2	Introduction to IT in Education	Reference Sheet
3	Logo Programming	Logo Worksheet1
4	Theories of IT in Education	Logo Worksheet2
5	Introduction to IT Supported Learning Environment	Evaluation of Software
6	Virtual Classrooms	Role Simulation
		Student

experiences of using the WBLS to complement classroom learning. The aim of these meetings was to develop an in-depth understanding of participants' views on using the WBLS to enhance flexible and collaborative learning. Twelve learners attended five focus group meetings. The researcher, assisted by a research assistant, acted as facilitators to prompt participants during these meetings. The facilitators asked some leading questions to guide participants in voicing their feelings about the benefit of using a WBLS to complement face-to-face learning. All the meetings were tape-recorded and the main points were transcribed. The findings presented in the next section are the common opinions collected during different focus group meetings. Note that not all opinions were positive and these are discussed in the lesson learnt section.

Findings

All of the participants accessed the WBLS regularly to download or view the learning resources and to participate at the e-forum. They logged on to the WBLS more than once per week, most often to check to see if there was any interesting discussions taking place, even though many times they did not post a message. Over three hundred messages were posted, more than thirty of which came from just one participant. The following is the summary of the participants' opinion on using the WBLS and is substantiated with the main findings gathered from the discussion e-forum:

Convenient and Flexible System

Learners regarded the WBLS useful, as it was very convenient. They could access the learning resources at a "one-stop" spot, at any place and any

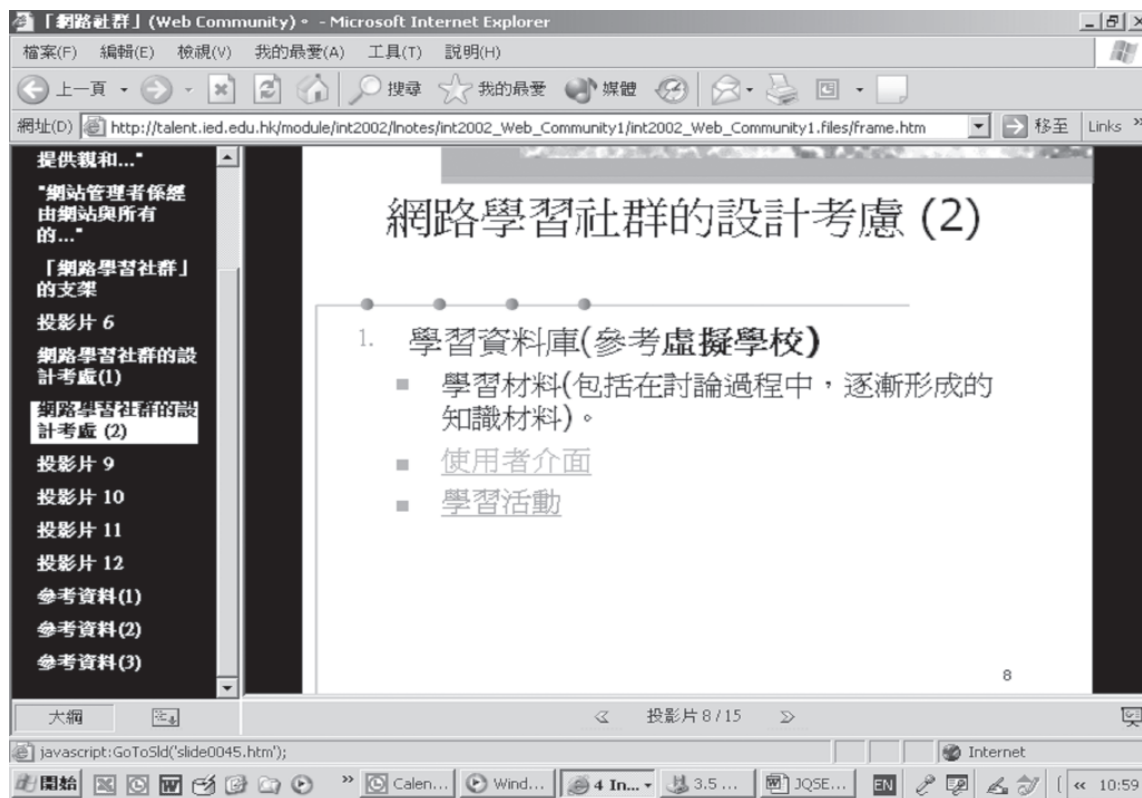
time. In addition they realized it was much easier to find the relevant learning materials and electronic references using the WBLS than the traditional printed format as they did not have to carry learning notes with them. The materials were hyperlinked meaning they could be accessed with just one click. Furthermore, as the learning materials were in hypermedia format, learners did not have to read sequentially but rather could browse those areas of interest to them, as shown in Figure 2.

The flexibility of a WBLS was fully utilized as messages were posted at a variety of times and on various days. Indeed, some messages were posted after mid-night as shown in Figure 3. Since the WBLS accepted both Chinese and English input, learners were free to post messages in the language in which they felt most comfortable.

Fostering Collaborative Learning

Inspired by the suggestions to post web sites on the discussion e-forum, many learners took the initiative to post some information of their presentation in advance on the e-forum. For example, one group of presenters recommended the web site <http://www.bud.org.tw> which they would subsequently present in class and asked others to consider if the questions and answers in the recommended site were sufficient to support learning. This type of posted information not only saved participants' time in searching and evaluating resources which were pertinent to the subject matter, but also encouraged collaborative learning. In fact, all the messages initiated were followed up by their classmates and most of them gained a positive response. For example, "I have visited the web site of <http://www.grammarfree.com.tw/tw/> that was just posted by classmates. This is a very useful and funny

Figure 2 : Learning Materials



web site for us. It is beneficial for students in the area of language learning as it incorporates two different languages and the movie is also very attractive. The content is valuable for language study and also contains a moral lesson.” (translated from Chinese)

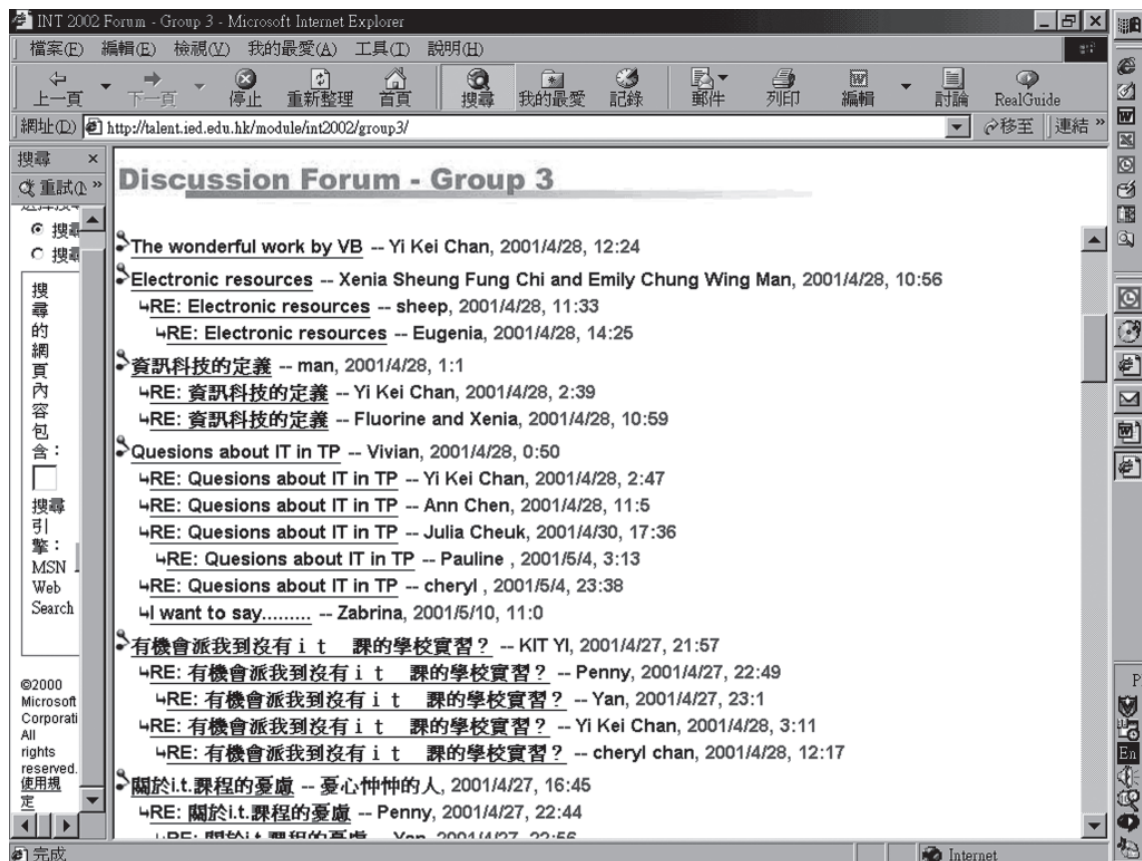
They did not realize that many of them were worried about whether they should use IT during their first teaching practice until someone posted this concern on the e-forum. One useful response was “we should think about: 1) is there really a need to use IT? 2) will the teaching be effective after using IT? 3) any resources?”. They also posted their experiences of using and not using IT to teach during the teaching practice period. One participant stated that she had used PowerPoint during teaching practice and her

pupils were very excited. However, another said that a lesson had been spoiled because there were some technical problems whilst attempting to use IT. The merits and shortcomings of using IT to teach during TP were discussed widely exhibiting the success of fostering collaborative learning using the e-forum. The active participation in the e-forum on the part of the learners certainly illustrated that the five basic elements for maximizing collaborative performance were involved.

Enhancing Communication Skills

Participants believed that the e-forum had helped them to develop better communication skills. This was especially the case with their written skills, as they often had to think carefully before putting their

Figure 3 : An Example of Messages Posted



thoughts into writing. The e-forum was thought to foster wider discussion than using traditional classroom discussion. The learners believed that responding to the different opinions posted on the e-forum also enabled them to develop critical thinking skills. For example, someone posed a question on the attributes of a good teacher. It elicited such responses as: “Apart from being knowledgeable, a good teacher must adopt a good teaching approach”, “Yes, I think the role of teachers today is totally different. In the old days, teachers only needed the skills of using ‘chalk and talk’. Compared with then, different skills are needed thus imposing a heavier workload. Teachers are forced to learn continuously” and “A good teacher should understand the mentality and personality of

primary school children. Sometimes, the adult teacher thinks that some concepts are very easy to understand but cannot see the difficulties from the angle of the children”. (translated from Chinese)

Participants were required to take turns in group presentations during class almost every week. They thought that this was an invaluable arena in which to express their opinions whilst their fellow classmates were presenting. In this manner, they did not interfere with the presenters and yet they could see other classmates’ thoughts and respond accordingly. Participants were so accustomed to using the e-forum that they continued to use it after the last class, for example “... I have to say thank you to Glass Bottle for taking such wonderful pictures. The debate

teammates were very excited in the pictures.” It was impossible to show such an appreciation normally after the completion of the module as pictures were taken during the last class.

Changing Role

Participants did not expect the educator to play an active or authoritative role but rather a supporting one. They did not treat the comments from the educator any differently than those of the other participants as they felt that she was also a member of the discussion forum. Many of them took the initiative to discuss pertinent issues. For example, unlike other teaching subjects, IT minor learners did not study IT teaching methods as there was no such subject at primary school at the time of the programme development. Some of them showed concern that they would not be able to teach IT effectively in schools when they had not studied the relevant teaching methods. This concern was echoed by a few learners so the educator raised the issue with the programme leader and the class representative also voiced the same concern during a staff-student consultative meeting. As a result, teaching methods were introduced in the subsequent year.

Readiness

Despite the positive feedback on the WBLS, participants did not fully utilize it as had been intended. Student teachers seldom searched for more resources after classes apart from the lecture materials posted on the Web. Related Web sites were not frequently visited. They still preferred the educators to give them a hard copy of the learning materials rather than asking them to read them on the Web. They found that it was much easier to read

a considerable amount of information in printed format rather than on screen. Their comments re-confirmed some of the earlier findings that pre-service teachers performed better using printed resources than Web-based ones (Harkrider & Chen, 1998; Ng, 1999; 2000, Ng & Leung, 2002).

Similarly, pre-service teachers did not take many initiatives at the beginning in using the e-forum for communication. This was probably due to their relative inexperience in using this method. As time progressed, the learners appreciated the value and convenience of the e-forum. It was subsequently regarded as a valuable arena for communication as they were able to learn and discuss so much during the course of the module. In fact, it would have been impossible to do so without the e-forum. However, they were not certain if the e-forum should be an integral part for all module deliveries or not. The main reason for this concern was the considerable amount of time and effort required to participate. These conflicting findings were inevitable as there is a great need to balance time and outcomes.

Reflections

Whilst all of the learners were comfortable using the Internet in their leisure time in the same way as reading newspapers or communicating, learning to use the Web involved both a cultural change and a change of study habits. This situation could be improved in a number of ways. Firstly, by posting some of the learning materials on the Web which are not easily available in another format. Videos and hyperlinks of relevant Web sites are also possible resources to be included. Secondly, inclusion of some online activities as part of the assessment such as answering quizzes related to the learning materials, and being assessed on their contribution to the e-forum. In this way,

participants are motivated to access the WBLS and to contribute to the discussion. Thirdly, by modelling the use of the discussion e-forum. That is, the educators actively participate in the discussions whilst trying not to give direct answers except when absolutely necessary. Fourthly, by encouraging the usage of the WBLS. For example, by suggesting an appropriate time for access and discussion, might be when the learners arrive in the laboratory before the class has started. Fifthly, by building trust among all participants so that they are not shy in discussing or voicing their concerns. This is easier said than done, but participants would trust each other if it meant gaining helpful advice in the process. Sixthly, by teaming up reticent learners with the more vocal ones, so that they are encouraged to have collaborative learning face-to-face and online. Last but not least, by monitoring and eliciting feedback from the participants so that improvements can be made promptly during the course of module deliveries.

Conclusion

This paper has described an experience of using a Web-based learning system to foster flexible and collaborative learning for pre-service student teachers. The messages posted in the discussion e-forum and opinions gathered during focus-group meetings supported the principle that a WBLS enabled flexible learning and the e-forum fostered collaborative learning. Participants especially appreciated the convenient arena for communication during their teaching practice when they did not meet on campus. The openness of the Web introduced new roles and relationships between educators and learners. Both the educator and student teachers have shown their social and cognitive engagement with online materials and the e-forum in a democratic

and dynamic environment. However, we have to be mindful that learners need to be constantly encouraged and supported in order for meaningful communication and collaborative learning among participants to be present.

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References

- Berger, P. (1996). *The social construction of reality: A treatise in the sociology of knowledge*. New York: Doubleday.
- Brown, A. L. (1992). Design Experiments: Theoretical and Methodological Challenges in Creating Complex Interventions in Classroom Settings, *Journal of the Learning Sciences*, 2 (2) 141-178.
- Bruffee, K.A. (1999). *Collaborative learning* (2nd ed.). Baltimore, MD: The John Hopkin University Press.

- Bryum, D.C., & Cashman, C. (1993). Preservice teacher training in education computing: Problems, perceptions and preparation. *Journal of Technology and Teacher Education*, 1(3), 259-274.
- Chen, A. Y. (1993). Experienced and student teachers' reflection on classroom practice. *Educational Research and Perspectives*, 20 (1), 46-71.
- Chou, C., & Sun, C. T. (1995). Collaborative CAI by multimedia on the Internet. *Teaching Information and Multimedia*, 21, 13-21.
- Education and Manpower Bureau. (1998). *Information technology for learning in a new era: Five-year strategy 1998/99 to 2002/03*. Hong Kong: Printing Department.
- Garland, K. J., Anderson, S. J., Noyes, J. M. (1998). *The Intranet as a learning tool: A preliminary study*. IRISS' 98 [On-line]. Available: <http://www.shef.ac.uk/~is/publications/infres/paper51.html>
- Harasim, L. (1995, December). *The virtual university: New approaches to higher education in the 21st century*. Paper presented at ASCILITE95. The 12th Annual Conference of the Australian Society for Computers in Learning in Tertiary Education, Melbourne.
- Harkrider, N., and Chen, A. Y. (1998). Design Considerations for Web-Based Reflective Inquiry. In T.W. Chan, A. Collins, & J. Lin (eds.), *Proceedings of ICCE 98 Global Education on the Net*, CHEP, Beijing, 388-395.
- Harrington, H. (1991). Normal style technology in teacher education: Technology and the education of teachers. *Computers in the Schools*, 8(1/2/3) 49-57.
- Hiltz, S. R., & Wellman, B. (1997). Asynchronous learning networks as a virtual classroom. *Communications of the ACM*, 40(9), 44-49.
- Jacobson, M., & Spiro, R. (1995). Hypertext learning environments, cognitive flexibility and the transfer of complex knowledge. *Journal of Educational Computing Research*, 12(4), 301-333.
- Johnson, D. W., & Johnson, R. T. (1999). *Learning together and alone: Cooperative, competitive and individualistic learning* (5th ed.). Boston: Allyn & Bacon.
- Lee, K. T. (2001). Information technology integration in teacher education. *Asia-Pacific Journal of Teacher Education and Development*, 4(1), 157-178.
- Ng, E. M. W. (1999, November). Comparing Web-based Learning with Paper-based Learning: A Case Study. *Proceedings of the 16th Annual Conference of The Hong Kong Research Association, Hong Kong SAR*, 35-36.
- Ng, E. M. W. (2000). Does the Web provide a better alternative medium for learning? *Proceedings of Technology in Teaching and Learning in Higher Education: An International Conference*, 309-314.
- Ng, E. M. W. and Leung, N. W. R. (2002). Information Technology in Education: The Challenge of Adopting World Wide Web as Learning Resources. In Cheng, Y. C., Tsui, K. T., Chow, K. W., Mok, M.M.C. (Eds.), *Subject Teaching and Teacher Education in the New Century: Research and Innovation* (pp.69-92). Hong Kong: Hong Kong Institute of Education and Kluwer Academic Publishers.
- Nguyen, A. T. A., Tan, W., & Kezunovic, L. (1996). Interactive multimedia on the World Wide Web: Implementation and implications for the tertiary education sector. In M. Nott (Ed.), *Proceedings of AusWeb96: The Second Australian World Wide Web Conference*. Gold Coast, Australia: Southern Cross University.
- Peacock, K. A. (1995). *Distance education in a university setting: connecting to the global classroom*. Available, http://www.utirc.utoronto.ca/Distance_Ed/disted-report.html [on-line]. University of Toronto, Canada, October, 1995.
- Roschelle, J., & Behrend, S. (1995). The construction of shared knowledge in collaborative problem solving. In C. O'Malley (Ed.), *Computer-supported collaborative learning* (pp. 69-97).

Berlin: Springer-Verlag.

Scardamalia, M. and Bereiter, C. (1996). Engaging Students in a Knowledge Society, *Educational Leadership*, 54(3) 6-11.

Sun, P. C., Liou, N. T., Cheng, Y. W., Ni, H. C., & Lian, H. F. (2000) Collaborative learning using GSS on the Internet. *Proceedings of the 8th International Conference on Computers in Education/International Conference on Computer-Assisted Instruction 2000*, 1588-1590.

Thuring, M., Mannemann, J., & Haake, J. (1995). Hypermedia and cognition: Designing for comprehension. *Communications of the ACM*, 38 (8), 57-66.

Tung, C. H. (1997). *The 1997 policy address* [On-line]. Available: <http://www.info.gov.hk/pa97/english/patext.html>

Wang, W., Tzeng, Y., & Chen, Y. (2000). A comparative study of applying Internet on cooperative

traditional learning. *Proceedings of the 8th International Conference on Computers in Education/International Conference on Computer-Assisted Instruction 2000*, 207-214.

White, C. (1995). The place for technology in a constructivist teacher education program. In J. Wills, B. Robin, & D. A. Willis (Eds.), *Technology and Teacher Education Annual - 1995*. (pp. 290-293). Charlottesville, VA: Association for the Advancement of Computing in Education.

Yu, F. Y. (2000). Promoting student learning and development in computer-based learning. *Proceedings of the 8th International Conference on Computers in Education/International Conference on Computer-Assisted Instruction 2000*, 248-253.

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