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The International Journal of Instructional Technology and Distance Learning is refereed, global in scope, and focused on research and innovation in teaching and learning.

The Journal was established to facilitate collaboration and communication among researchers, innovators, practitioners, and administrators of education and training programs involving instructional technologies and distance learning. The editors and peer reviewers are committed to publish significant writings of high academic stature.

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Donald G. Perrin
Executive Editor

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Editorial

Bandwidth

The current emphasis in business is to do more with less. This is due in part to globalization and economic competition from nations such as China and India. In the United States, social services and employee benefits are pushed aside in the fierce competition for survival and shareholder support. Education, the life-blood of economic development, is subjected to those same pressures.

A few decades ago, there was an emphasis was on humanistic aspects of teaching and learning. Today there is a question of how to do an adequate job with inadequate resources. Technology may be part of the solution but baggage about teaching and learning from past generations are recycled by parents and politicians as solutions to current problems. The world has changed, and in the struggle for relevance and higher standards, knowledgeable professionals are ignored and innovation is drowned by mediocrity.

Many of the changes that have negatively impacted public education are fortuitous for higher education. New communication tools have enabled adults to assume responsibility for their own learning and accomplish this interactively, at a distance, anywhere and at any time. These same technologies have enriched on-campus education and are in daily use by faculty, students, and the communities they represent. Moreover, with increasing bandwidth, interactive voice and text-based communications are enriched by images, animations and video.

In the argument about relevance and standards, education now has a global perspective. This is illustrated by publication of the MIT curriculum on the Web to be freely used and adapted by others. It set a higher benchmark with global standards for science and engineering courses and programs. The Internet has countered the privatization of knowledge with excellent tools and resources that are free for educational purposes, such as Open Source software, Wikipedia, and publications with a “Creative Commons” license.

The constraints of the past related to access or constriction of bandwidth. Broadband communications involving cable and telephone systems now encircle the globe. The power of the Internet has created economic opportunities for developing nations. Globalization of teaching and learning makes it necessary for education to be more relevant and effective. In the halls of ivy, excellence is often defined by history. In the global information economy, excellence is defined by the future.

Editor's Note: In many parts of the world, online quickly replaced television for distance learning. China has the only mega-university based on television and it continues to grow. However, distance learning is expanding even more rapidly as a result of the Internet. This study reports progress in online learning in China since 1998.

The Experiment of Tertiary Online Education in China: An Overview[1]

Tong Wang (China)

Charles Crook (UK)

Abstract

This paper gives an overview of the experiment of tertiary online education in China since the launch of the pilot in 1998. It reports the scale of development, the infrastructure, the macro environment at the governmental, the social and the financial levels and the micro environment for development. The article concludes by summarizing the achievements and challenges for tertiary online education in China.

Keywords: tertiary online education, China, experiment

Introduction

Online education has been regarded by many governments and organizations as an important educational mode which can contribute significantly to lifelong learning in a knowledge society (Alhabshi & Hakim, 2003; Bell, 2002; Bello, 2003; Committee, 2004; E.D.Tabs, 2003; Gudmundsson; Helios, 2005; Hernes, 2003; Juma, 2003; Kappel, 2002; Kerrey & Isakson, 2000; Lewis, 2002; Louisa Kwok; Mason, 2003; MoE, 1996, 2004a; Moore & Tait, 2002; Sangra, 2003; Stefania Aceto, 2004; Taylor, 2003; UNESCO, 2002; W. Y. Zhang, 2003). Hence, its development has been given unprecedented importance despite concerns and hesitation of various forms at various levels. This is also true of China. The China Ministry of Education (MoE) coined a special term for online education - "Modern distance education" (xian dai yuan cheng jiao yu in Mandarin pronunciation), emphasizing the technological element employed by this mode of education. As many nations, China joined the campaign of promoting this panacea-looking phenomenon through an eventful but rewarding learning process of experimentation.

This project explores the China experiment of online education at the tertiary sector. The following sections give an overview of the development of tertiary online education in China and the challenges it is facing.

The scale of development

Accredited tertiary online organizations in China

In 1998, China MoE endorsed the mission of developing tertiary online education and submitted an Action Plan for Innovating Education in the 21st Century (Ding, 2005) which was approved in 1999 by the State Council so that modern distance education (online education) then making its debut in government documentation in China. The year of 1998 witnessed the birth of the first group of tertiary online institutes with China MoE accrediting four prestigious universities as the

[1] This study is part of the eChina-UK eLearning Programme sponsored by the HEFCE of the UK and the MoE of China. The article limits its scope of analysis to the tertiary online institutions in Chinese Mainland. The author sincerely thanks Dr. Charles Crook for his guidance and support.

very first pioneers experimenting with tertiary online education. The four universities were Peking University, Qinghua University, Beijing Telecommunication University, and Hunan University. The first three are located in Beijing and the last one is in Hunan province in Southern China. Until 2003, a total of 68 universities/organizations were approved to pilot tertiary online education, of which 67 were universities (MoE, 2002c) and one was China Central Radio TV University (CCRTVU). The number of pilot organizations remains the same at the present time.

It is worth noting that CCRTVU was and still is the largest conventional distance education organization in China employing radio, TV, and satellite technologies to deliver courses. CCRTVU (headquarters in Beijing) has 44 local/provincial TV universities in all provinces of China's mainland with its local learning centres set up in every county (the smallest governmental administration unit) all across the country. As an organization directly affiliated with China MoE, it has been recommended from the top as a successful reference model for its online counterparts. Table 1 is the list of the piloting universities (MoE, 2002c).

Table 1

A list of Chinese universities piloting online education

Geographic Dispersion in China's Mainland	Name of Province or Municipality	Number of Approved Universities
North (19)	Beijing	17
	Tianjin	2
North East (8)	Jilin	2
	Heilongjiang	2
	Liaoning	4
East (17)	Shanghai	8
	Jiangsu	3
	Zhejiang	1
	Fujian	2
	Anhui	1
	Shandong	2
Central & South (11)	Guangdong	3
	Hubei	5
	Hunan	2
	Henan	1
South West (8)	Sichuan	6
	Chongqing	2
North West (5)	Shanxi	4
	Gansu	1

From the information in Table 1, it is obvious that the piloting online education institutes are geographically dispersed all across the Chinese Mainland.

Student enrolment, disciplines, and study centres of tertiary online education in China

Tertiary online education in China has seen a rapid growth. By the middle of 2004, more than 3,000,000 students were registered by the 68 tertiary online organizations, accounting for around 10% of the overall tertiary student population. The online institutes offered degree programmes at diploma, graduate, and post graduate levels, covering 153 majors in 10 disciplines. More than 6,000 local study centres were set up, among which 3,600 provided local support for the 67 online institutes and 2800 were affiliated with CCRTVU (Liu, 2005).

According to Zhang (2004), the growth of tertiary online education can be summarized as in Table 2-3 and Figures 1-2 below.

Table 2

Growth of registered students with tertiary online education in China

Year	1999	2000	2001	2002	2003	Total
Total	32,000	185,000	456,000	675,000	942,000	2,290,000
Overall yearly growth rate	--	578%	246%	148%	140%	
Online institutes	3,000	21,000	184,000	274,000	316,000	798,000
Yearly growth rate	--	700%	876%	148%	115%	
CCRTVU	29,000	164,000	272,000	401,000	626,000	1,492,000
Yearly growth rate	--	566%	166%	147%	156%	

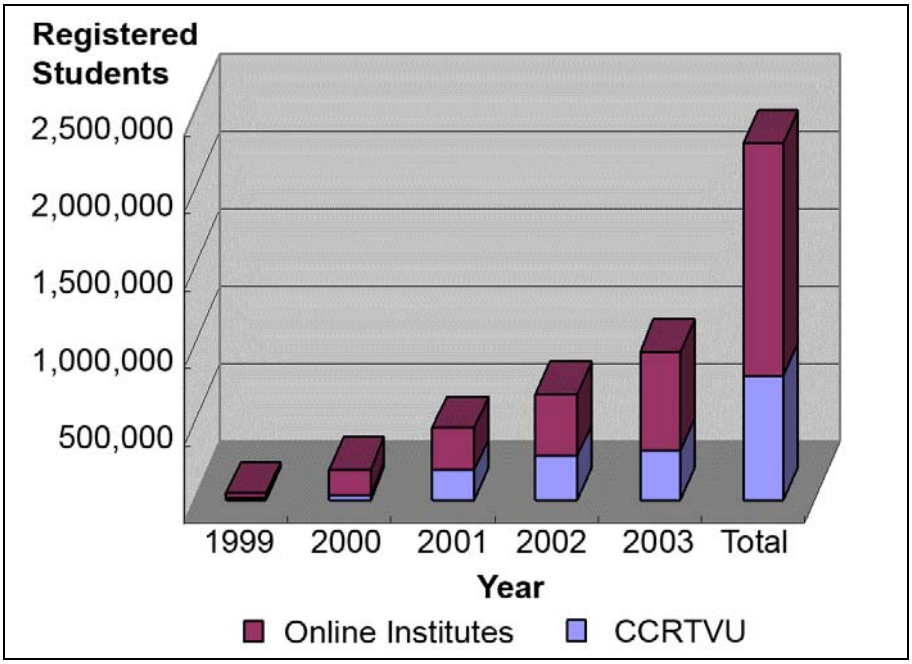

Figure 1: Growth of registered students with tertiary online education in China

Table 3

Growth of graduates from tertiary online education in China

Year	2001	2002	2003	2004
Total	539	32,641	153,708	186,888
Overall yearly grow rate	--	6000%	471%	121%
Online Institutes	539	1,305	19,422	21,266
Yearly growth rate	--	242%	1,488%	109%
CCRTVU	--	31,336	134,286	165,622
Yearly growth rate	--	3,133,600%	428%	123%

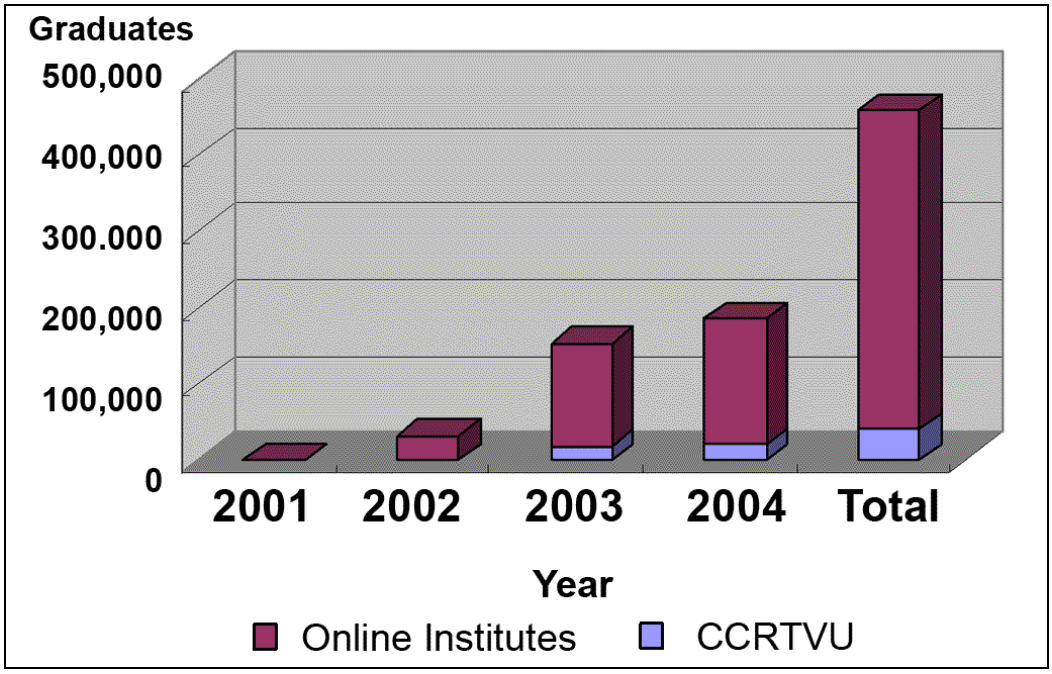

Figure 2: Growth of graduates from tertiary online education in China

By comparing growth of enrolment and graduate numbers, it is discovered that CCRTVU admitted double the total enrolment of its 67 domestic counterparts by 2003 and graduated 7 times more students than from 67 online institutes in the same period. It is even more alarming that only the year of 2000 saw an explosion of student admission six times larger than that of 1999. The online institutes experienced a two-year over-heated expansion reaching a peak of enrolment 8.76 times bigger than that of 2001. The yearly growth rates for both the enrolment and the graduation were breathtaking. Taking the year of 2002, the overall growth rate was 60 times larger than that of 2001. CCRTVU alone mass produced more than 30,000 graduates in 2002. It was a nightmare given the fact that 2002 was the first year for CCRTVU to have graduates of online education. The outcomes, as can be envisaged, were multi-fold. Both the public opinion and the MoE policy demanded an instant slow-down for tertiary online education in China as the explosive expansion of tertiary online education was considered to have the tendency of bringing more harm than good to Chinese tertiary education in general.

Infrastructure of tertiary online education in China

China has built up the infrastructure, so-called “highways both in the sky and under the ground”, for modern distance education. CERNET (The China Education and Research Network) - - “the underground highway” was initiated in 1994 and has developed into an operative education network consisting of three tiers: a national level backbone network, local area networks (LANs) and campus intranets. On March 19, 2004, a CERNET 2 pilot project was officially launched in China, connecting dozens of universities in major cities (Li, 2004a; 弘成科技, December 29, 2004). With the help of adopting IPv6 protocol, CERNET 2 enjoys the transmission speed 1000 times faster than that of CERNET 1. Other promises CERNET 2 brings are its enormous space for storage, higher level of security, better quality of synchronous communication, and more convenience for end users. 2006 was the official start of the application phase for CERNET 2. CEBSat (China Education Network with Satellite) - “the over sky highway” plays its effective role by delivering courses via satellites. Among the 68 tertiary online organizations in China, some are still using satellites as the main means of communication. With the development of the Internet technology, more online institutes and organizations opt for the Web choice. The integration of CERNET and CEBSat, can serve as a good platform (MOE, 2004f), at least taken its face validity, for developing modern distance education in China.

The Environment for development

Macro environment for tertiary online education in China

Tertiary online education weathered mixed attitudes and responses in China at both macro and micro levels. Compared with classroom-based education, online education, as a new-born baby, needs a more nurturing and regulated environment for healthy growth.

Generally speaking, tertiary online education in China experiences a change of perception by the general public, the home universities, or even the MoE from being “apple of the eye” (1998-2001) to “a monster” (2002-2004) to “a hot potato” (2005 onwards). The following sections analyse the macro environment for tertiary online education in China from the governmental, social, and financial perspectives.

The macro environment for tertiary online education at the governmental level

Conceptually, Chinese government regarded online education at the outset as a panacea which could increase access to higher education for the general public, upgrade the educational level of the people, and achieve lifelong learning objectives. Given this understanding, China MoE set up an office of tertiary modern distance education to guide and supervise the development of online education.

As a new and under-researched mode, online education enjoyed a moment of being worshipped in China due to the lack of understanding of what it was really about. People wishfully believed that online education was the solution to realising their college dream. Chinese culture has highly valued education for centuries. However, only 21% of the population could have access to tertiary education due to limited resources. Without a rigorous validation and accreditation system, China MoE rushed to make a big campaign for piloting online education. Table 4 captures the growth path of the accreditation work (R. X. Zhang, 2004).

Table 4 depicts the sky-rocketing growth of online institutes during 1999-2002 when 67 universities were given the green light from the MoE. However, 2003 saw a full stop of the accreditation by only adding one more school to the list. Since then, the “honeymoon period” with online education was over. It is worth noting here that the explosive expansion of online education during this period had a national impact both geographically and educationally. All online institutes had their national network across China, collaborating with various organizations and schools. Any event concerning one online institute was not single or stand-alone. It had repercussions nation-wide.

Table 4
Basic information on tertiary online education in China

Year of accreditation	Number of pilot universities	Yearly growth rate	Registered students	Number of local study centres (cumulative)
1999	5	--	32,000	--
2000	26	520%	185,000	--
2001	14	54%	456,000	966
2002	22	157%	675,000	2,012
2003	1	5%	949,792	2,347
Total	68	--	2,301,305	2,347

Following the "honeymoon period" was the "ice age" when many regulations were issued by the MoE to put out the "fire". The regulations and documents released by China MoE can offer a lens to the ups and downs of the eventful growth of the "new born baby". Below is a list of the most important documentations of China MoE since 1998:

the document on setting up a national committee overseeing the overarching design of modern distance education [关于聘请童铠等21名同志为教育部现代远程教育规划专家组成员的通知 教电函［１９９８］５号] (1998年6月25日) (MoE, 1998)

the document on setting up a national committee overseeing resources development for modern distance education
[关于成立教育部现代远程教育资源建设委员会和教育部现代远程教育资源建设专家组的通知 教高［1999］6号] (1999年9月15日) (MoE, 1999)

the document on supporting the pilot of modern distance education at some universities
[关于支持若干所高等学校建设网络教育学院开展现代远程教育试点工作的几点意见] (MoE, 2000)

the document on initiating the project of an accreditation system for modern distance education
[关于启动网络教育认证制度研究与实践项目的通知 教高司函[2001]132号] (MoE, 2001a)

the document on an urgent call for regulating enrolment of modern distance learners
[教育部办公厅关于加强现代远程教育招生工作管理的紧急通知 教高厅〔2001〕9号] (MoE, 2001b)

the document on the guidelines for establishing local study centres for modern distance education
[教育部办公厅关于印发《关于现代远程教育校外学习中心（点）建设和管理的原则意见》（试行）的通知, 教高厅〔2002〕1号] (MoE, 2002a)

the document on regulating tertiary distance learning organizations and enhancing quality control of online education [教育部关于加强高校网络教育学院管理, 提高教学质量的若干意见, 教高 [2002]8号] (MoE, 2002b)

the document on the list of the licensed universities piloting modern distance education

[经教育部批准的67所现代远程教育试点学校名单] (MoE, 2002c)

the document on the guidelines for regulating local study centres of modern distance education [教育部办公厅关于印发《现代远程教育校外学习中心（点）暂行管理办法》的通知 教高厅[2003]2号] (MoE, 2003b)

the document on establishing the national association for online teacher education [教育部关于实施全国教师教育网络联盟计划的指导意见] (MoE, 2003c)

the document on approving of the establishment of Beijing Aupeng Distance Education Service Provider [关于同意申请注册"北京奥鹏远程教育中心"的批复 教高司函[2003] 35号] (MoE, 2003a)

the document on regulating admissions of distance education students in 2004 [关于做好2004年现代远程教育试点高校网络教育招生工作的通知] (MoE, 2004b)

the document on establishing the board of national examinations for modern distance education [教育部关于成立第一届全国高校网络教育考试委员会的通知 教高函[2004]10号] (MoE, 2004e)

the document on further regulation of electronic registration of distance education students [教育部办公厅关于进一步完善高等教育学历证书电子注册制度的通知 教学厅［2004］11号] (MoE, 2004c)

the document on implementing national examinations for modern distance education [教育部办公厅日前下发了对现代远程教育试点高校网络教育学生部分公共课实行全国统一考试的通知] (MoE, 2004d, March 2004)

the document on submitting self-examination report by all online institutes [教育部办公厅关于对现代远程教育试点高校网络教育学院开展2004年度、2005年度年报年检工作的通知] (MoE, 2005a)

the document on establishing the service providing system for modern distance education of CCRTVU [教育部办公厅关于建设中央广播电视大学现代远程教育公共服务体系的通知 教高厅[2005]2号] (MoE, 2005b)

the document on punishing some online institutes for their ill-practices [教育部关于部分现代远程教育试点高校违规办学问题的通报] (MoE, 2005c)

the document on the guidelines for organizing national examinations for modern distance education [全国高校网络教育考试委员会关于下发《试点高校网络教育部分公共基础课统一考试试点工作管理办法》的通知 网考委[2005]1号] (网考委, 2005)

the document on regulating admission of distance education students in 2006 [教育部关于做好2006年现代远程教育试点高校网络高等学历教育招生工作的通知] (MoE, 2006)

The attitude and policy shifts reflected in the documentations above ise summarized in Table 5.

Table 5

Attitude and policy changes on tertiary online education

	Enrolment	Setting up Local Centres	Length of Study
By 2002	All decisions could be made by the piloting institutes.	All decisions could be made by the piloting institutes.	All decisions could be made by the piloting institutes.
2002-2004	MoE prescription: online students could not be taught on-campus full time.	MoE prescription: all local study centres needed to be approved by the local government.	MoE prescription: minimum length of study were set
2005 onwards	The MoE prescription: online students could not be taught on-campus full time. all online students must pass national exams before graduation.	MoE prescription: all piloting institutes could not open new local centres. Instead, they must use Aupeng system (affiliated with CCRTVU).	MoE prescription: minimum length of study were set

From the above documentations, it can be inferred that China MoE dealt with online education soft-handedly at the very beginning without an integrated national plan, and then it was overwhelmed by and drowned in the sudden but unexpected happenings nation-wide due to the lack of an effective national regulating scheme. Since 2003, China began to prescribe many practices for the piloting organizations.

The upheavals of online education in China could be reflected through the cover stories of the Journal of Distance Education (the Information Edition) in China, a well-established journal on tertiary online education in China since its first issue in 2002.

The headline stories in Table 5 depict the eventful development of tertiary online education in China. Due to the lack of macro planning at the governmental level, tertiary online organizations in China experienced a “Warring States Period” (Ding, 2001) in the pilot phase. The manifestation is that each organization built up its own systems and there was little sharing among them in learning resources, platform design, credit transference, etc. To be more exact, there were 68 versions of modern distance education learning systems in China resulting from the lack of coordinated national approach. Confronted with the lack of national coordination, some online institutes initiated ideas of consortia and association. The first self-initiated consortium came into being on August 13th of 2004 when eight online institutes located in the south and east of China signed the *Taihu Declaration*. This historic moment made it possible within the consortium to increase sharing (Li, 2004b) in learning resources.

As a fairly new mode of learning/teaching, online education has been fighting an uphill battle in entering the mainstream in China. It still has a long march to make. Quality and the nature of the certification it grants to students have been the major concerns of the general public and employers. As with many other foreign counterparts, China MoE categorizes higher education at three levels: diploma, graduate, and post-graduate (master and doctoral) (MoE, 2005d). A certificate/degree can be granted upon successful completion of any level of the programmes. However, the certificates and the degree vary significantly in nature. Table 7 is an overview of the certificates and degrees of higher education in China.

Table 6

Some cover stories of the Journal of Distance Education in China

Year	Issue	Cover Story in China	English Translation
2002	8	直击教学质量	Quality of Online Education
	10	羞答答的玫瑰静悄悄地开	The Commercial Side of Online Education
2003	2	一个新起点	A New Beginning
	4	拥抱学习化社会	Embracing the Learning Society
	8	网院求变	Facing the Challenges
	10	“非典”的考验	The SARS Test
	12	中国E-learning期待榜样	Looking for a Role Model
	14	中国远程教育转折之年	A Year of Transition for Online Education
	18	准备好了吗	Getting Ready for Changes?
	20	远教“大鳄”寻找新大陆	Foreign Education Providers Coming to China
	22	回归理性	Returning to Reason
2004	1	步入调整期	In the Year of Readjustment
	2	见证共享时刻	The First Consortium
	3	电大25年	The 25th Anniversary of CCRTVU
	4	整合之难	The Challenge of Integration
	6	改变在2004	Making Changes in 2004
	11	质量行动	Quality Control Initiatives
	12	走服务路线	Support Services
2005	1	学习中心生存调查	A Survey Report on Local Centres
	2	守望农村	Online Education for Farming Areas
	3	收获季节	Harvest Season
	4	中国经验	China Experience
	5	牵手行业	Partnering with Business
	7	期盼突破	Looking for a Breakthrough

The macro environment for tertiary online education at the social level

At the very beginning of the pilot, most of the online organizations granted the Certificate/Degree for General Higher Education, viz. the most prestigious among the three types above. Confronted with the doubts, complaints, and pressure from all levels regarding the quality of online education, most of the piloting universities changed to grant the Certificate/Degree for Adult Higher Education. With more and more online institutions decided to award the Certificate/Degree for Adult Higher Education to e-learners, online education has become a less attractive learning mode for the general public.

Table 7

An overview of the degree for higher education in China

Type of Certificates/Degrees	Holders	Weight of Certificate/Degree by Public Opinion
Certificate/Degree for General Higher Education	students who passed the national college entrance examinations upon graduating from middles schools and successfully completed required course of study at university/college	most prestigious
Certificate/Degree for Adult Higher Education	students (a certain proportion are working students) who passed the national college entrance examinations for adults and successfully completed required course of study at university/college	less prestigious
Certificate/Degree for Higher Education through self-study	students (a certain proportion are working students) who passed the national examinations for required self-study courses	less prestigious

The macro environment for tertiary online education at the financial level

External funding was allowed to be introduced to tertiary online education in China. Investors, both foreign and domestic, could partner with the piloting universities by jointly setting up online institutes within the universities. By August 2004, a total of RMB1,840,000,000 as external funds was invested in tertiary online education (R. X. Zhang, 2004) and the total revenue generated reached RMB12,300,000,000 in the same year (iResearch, 2004), making it an attractive business for investors. Among the 68 tertiary online organizations, two business models emerged: “joint funding” (usually with domestic technological companies) and “sole funding”. The first type is the predominant form of the funding structure in China (R. X. Zhang, 2004).

Micro environment for tertiary online education in China

Among the 68 tertiary online organizations, it was always likely that these institutes would be seen as mere revenue generators by their home universities. Given this prescribed role, some online institutes often found themselves sidelined, battling for university resources, long-term development policies, and more in-depth strategic plan within the university; in contrast, some other institutes even did not bother to consider strategic planning with all their resources devoted to short-term gains, viz. generating revenue for the university. The “second-class and non-mainstream” status of the online institutes within their universities hindered a strategic and long-term development of this new educational mode, thus harming its future growth in China.

Conclusion

Tertiary online education in China has made tremendous strides. The deputy minister of China MoE described the progress in this way (Wu, 2005):

> *Modern distance education has invigorated the reform of higher education in China. In the pilot phase, the online institutes have made innovative achievement in educational rationales, system construction, technology application, administration model exploration, service provision, quality assurance, resources development and sharing. In the fifth national achievement awards for Quality Teaching Outcomes, 18 of them were given to online education. To push the higher education further, online education still has a lot of work to accomplish.*

Meanwhile, there are many good lessons to learn as well. “Ten challenges concerning tertiary online education await the Chinese government and the piloting universities to address: strategic national vision of elearning, government policies, relationship between short-term financial gains and long-term educational objectives, administration structure, relationship between cost and revenue, technology, standards for resources development and sharing, interaction, quality, and learner support” (Ding, 2002).

Having considered its scale, social and educational prospects, international influence, the China Experience in tertiary online education is worth researching both domestically and internationally.

References

Alhabshi, S. O., & Hakim, H. (2003). *Unitar Malaysia*: UNESCO.

Bell, M. (2002). A Survey of Online Education and Services in Australia.

Bello, J. C. D. (2003). *The Virtual University: University Vertual de Quilmes, Argentina*: UNESCO.

Committee, L. (2004). Distance Learning and eLearning in European Policy and Practice: the Vision and the Reality: The European ODL Liaison Committee.

Ding, X. F. (2001). 网络教育的春秋时代及其对策, 北师大网络教育电子杂志: 北师大网络教育实验室.

Ding, X. F. (2002). 普通高校网络远程教育面临十大挑战(上). *Journal of Distance Education in China* (8).

Ding, X. F. (2005). 远程教育质量保证国际比较研究及其主要结论. *Journal of Distance Education in China* (5).

E.D.Tabs. (2003). *Distance Education at Degree-granting Postsecondary Institutions: 2000-2001*: US Department of Education.

Gudmundsson, A. *Distributed Learning in the Nordic Countries and Canada*.

Helios. (2005). Is eLearning Improving Employability of European Citizens?

Hernes, G. (2003). *The New Century: Societal Paradoxes and Major Trends*: UNESCO.

iResearch. (2004). *China Online Education Research Report*: iResearch.

Juma, M. N. (2003). *The Virtual University: Kenyatta University*: UNESCO.

Kappel, H.-H. (2002). Distance Education at Conventional Universities in Germany. *International Review of Research in Open and Distance Learning, 2*(2).

Kerrey, B., & Isakson, J. (2000). *The Power of the Internet for Learning - - Moving from Promise to Practice*: The Web-based Education Commission, USA.

Lewis, R. (2002). The Hybridisation of Conventional Higher Education: UK Perspective. *International Review of Research in Open and Distance Learning, 2*(2).

Li, G. Y. (2004a). A Report on CERNET 2 in china. *Distance Education in China* (11), 48-50.

Li, G. Y. (2004b). Starting Moment of Sharing. *Journal of Distance Education in China* (8), 26-40.

Liu, Y. (2005). 中国内地现代远程高等教育的治疗保证与监管, *CRIDALA/DEC 2005*. Hong Kong.

Louisa Kwok, e. a. Imperative Issues on the Educational Process among Asian Open Universities.

Mason, R. (2003). *The university - - Current Challenges and Opportunities*: UNESCO.

MoE. (1996). 全国教育事业九五计划和2010年发展规划.

MoE. (1998). 关于聘请童铠等21名同志为教育部现代远程教育规划专家组成员的通知 教电函［１９９８］５号 (1998年6月25日).

MoE. (1999). 关于成立教育部现代远程教育资源建设委员会和教育部现代远程教育资源建设专家组的通知 教高［1999］6号 (1999年9月15日).

MoE. (2000). 关于支持若干所高等学校建设网络教育学院开展现代远程教育试点工作的几点意见.

MoE. (2001a). 关于启动网络教育认证制度研究与实践项目的通知 教高司函[2001]132号.

MoE. (2001b). 教育部办公厅关于加强现代远程教育招生工作管理的紧急通知 教高厅〔2001〕9号.

MoE. (2002a). 教育部办公厅关于印发《关于现代远程教育校外学习中心（点）建设和管理的原则意见》（试行）的通知, 教高厅〔2002〕1号 (2002年1月7日).

MoE. (2002b). 教育部关于加强高校网络教育学院管理, 提高教学质量的若干意见, 教高 [2002]8号.

MoE. (2002c). 经教育部批准的67所现代远程教育试点学校名单.

MoE. (2003a). 关于同意申请注册"北京奥鹏远程教育中心"的批复 教高司函[2003] 35号.

MoE. (2003b). 教育部办公厅关于印发《现代远程教育校外学习中心（点）暂行管理办法》的通知 教高厅[2003]2号.

MoE. (2003c). 教育部关于实施全国教师教育网络联盟计划的指导意见.

MoE. (2004a). 2003-2007年教育振兴行动计划 2004-02-10.

MoE. (2004b). 关于做好2004年现代远程教育试点高校网络教育招生工作的通知.

MoE. (2004c). 教育部办公厅关于进一步完善高等教育学历证书电子注册制度的通知 教学厅［2004]11号.

MoE. (2004d). 教育部办公厅日前下发了对现代远程教育试点高校网络教育学生部分公共课实行全国统一考试的通知.

MoE. (2004e). 教育部关于成立第一届全国高校网络教育考试委员会的通知 教高函[2004]10号.

MOE. (2004f). 中国教育改革与发展情况（英文）.

MoE. (2005a). 教育部办公厅关于对现代远程教育试点高校网络教育学院开展2004年度、2005年度年报年检工作的通知.

MoE. (2005b). 教育部办公厅关于建设中央广播电视大学现代远程教育公共服务体系的通知 教高厅[2005]2号.

MoE. (2005c). 教育部关于部分现代远程教育试点高校违规办学问题的通报.

MoE. (2005d). 学历常识问答.

MoE. (2006). 教育部关于做好2006年现代远程教育十点高校网络高等学历教育招生工作的通知.

MoE. (March 2004). 教育部办公厅日前下发了对现代远程教育试点高校网络教育学生部分公共课实行全国统一考试的通知.

Moore, M. G., & Tait, A. (2002). *Open and Distance Learning*: UNESCO.

Sangra, A. (2003). *UoC, Spain*: UNESCO.

Stefania Aceto, e. a. (2004). *Lifelong Learning Policies and Practice: The Drive of ICT*. Brussels: The Menon Network EEIG.

Taylor, J. (2003). *The Virtual University: Usqonline, Australia*: UNESCO.

UNESCO. (2002). *Technologies for Education: Potentials, Parameter, and Prospects*: UNESCO.

Wu, Q. D. (2005). Develop Modern Distance Education in China. *Journal of Distance Education in China* (10), 36.

Zhang, R. X. (2004). A Survey Report on Tertiary Online Education in China. *Distance Education in China* (8), 18-22.

Zhang, W. Y. (2003). 开放大学的网上教学：亚洲地区七国九地的调查报告. *Journal of Distance Education in China* (9).

弘成科技. (December 29, 2004). 中国下一代互联网开通为网络教育带来新机遇.

网考委. (2005). 全国高校网络教育考试委员会关于下发《试点高校网络教育部分公共基础课统一考试试点工作管理办法》的通知 网考委[2005]1号.

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Editor's Note: This article is a distillation of principles and best practices to ensure effective online learning. It recognizes the changing roles and responsibilities of administrators, teachers and learners and provides simple taxonomies to guide the change process.

The Course is Online: Why Aren't the Students Learning?

Tim S. Roberts, Joanne M. McInnerney

Australia

Abstract

Despite literally hundreds of thousands of courses being transferred wholly or partly to an online mode of delivery over the last decade, many institutions continue to get it badly wrong. This paper draws on the literature to highlight some important aspects of online learning implementation that are often overlooked or given little attention. One common thread throughout is the major importance of good communication to the success of any online course. The authors distil the essence of good practice to present ten guidelines for effective online learning, in the hope that some of the more prominent pitfalls and disasters can be avoided.

Keywords: online learning, distance education, web-based delivery, online communication.

Introduction

The nature of education at tertiary level is currently undergoing an enormous transformation. Gone are the days when students expected little else but a lecture twice a week and a set text from which to study. Now, more students are expecting – indeed demanding – that courses be available online, so that they can study at times and from places of their own choosing, without, necessarily, any face-to-face contact with the academics responsible for the course.

In response to these pressures, many universities and colleges worldwide have introduced partial or full online courses: such as the University of Phoenix for working adults who want to further their education, and M.I.T, who have recently placed the majority of their curriculum online, available to a worldwide audience free of charge.

But along the way to full online delivery there have been many casualties. Institutions have attempted to place their courses online with minimal planning, paying little or no regard to the resources required. Panettieri (2004) stated in relation to online learning that:

> *"… most universities do offer distance learning programs. But many of them don't live up to their hype. In some cases, immature technology is to blame for the online woes. Yet far more often, distance learning initiatives fail because of internal cultural issues across multiple departments--academic, financial, marketing, and so forth."*

Online learning challenges the existing relationships between academics, those who learn and those who administer the learning institution.

Marsden (2003) stated it well when she said:

> *"Understanding the online education paradigm is more than an academic pursuit. All of those concerned – administrators, course developers, teachers, and students - must embrace the paradigm to realize success."*

Unfortunately, many students seeking to study online have become disenchanted with low-quality materials, with outdated links, and with files that take hours to download. Where such online materials have replaced face-to-face lectures, students have become disenchanted with what they perceive as academics 'not doing their job'. Further, the use of email and discussion lists has led to an expectation of help being available 24 hours per day, 7 days per week, which many institutions have been unable or unwilling to provide. How can these and other similar disasters be avoided?

In this paper we take as our starting point that

- resources have been made available to transfer courses to an online mode of delivery,
- both administrators and academics have been consulted on all changes,
- instructional designers have been involved throughout the process of course development,
- adequate resources have been provided for continuous development, and
- timeline and schedule pressures have been duly recognized.

As a minimum, the learning resources should include the following:

- A course home page with a range of links to electronic resources;
- The provision of electronic copies of course materials available for printing;
- The placement workshop tasks and solutions to encourage participation in online communications;
- The inclusion of clear and concise assignment marking guidelines;
- The full contact details of all instructors;
- The provision of facilities to enable online submission and return of assignment items in a timely and efficient manner,
- A copy of the web site on CD-Rom.

Regrettably, many online courses do not currently provide even these essential requirements. But even with them, many courses still fail, because institutions fail to recognise the importance of many other factors, which are the subject of the rest of this paper.

The Ten Guidelines

Rather than take a negative stance and describe the problems often encountered, we describe ten guidelines which, if adhered to, greatly improve the chances that successful learning outcomes will be achieved.

GL 1. Ensure academics are fully conversant with potential problems.

Some academics may feel that a lifetime of teaching skills has been wasted or rendered obsolete in the institutional charge to online education. They may feel unable to use the talents that they most value in teaching – their presence in a classroom, their oral ability to control problem situations, and their skills in enhancing the benefits of learning for their students from opportunities that may present themselves whilst in class.

Berge (1998) listed many fears that still have a major impact on academic resistance to online learning. Amongst the most relevant almost a decade later are: -

- *"faceless" teaching…* Will the ‘facelessness’ of online learning mean a loss of control and ability to guide students? This ability is normally aided by an effective use and

understanding of body language by the academic. The answer here is the effective inculcation of good online communication skills.

- *diffusion of value traditionally placed on getting a degree* …. Will the course or program being taught online be valued as highly by employers as that which is taught classically (face-to-face)? Time, and the continued development and practice of online teaching and learning, and effective quality controls are essential to convey the value of this still reasonably innovative method of learning to prospective employers.
- *lack of an adequate time-frame to implement online courses.*…. Will the academics be given an appropriate time period to develop and test the online courses prior to implementation? An institutional understanding of the increasing workload of many academics can alleviate this fear.
- *high cost of materials* …. Will the online course be too expensive to 'build' or maintain which may lead to a cheapened and therefore inferior product? Effective financial planning is clearly essential.
- *increased time required for both online contacts and preparation of materials/activities* …. Will more time be spent online with students than would be the case in conventional teaching? The time spent online may be reduced if the academic provides guidelines for students to follow, clearly states times of availability, and utilizes an appropriate discussion forum for questions.
- *lack of technological assistance* ….. Will appropriate assistance be available? This can be a very large obstacle if the concerned institution does not provide technological support for all parties – academics, administrators and students.

Many academics may benefit from auditing an online course, prior to a more substantial commitment, to help them to understand the dynamics involved in online teaching and learning. In addition to those factors mentioned previously change is often feared and resisted simply because of a reluctance to admit a lack of preparedness to meet the challenge of a new educational environment.

Smith, Ferguson and Caris (2002), stated that online courses are:

> *"… a labor-intensive, highly text-based, intellectually challenging forum which elicits deeper thinking on the part of the students, and which presents, for better or worse, more equality between instructor and student."*

It is vitally important that academics should not be intimidated by the perception of a greater equality between themselves and students. This changing role for academics in the online environment has an importance that should not be underestimated.

It is also important that those academics who do decide to teach online enjoy using technology, or they may find that the environment of online learning is far more demanding than they have been led to expect. Kearsley (2002) plainly states his view that '*many teachers who are excellent at classroom teaching will not make good online teachers.'*

Once the transition to online teaching and learning has occurred, academics may find themselves online in chat rooms and email sessions with students for several hours per week. The responses to questions and assignments will lead towards the creation of an online persona that will reassure students that someone is 'out there' and interested in them and what they produce. The successful creation of an online persona will ease the possibility of an increase in the class attrition rate (Smith, Ferguson & Caris, 2002: 65). To feel confident in this environment academics should embrace and become literate with the technologies connected to the teaching and learning of their online course.

GL 2. Consider the use of synchronous communication where feasible.

Many authors stress the importance of asynchronous communication: for example, Aitken and Shedletsky (2002) however, both types of forum are often required for the successful operation of an online course. Wang and Newlin (2001) advocate the simultaneous use of asynchronous and synchronous communication for an online course to be successful.

Asynchronous online courses often have a one-way flow of information between the lecturer and student, and are a passive method of teaching, which simply turns the Internet based online course into another form of distance education. By utilizing synchronous chat rooms, a sense of social presence develops that often leads to a greater sense of community (McInnerney & Roberts, 2004).

Wang and Newlin (2001) advocated the simultaneous use of asynchronous and synchronous communication for an online course to be successful:

> *"… the type of interaction fostered by online chat rooms will enhance and clarify the information that is gathered via asynchronous interactions. Both types of information delivery systems are needed."*

They asserted that asynchronous online courses often have a one-way flow of information between the lecturer and student, and are a passive method of teaching, which simply turns the Internet based online course into another form of distance education. By utilizing synchronous chat rooms, or a system such as Blackboard, a sense of social presence develops that often leads to a greater sense of community.

Whether the online communication that is occurring is synchronous or asynchronous, one significant advantage resulting from online learning and communication is that the individual competitiveness of the face-to-face classroom is reduced. In an on-campus class, there is usually a strict time limit to each session or tutorial, and this may mean that the less vocal or less self-assured students do not have adequate opportunities to express themselves to either fellow students or academics. Online communication gives those students the time they need to express themselves without the pressures that are often inherent in a face-to-face setting (Bowman, 2003).

GL 3. Ensure instructors have the appropriate communication skills.

The effectiveness of online learning can often be severely constrained by poor communication between academics and students. Essential to effective online communication is that appropriate technology be affordable and available to students, and that courses be designed with this understanding. Another aspect that may lead to poor communication is the constraint of time for the academic or tutor monitoring several hundred emails and many chat rooms, particularly if these are the primary means of communication.

We are all used to the standard forms of communication. That is where one is face to face with someone and can read and become accustomed to the other persons body language. Gender is also important in communication protocols as the differences in the thought and body language processes between men and women can and often do cause difficulties when one is trying to interpret social interactions (Rossetti, 1998; Tannen, 1994).

Some instructors may lack the communication skills necessary to give advice with clarity and explicitness, especially if they are overworked and frustrated with the problems they are encountering. Priest (2000) stated that there are several areas in the teaching and learning of online learning that need to be addressed by both academics and institutions.

- Provide consistent access to course and program advisors,
- Practice clear and effective communication with online learning,

- Provide clear and concise curriculum guidelines,
- Provide student motivation when needed, and
- Be tolerant.

While Finley (2000) succinctly states a set of *'DO'S AND DON'TS'* that go some way towards explaining the complexities of online communication.

- Personalize the environment,
- Encourage introductions – introduce yourself,
- Use names when addressing responses to students – comment on personal things they have mentioned,
- Use an informal writing style but model correct grammar and spelling,
- Be aware that students cannot see your nonverbal behavior – avoid sarcasm,
- Be visible in the classroom - you can do this without dominating but students like to know that the instructor is there, and
- Establish clear guidelines for participation in conferences

Anyone who uses email regularly will know that although this is an excellent medium for fast communication it does place limitations on their own, and others, ability to socially interact. Therefore, it is of paramount importance that academics clearly communicate their expectations on how they want students to communicate in the online environment.

GL 4. Use a system such as W.R.I.T.E. as a basis for good communication

When communicating online educators and students have to learn to fill in the blanks that are left when they are unable to 'read' the body language of the people to whom they are 'talking'. Lewis (2000) asserted that it is important that academics master the art of communicating online in both asynchronous and synchronous format and that it is:

> *"…helpful … (to) engage in … the WRITE way to communicate online.*
>
> *… that is (W)arm, (R)esponsive, (I)nquisitive, (T)entative, and (E)mpathetic."*

McInnerney and Roberts (2002a) stated that if academics, administrators and students can manage to incorporate Lewis' concepts into their teaching, when online, then they will increase the ability of all concerned to succeed.

Haight (2002) suggested three ways to reduce student frustration with online learning:

- *Reassure*….students that support is there for them and that any problems they may be having with the technology are common and fixable.
- *Encourage*….students who may be having problems with the material, and offer suggestions that will help their understanding, and
- *Orient and Facilitate*….students by clarifying expectations of behaviour and performance while undertaking online study.

Other authors have stressed the importance of the establishment of rules of conduct at the beginning of the course, such as not allowing individual students to dominate online discussion periods, and the summarization by the academic of student contributions and comments on the topic under discussion (McInnerney & Roberts, 2002b).

GL 5. Stress the importance of all online participants (instructors, technical staff, students) treating each other with respect.

One important issue not addressed by Lewis (2000), is that of respect. Academics, administrators and students should show respect towards the comments and ideas of others when communicating. This attitude of respect allows others to contribute meaningfully to discussions and along the way, all parties may discover that not only have they learnt how to communicate, but they may also have learnt how to learn more effectively and efficiently.

Good communication skills are of paramount importance in an online environment. If academics are not appropriately prepared, little can be done to salvage an essential component of the course, and this is likely to lead to low student morale, thereby compounding the problem.

Although no one style of education is going to be successful for all students, it is important that educational bodies and academics appreciate that effective support may be given to distant online learners by the implementation of, and adherence to, appropriate communication protocols. Universities have to ensure that their educators do not become blasé and assume that everyone knows what they mean – clear and precise communication has to continue for the lifetime of the institution's teaching and learning practice.

GL 6. Ensure that academics are aware of the problem of student isolation

Cowley et al (2002) provided a profile of '*ideal*' online students.

- Self-disciplined
- Mature, experienced
- High emotional quotient
- Willingness to ask for help (which requires self-awareness and high emotional quotient
- Independent

In reality, not many students would conform to this ideal. Students are likely to bring a wide range of backgrounds, experiences, and skills to the online environment.

Kearsley (2002) has stated that although online learning is seen by many students as the most flexible manner in which to study, it is not an ideal forum for all as it requires an enormous amount of self-discipline and initiative on the part of the student. It is also for many an isolating experience as they are more familiar with the face-to-face experience.

Isolation, or the lack of physical interaction, is not always seen as a constraint but as a symptom or side effect of online learning. It is hard for academics to combat this very real problem (Hara & Kling, 2000). Humans are gregarious beings and no matter how mature the student, the feeling of isolation that is often generated by the sheer geographical distance between students, and between students and academics is a very real problem that needs to be addressed before the courses are placed online. Solutions must be deployed to overcome this isolation or many students may elect to leave the course. The research of Wegerif (1998), Palloff and Pratt (1999) and Curry (2000) substantiated that the online medium is often seen as cold, and that student attrition can be high.

Daugherty and Funke (1998) indicated that the issue of isolation is *'an important criterion for student satisfaction'* with a web-based online course. This feeling of isolation is often *'based on the physical separation between student and instructor'* and is one that academics may be able to ameliorate, but are unlikely to ever be able to successfully eradicate. It is however very worthwhile to attempt to minimize this problem.

Cereijo, Young & Wilhelm (2001) confirmed that isolation could be a problem with online learning, particularly if students are extroverts, are visual learners, live near campus, have computer problems or are inexperienced. Despite this, they indicated that for those students who are working, have families, or face socio-economic problems, the concept of online education is a preferred option, as their other commitments may prevent them from attending face-to-face classes.

GL 7. Provide as much flexibility in schedules and procedures as possible.

Students attempting to study online may also become intensely frustrated by online administrative procedures. Generally, schedules and procedures will have been established so that the administration of the institution can operate smoothly and efficiently. However, changes will be needed if courses are to operate in an online manner. Additional flexibility is often required if online students' needs are to be fully met.

Roberts (2001) proposed a three-by-three grid to classify nine ways in which online courses may be said to be flexible. On the vertical axis are time, place, and mode of study; along the horizontal are administrative procedures, learning, and assessment. Many online courses would currently be worthy of a positive ranking in only perhaps two or three of the nine classifications, indicating that, at least according to this method of classification; true flexibility is still a long way off.

One of the nine classifications is the ability to learn via a variety of modes. Werry (2002) points out that:

> *"…students must, of necessity, show a great deal of initiative. They are at the "center" of the system in the sense that they must take charge of their education in a way that traditional students aren't required to. However, it isn't clear that this necessarily empowers students, provides for a better educational experience, or is really in line with constructivist pedagogy".*

As an opposing view, Rovai (2001) said that:

> *"Findings indicated that online learners took advantage of the learn anytime characteristics of the Internet by accessing the course seven days per week, 24 hours per day."*

Rovai (2001) indicated that students could adapt to, and cope with, the concepts used in online learning far more readily than is commonly acknowledged. Western society is becoming familiar with the use of the Internet, and students are more able to accommodate their study programs around their work and lifestyles. It is therefore up to administrators and academics to ameliorate any problems that exist within their institutions so that students may avail themselves of this form of education with ease. In the twenty-first century, potential students are likely to be more comfortable in the use of the online environment than are academics from previous generations.

What are the principal sources of student frustration? Three in particular seem to occur very regularly throughout the literature. Almost all students, but especially those studying online, expect prompt feedback on assignments, do not appreciate ambiguous instructions from academics, and get frustrated when the institution has 'technical problems' which can make communication problematic (Hara & Kling, 1999).

GL 8. Recognize the importance of prompt feedback and unambiguous communication.

In the online environment, students have an increased expectation that they will receive prompt feedback. If assignments are not returned promptly, and with adequate notations by markers, this

may well lead to an increase in the students' sense of isolation, contribute to their feelings of frustration, and lead to a repetition of mistakes in follow-up assignments.

The expectation of prompt feedback needs to be addressed at the outset of the course. The instructor should make explicit to the students the rates of response that can reasonably be expected.

Ambiguity can also be a source of major dissatisfaction. If academics do not give clear and precise directions concerning assessment requirements, and then receive incorrect assignments based on those unclear instructions, the students may have justifiable complaints if they are penalized for submitting incorrect work. Clear and unambiguous communication is a key concept that all academics must follow whether in a face-to-face or online course. It is therefore of extreme importance that all academics be instructed in the use of email and chat room styles of communication (see Diagram 2).

GL 9. Provide a well resourced permanently available Help Desk facility.

Technical problems may present substantial challenges for academics. Students may be left with negative feelings towards online education if course web sites and chat rooms are unable to be accessed due to technical problems. This is often the most difficult of the limitations to overcome. Institutions should as a matter of priority ensure the provision of well-resourced IT departments able to maintain and upgrade computing facilities and hardware, thereby minimizing the potential for technical problems, as well as providing well-trained and patient help desk staff able to respond promptly to 'cries for help' from students (Kazmer, 2000). It is essential to recognize that such support may be especially important to online students outside of normal office hours.

GL 10. Implement appropriate feedback mechanisms to enable continuous improvement.

It is essential that adequate communication channels and feedback mechanisms be provided for academic and administrative staff, and for students. Appropriate feedback is not just the ubiquitous survey forms, which students are loath to fill in but also the intelligent use by academics and administrators of good and clear communications technology – whether synchronous or asynchronous.

Academics and administrators should constantly gauge the success of the course materials via interactive processes. Have they successfully achieved what they set out to do – the creation or adaptation of a standard course to its new online environment? Have the students found this environment to be an easy one in which to study?

With careful monitoring of the appropriate communication mechanisms, such as email lists and course specific chat rooms, academics will be able to find, understand, and hopefully solve, any problems that may be a cause of concern. This continuous feedback from students will be one of the most important tools used to improve the online course materials. This process will also enable the academics and administrators to gauge the success of both their materials, and the delivery method.

Summary

The issues that confront academics, administrators when they attempt to introduce online learning courses in the curriculum of their educational institutions are many. This paper has attempted to highlight some of the common problems, and has presented ten guidelines designed to ensure that online courses have a reasonable expectation of success – that is, where the courses present an environment in which students are capable of effective learning. With careful planning, the introduction of online learning can greatly benefit all those involved – academics, administrators, and students.

References

Aitken, J. E. & Shedletsky, L. J. (2002). Using electronic discussion to teach communication courses. Communication Education. vol. 51 (3), pp. 325-331.

Berge, Z. L. (1998). Barriers To Online Teaching In Post-Secondary Institutions: Can Policy Changes Fix It? Online Journal of Distance Learning Administration, Volume I, Number 2, Summer 1998 http://www.westga.edu/~distance/Berge12.html (Accessed on November 29, 2004)

Bowman, L. (2003). Interaction in the Online Classroom. In DegreeInfo. Com http://www.degreeinfo.com/article7_3.html (Accessed on November 29, 2004)

Cereijo, M. V. P., Young, J. & Wilhelm, R. W. (2001). Factors Facilitating Student Participation in Asynchronous Web-Based Courses. The Journal of Computing in Teacher Education. 18 (1). http://www.iste.org/jcte/pdfs/te18132cer.pdf (Accessed on July 4, 2004)

Cowley, J., Chanley, S., Downes, S., Holstrom, L., Ressel, D., Siemens, G. & Weisburgh, M. (2002). Preparing Students for Elearning http://www.elearnspace.org/Articles/Preparingstudents.htm (Accessed on December 1, 2004)

Curry, D. B. (2000.) Collaborative, Connected and Experiential Learning: Reflections of an Online Learner. http://www.mtsu.edu/~itconf/proceed01/2.html (Accessed on July 4, 2004)

Daugherty, M., & Funke, B. L. (1998). University faculty and student perceptions of Web-based instruction. Journal of Distance Education, 13 (1), 21-39.

Finley, D. (2000). Communication Issues in the Online Classroom. The Online Express, Fall 2000. http://academic.pgcc.edu/~dfinley/communicationissuesonline.htm (Accessed on November 29, 2004)

Glenn, L. (2002) as cited in Academe, Jan/Feb 2002, Vol. 88, Issue 1, p. 15. (Anonymous author)http://proquest.umi.com/pqdweb?index=10&did=000000101407914&SrchMode=1&sid=1&Fmt=3&VInst=PROD&VType=PQD&RQT=309&VName=PQD&TS=1081563977&clientId=48651 (Accessed from ProQuest 13.04.04)

Haight, W. (2002). Understanding Student Frustration. Online Classroom: Ideas for Effective Online Instruction. April 2002. http://www.regent.edu/admin/ctl/newsletter/2003/02-05-03.html (Accessed on December 4, 2004)

Hara, N. & Kling, R. (2000). Students' Distress with a Web-based Distance Education Course: An Ethnographic Study of Participants' Experiences. Turkish Online Journal of Distance Education-TOJDE April 2003 ISSN 1302-6488 Volume: 4 Number: 2. http://tojde.anadolu.edu.tr/tojde10/articles/hara.htm (Accessed on July 4, 2004)

Indiana College Network (2004). Becoming a Successful Online Student

http://www.icn.org/studentservices/success.html *(Accessed on December 4, 2004)*

Kazmer, M. M. [2000]. Coping in a Distance Environment: Sitcoms, Chocolate Cake, and Dinner with a Friend. First Monday, Volume 5, Number 9 (September 2000). http://www.firstmonday.dk/issues/issue5_9/kazmer/ (Accessed on July 9, 2004)

Kearsley, G. (2002). Is online learning for everybody? Educational Technology, 42 (1), pp. 41-44. available at http://home.sprynet.com/~gkearsley/everybody.htm (Accessed on November 29, 2004)

Lewis, C., (2000). Taming the Lions and Tigers and Bears in White, K. W. and Weight, B. H., (eds.), (2000), The Online Teaching Guide: A Handbook of Attitudes, Strategies, and Techniques for the Virtual Classroom, Allyn and Bacon, Boston.

McInnerney, J. & Roberts, T. S. (2001). Towards Online Engineering: Fitting Square Pegs in Round Holes AAEE 2001, Brisbane, Queensland, 26-28 September 2001.

McInnerney, J. & Roberts, T. S. (2002a). Online Learning and Effective Communication ASET 2002, Melbourne, 7-10 July 2002.

McInnerney J & Roberts T S (2002b). Online Collaborative Learning: Have We Overcome The Obstacles? ICCE 2002, Auckland, New Zealand, 3-6 December 2002.

McInnerney, J. & Roberts, T. S. (2004). Online Learning: Social Interaction and the Creation of a Sense of Community, Educational Technology & Society, 7 (3), 73-81, ISSN 1436-4522.

Palloff, R. M. & Pratt, K. (1999). Building Learning Communities in Cyberspace: Effective strategies for the online classroom. Jossey-Bass Publishers, San Francisco.

Panettieri, J. C. (2004). Inside Tips for Better Online Ed Don't just envy the University of Phoenix, learn from it. University Business July 2004. http://www.universitybusiness.com/page.cfm?p=577 (Accessed on November 29, 2004)

Priest, L. (2000). The Story of One Learner: A Student's Perspective on Online

Teaching. In K. W. White & B. H. Weight (Eds.), The Online Teaching Guide: A Handbook of Attitudes, Strategies, and Techniques for the Virtual Classroom (pp. 37-44). Boston: Allyn and Bacon.

Roach, R. (2002). Staying Connected: Getting Retention Right Is High Priority For Online Degree Programs Back Issues in Higher Education Vol. 19, Iss. 18, p. 23 http://proquest.umi.com/pqdweb?index=5&did=000000581471771&SrchMode=1&sid=1&Fmt=3&VInst=PROD&VType=PQD&RQT=309&VName=PQD&TS=1081563391&clientId=48651 (Accessed on July 4, 2004)

Roberts, T. S. (2001). A Classification Scheme for Flexible Learning. ITiRA Conference, Rockhampton, Queensland, 5-7 September 2001.

Rossetti, P., (1998). Gender Differences in E-mail Communication. The Internet

TESL Journal Vol. IV, No., 7, July 1998. http://www.aitech.ac.jp/~iteslj/Articles/Rossetti-GenderDif.html (Accessed on July 20, 2005)

Rovai, A. P. (2001). Building Classroom Community at a Distance: A Case Study. http://www.alnresearch.org/Data_Files/articles/full_text/rovai01.pdf (Accessed on July 27, 2004)

Smith, G.G., Ferguson, D. & Caris, M. (2002). Teaching over the Web versus in the classroom: Differences in the instructor experience International Journal of Instructional Media. New York: 2002.Vol.29, Iss.1, p. 61 http://proquest.umi.com/pqdweb?index=32&did=000000112012079&SrchMode=1&sid=3&Fmt=4&VInst=PROD&VType=PQD&RQT=309&VName=PQD&TS=1090891200&clientId=48651 (Accessed on July 27, 2004)

Tannen, D., (1994). Talking From 9 to 5. New York: William Morrow and Company.

Toporski, N. & Foley, T. (2004). Design Principles for Online Instruction: A New Kind of Classroom Turkish Online Journal of Distance Education-TOJDE January 2004 ISSN 1302-6488 Volume: 5 Number: 1 http://tojde.anadolu.edu.tr/tojde13/articles/toporski.html (Accessed on November 27, 2004)

Wang, A. Y. & Newlin, M. H. (2001). Online Lectures: Benefits for the virtual classroom. *T.H.E. Journal*, vol 29 (1), 17-24. http://www.thejournal.com/magazine/vault/A3562.cfm (Accessed on July 4, 2004)

Wegerif, R. (1998). The Social Dimension of Asynchronous Learning Networks. Journal of Asynchronous Learning Networks, vol 2 (1). http://fels-staff.open.ac.uk/rupert-wegerif/rwpapers/jaln.pdf (Accessed on July 4, 2004)

Werry, C. (2002). The Rhetoric of Online Education. Radical Teacher. Cambridge: Spring 2002. Iss. 63, p. 7. http://proquest.umi.com/pqdweb?index=21&did=000000592462951&SrchMode=1&sid=3&Fmt=3&VInst=PROD&VType=PQD&RQT=309&VName=PQD&TS=1090890963&clientId=48651 (Accessed on July 28, 2004)

Wood, S. (2002). *Developing New Ways to Provide Service* NSW Dept. of Education and Training, 2002. http://www.schools.nsw.edu.au/learning/yrk12focusareas/learntech/blended/exemplar6.php (Accessed on July 21, 2005).

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Editor's Note: If a bell-shaped curve describes the spectrum from innovative to conservative, this paper attempts to find common ground and resolve differences between these extremes in institutions of higher learning. Do these vocal minorities facilitate or retard development and moderate each other? What advantages and challenges does each offer for teachers, learners and the community?

Enthusiasts focus on access to education for unserved or underserved learners and logistical advantages to integrate learning into work and family schedules. Critics emphasize lack of face-to-face contact and personal dialog that complement lectures and laboratory experiences. There is a growing tension between preserving academia as we knew it and/or adapting it to be accessible, efficient and relevant in the future. Small and vocal minorities are steering education and distance learning in different directions at the same time. They provide checks and balances for each other and pose questions for scholars to resolve through research and dialog.

In searching for common ground and solutions, Katrina Meyer found a trichotomy and issues that will be argued in the halls of ivy for years to come. And while the dialog continues in traditional institutions, other organizations continue to develop and propagate distance learning programs for regional and global education and training.

Technology-Driven Change: Moving From Theory to Assertion to Evaluation

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Abstract

Current discourse about technology or the Internet in higher education is influenced by two extreme views. In the positive view, technology is transforming higher education into a better organization and in the negative view, it is destroying higher education. There seems to be little middle ground between these diametrically opposed positions. This paper explores the ramifications of these opposing positions and develops a transactional view that focuses on a mutual relationship that recognizes that technology and higher education affect each other and that this relationship is changing, on-going, and revising the relationship even as it is formed and reformed. This view would argue for more careful analyses of how the Internet is changing (or combining with other forces to change) higher education as well as how it is not. It is a more balanced view of the interaction of technology and higher education, and more fruitful for developing thoughtful identification of problems and solutions.

Introduction

The past several years have seen numerous articles that claim that technology (often poorly defined) is "doing" several things to higher education. Examples of such claims are Barone et al. (2001), where technology will "transform" higher education, or Noble (1998), where technology is "destroying" higher education. It is as if these views are diametrically opposed and with little room to negotiate an amenable resolution of the conflict. These statements tend to be laden with strong emotion and influenced by deeply felt values about what higher education is, what is best for higher education, and what technology can or will do. Higher education is either virtuous and doing the Lord's work of educating youngsters or it is moribund and failing to fulfill its public purpose. Technology, then, is introduced to destroy the good work of teaching and learning in academe, or it will prod a sluggish institution into new life and service. This is why technology is not-so-subtly characterized as "good" or "evil." In either case, as you can tell, the characterizations are cast in the boldest strokes of black and white, with little shadings of gray or recognition that both stances may be partially true.

These claims beg for an analysis of the theoretical or suppositional frameworks that authors use when they speak of the role of technology and its effects on higher education. This paper will review these theories and the assumptions upon which they are founded. Next, it will further ground these theories with the perceptions and points-of-view of professionals working in educational telecommunications. As often as necessary, practical examples will ground the work further and help make some of the more abstract and abstruse concepts or ideas more clear and understandable. And lastly, it will develop an integration of the two theoretical frameworks and outline lines of research that might help evaluate the value of this new, integrative approach. Please note that judging the veracity of the claims made by technology's critics or advocates is beyond the scope of this effort, but is surely a worthwhile endeavor. Instead, the focus of this paper will be on finding a way to forge a truce if not a working compromise between the warring parties.

Definitions

Please note that while many early writers use technology as an unspecific term – sometimes defined differently by each writer or not at all – current writers about technology are discussing the Internet or information technology. Unfortunately, these are disparate definitions and likely produce a variety of influences. The discussion that follows will try to be precise in its use of the authors' preferred terms: either "technology" or the "Internet" as the case may be. However, these distinctions are important and the reader should keep these distinctions clear and not presume that "technology" means the same thing in all contexts.

Theoretical Frameworks

Barone et al. (2001) and Noble (1998) may or may not know it, but they are working from two distinct theoretical traditions on the effects of technology on human beings and their institutions. The first tradition is, for lack of a better term, the negative view and the second tradition is the optimistic view.

The Negative View

Ellul (1964), Barrett (1978), and McLuhan (1964) may be some of the better-known philosophers and critics of technology and specifically its effects on humans. Ellul (1964) describes "technique" as those methods that create their own reality and world view, which is a characteristic not just of modern technologies but our uses of them. Technique is not synonymous with technology, but technology systematizes and grounds technique in its processes and uses. Tenner (2003) states that technology and technique are inseparable (p. 5) but different, with technology used to describe the created thing (whether machine, tool, or item) and technique describing the processes and laws that predetermine, create, and use things. There are intellectual techniques, such as history and philosophy, as well as cultural techniques that stress systematization, rationalization, and the drive for efficiency. One such example of the technology-technique interaction and its effect on humans is how Microsoft Office software uses earlier office practices to structure activities. Documents to be worked on are in "files" and "directories," and there is a "trash can," "cut and paste" routines, and "format" options. These are perhaps innocuous examples of how a piece of software has structured our uses of computers, but it is also an example of how the adoption of an earlier technique has spread office concepts into all uses of the computer, including personal and/or creative uses.

Barrett (1978) extends Ellul's thinking and applies technique to the control and determination of human behavior, which is much broader than just technological control or spying on humans at work, but the subtle processes whereby the individual is treated more like an object and less like a subject. Although an imperfect analogy, this may be the source of higher education's discomfort

with making students into customers, as students are transformed into mere partners in a business-like transaction. If we can continue with our Microsoft Office example, the software often assumes it knows what a writer is doing or wants to do and intrudes with dictated spacing, numbering, and indenting. The user is imposed upon by the software, is no longer in control of their document, and must disable these assumptions or concede to the software. The user is no longer a subject, but is subjected to the authority of the software.

Similarly, Postman (1993), never a fan of technology, expressed a fear that people will become "tools of our tools" (p. 3). In this view, which owes much to McLuhan, he worries that an important unintended consequence may be how technology changes our selves and our relationship to our creations (Meyer, 2005c). Freedom is lost and human agency impaired. Humans are products of media (Levinson, 2001, p. 183), which we may create and manipulate, but which also shape us in return. Two examples of this process might be the rise of so-called "Internet addiction" or perhaps less drastic examples may be how some adolescents turn their virtual games into a pseudo-reality or how spending too much time online might impair the development of social skills among children.

These are serious charges and the various authors ground the veracity of their claims in personal and societal experiences of how technology has changed our lives. These charges are taken up by more modern writers on technology such as Gurak (2001), Noble (1998, 2002), and Tenner (1996). Gurak (2001) extends the thinking of Postman and McLuhan about technology changing our selves and places it squarely within the emerging influence of the Internet: "How we view the world and how we live in it are being shaped by the features of these new technologies" (p. 10). Perhaps each of these writers on technology would disagree with the assertion that "technology is neither good nor bad, that only our use of it makes it so" (Neiman, 1998); in other words, there is a quality or something about technology that can be bad for humans. And this is not a matter of opinion or of mere human usage or intent. It is the character of technology to be bad for us.

Gurak (2001) has also noted how we "build our biases into technology" (p. 64), thereby making permanent our misassumptions and prejudices about learning or people. At first, the web was used by instructors as a place to post lecture notes or the course syllabus. These actions are no different than usual instructional practices that keep the instructor as the center of the course and in control of its activities and content. These uses belie an assumption that education is one-way, from teacher to learner, and that the web is a mere repository of learning aids and not a place for work or learning.

Noble (1998) has effectively tied the effects of technology (more specifically, digitization and more generally, distance education) to the commodification and corporatization of academia. Roberts (1998), in "Rereading Lyotard," relates commodification to the exteriorization of knowledge, now made possible by computerization and especially the immense information storage possibilities of the worldwide web. In other words, now that knowledge (or perhaps more accurately information) is exteriorized on the web and outside the control and humanistic motives of the university, it can be bought and sold like a commodity, and business assumptions and processes will begin to dominate the transaction. This spells the end of the university's control and influence over the use of knowledge and the ascendance of businesses who can figure out how to package, deliver, and market such goods and make a profit for their stockholders.

Tenner (1996) calls an unintended consequence of technology a "revenge effect," which results when complex systems cannot be completely mapped and it is impossible to test all possible occurrences (p. 16). Flaws will occur. Witness every new version of software, which needs hundreds of users to uncover hidden errors and missteps between execution and result. Tenner also proposes that technology alone "usually doesn't produce a revenge effect. Only when we anchor it in laws, regulations, customs, and habits" (p. 9) is a revenge effect likely to occur.

Perhaps a good example of this process is the way rules about requiring "seat time" has plagued online and distance learning. A rule to govern an older technology (that is, the classroom) has been used inappropriately to hamper the development of online learning, far after the six regional accrediting associations have removed much of their former language on seat time in favor of stressing the assessment of student learning outcomes.

From Tenner (1996), we can know that complex systems and the application of inappropriate regulations or practices to technologies may be more likely to lead to unintended consequences. An example of this is intellectual property policy. When online courses began to be more widely developed, faculty and institutions viewed these courses as possible sources of income. These courses were not included in existing intellectual property agreements, and the push to include online courses and to negotiate a sharing of the proceeds caused anguish among institutions and their faculties. The assumptions were that online courses would generate revenue beyond course tuitions, they were different from other traditional intellectual property (e.g., books) retained by faculty, and therefore institutions could or should assert ownership rights. These misassumptions and inappropriate regulations led (although it was unintended) to antagonism among faculty that is still felt on many campuses.

The Internet has also been called a "disruptive innovation" (Christenson, 1997; Duin et al., 2001; Meyer, 2005a), a technology that has already changed definitions, roles, and even institutions. E-mail may be the best example of a relatively simple technology that makes it possible for one person to contact everyone in an organization, be they the CEO, president, or secretary. The level of the person communicating, the importance of their communication, and the immediacy of the message is all the same, whether it is a joke being shared from the guy in the mailroom, a notice of raises for all employees, or a request for assistance. This quality has the ability to flatten an organization and communication, changing certain institutional rules about who has power, who has information of importance, and the approved route or flow of communication.

What makes the Internet "disruptive?" It is disruptive because former rules or skills may not be helpful in managing the innovation and may even result in counterintuitive outcomes. When former assumptions or rules do not work as intended, the result could well be an unintended consequence. A favorite example of an innovation that seems to be impervious to former rules is the file-swapping phenomenon, where college students use their college networks to download music and share their music with others of like taste. Universities charged with stopping or slowing this practice have found that students are immensely creative in pursuit of their ends and better versed in the technologies involved. Policies against stealing musicians' intellectual property, penalties for getting caught, and limitations on storage space on university servers seem to have only slowed this practice. This may be a case of the technology making possible a practice that not only violates current law, but has the potential of disrupting any attempt to manage it. In fact, by managing it in traditional fashions (e.g., policy), it may only encourage the practice to morph into new areas that are even harder to regulate and more disruptive in new ways.

These are not mere fears or simple fears. They are fears that are overwhelming to the fearful. Technology is frightening because we are sometimes blind to its effects (Levinson, 2001) and we are caught unawares and unprepared and perhaps left to deal with some very negative consequences. When fears about technology are minimized and dismissed, the fearful feel as if they have been treated with disdain, labeled "Luddites," and treated as if they were un-American, unmodern, and worse, childish. Yet from the perspective of those fearful of technology, these trends are on-going, self-evident, and spell difficulties for human values held personally dear, such as free will and our own humanity. Birkerts (1994), Locke (1998), and Healy (1999) have all written passionately about their fears of technology, how it will change reading, our sense of self, and our ability to relate to others, our sense of what reality is and can be, and even the creation of

new and different brains in young children. Use of technology in education is particularly frightening, since it affects the young and vulnerable and may have lasting effects.

These fears in turn influence perceptions of the future role of higher education, who controls higher education, and the role or function of faculty. Is the highest role of higher education to liberate students, to help them realize their full potential, or should it train them solely for productive lives? Is the control of higher education being eroded, gradually being taken over by legislatures, governors, and business leaders? And will faculty remain teachers with responsibility for maintaining curricula, quality standards and student learning, or will they be made into employees and responsible to administrators and boards for improving productivity and keeping control of sky-rocketing costs? The careful reader will note the largely negative cast to these perceptions, which can be readily overhead in conversations among faculty at meetings and lunchrooms. They express fears that in turn take much from the negative view of technology, but also perhaps the pessimism of individuals who no longer feel control over the changes that seem to surround and overwhelm them. Such persons are made more fearful and perhaps more extreme for having no means to influence the outcome.

The Optimistic View

The more optimistic view of technology – and more specifically the Internet or information technology – has resulted in the views captured by Barone (2001) as well as Hooker (1997), Matthews (1998), Norris (2001), and Morrison (2003). This is the view of technology as liberator and change agent: "New tools cause people to imagine new purposes" and change "people's understanding of what they can do, what they want to do, what they think they need to do" (Burbules & Callister, 2000, p. 10, 13). New tools allow us to imagine new forms of success and new definitions for success as well. New tools can change us for the better, by releasing human creativity in new ways. New tools can perform some work for us, doing the work better perhaps, and freeing us for new tasks.

The view that the Internet will "transform" higher education is a theme in much of the current literature on the Internet and its effects on higher education. Hooker (1997) states that "technology will change the way we order life" and that "higher education is on the brink of a revolution" (¶1). Matthews (1998) claims that "information technology is transforming higher education" (¶5); Norris (2001) claims that "we finally have the power and the right tools to finally transform higher education" (¶7); Morrison (2003) states that "American higher education is undergoing substantial change" (¶1); Pittinsky (2003) also thinks the Internet and information technology will transform higher education. Such a consistent view of the impact of information technology and/or the Internet is remarkable; why is this so? Perhaps this is the result of a common assumption that technology is, first of all, that new tool that allows us to imagine new purposes and second, that it has the potential (through some implied quality or effect) to make positive changes to higher education.

What is that quality or effect? Perhaps our best guide to asking how that potential works is to think of the process of learning, especially constructivism. Learning constructed from new and challenging personal experiences helps us draw new inferences, develop new theories, and possibly reconstruct old learning into new insights. Perhaps it can also draw from the "reframing" process encouraged by Bolman and Deal (1997), whereby new frames or theories are used to put a different perspective on the situation, provide a new way of looking at an old problem, and possibly develop a new understanding and solution. Perhaps a new tool is simply a new opportunity to construct some new understanding or perhaps it is simply a new frame.

At this point, the analysis of this optimistic view of the impact of the Internet needs to grapple with three questions. What are the means or mechanisms that bring about this transformation? What qualifies as transformation? Is it the sole influence of the Internet that can be credited with

these changes or is it combining in some fashion with other influences to create change? These questions need grounding in the experiences of professionals who are currently working in and around these issues.

In this stage of the analysis, the author engaged in a weblog conversation with members of the Western Cooperative for Educational Telecommunications (WCET). Members of WCET are drawn from over 40 states and several nations, including two- and four-year colleges and universities, state and system governing boards, technology companies, and accrediting associations, among others. It is particularly known for its work on cutting-edge issues of administration and policy, innovation and practice. It is an organization devoted to practical issues of improving institutions' use of technology but also developing new uses of technology that respond to the needs of the over 230 member institutions. The author placed a question on the weblog that asked interested members to comment on a) the changes in higher education they attributed to the introduction and action of the Internet; b) the importance or significance of these changes to higher education (and why); and c) whether the Internet i) "caused" the change, or ii) supported or reinforced other forces for change, or iii) only augmented other forces for change that may have preceded the Internet or were more influential than the Internet. One would not expect the comments of professionals in such an organization to be negative, as indeed they were not. But the weblog allows us to ground the discussion of theoretical frameworks with the perspectives of professionals working in the distance learning arena, be they at the institution, system, or state level.

What are the means or mechanisms of transformation? They seem to be several. There is the role of the "information revolution" and "management revolution," which combine to push an agenda focused on learning productivity (Hooker, 1997); the elimination of the need for synchroneity (Matthews, 1998); the possibility of "pervasive interactivity" (Norris, 2001); the influence of a generation of "digital natives" (Morrison, 2003). Some of these are tantamount to removing former barriers (e.g., education had to be synchronous and essentially one-way – from teacher to student – limiting the amount of interaction possible in a class). Others are changes occurring independently that create new possibilities (e.g., the push and possibility of improving learning productivity and the "digital natives" phenomenon).

Responses from the weblog conversation about means and mechanisms of transformation with members of the Western Cooperative for Educational Telecommunications (WCET) uncovered several other mechanisms, including the role of the Internet to "increase access to higher education" by destroying distance and time constraints, "increase access to knowledge, information, and learning resources," increase "individualization in learning placing the learner at the center of the enterprise," and increase attention to "quality in both the online and on-campus" classroom. In each of these comments is imbedded a notion that the Internet made access (for students), access (to knowledge), individualization, and attention to quality possible or enabled. There does not seem to be a sense that these means dictated or determined certain outcomes, but they did certainly make these outcomes more likely to occur.

What qualifies as transformation? These changes are not mere changes or simple changes, but transformative, or "to change a thing into a different thing" or implying "a major change in form, nature, or function" (Merriam-Webster, 2005). These definitions seem to imply that transformation may not simply be a matter of judgment or in the "eye of the beholder," but a matter ripe for extended research and evaluation. For instance, one might attempt to uncover the extent to which increasing access to higher education through online learning to the placebound or working student is transformative as it changes the character of the university, by encouraging changes to its student services as they are moved online or changing the composition of enrolled students by adding more working adults to the mix and providing greater attention to their needs and interests. Now this same phenomenon might not be true for a community college whose

mission may have always included those students, so this might be an example of a transformation that is not systemwide, but for a particular institution or set of institutions. The point here is that what qualifies as transformation will be different for different institutional types, and simplistic claims for "transformation" might need to be subjected to further analyses that break down the processes of transformation by institutional type, location, and/or mission.

What the mechanisms have in common is a sense that the Internet can or will or has changed fundamental assumptions or structures. In other words, a fundamental assumption of higher education has been that faculty and student must meet face-to-face in some modest physical proximity (large lecture halls notwithstanding) for teaching and learning to occur. Other assumptions under re-examination are that on-campus classes are of the highest quality and the only or best means of providing an education. An example of a structure that has changed in a radical fashion is the web as repository of information rather than relying solely on a physical library. Universities, who remain justifiably proud of their physical libraries, find that the web also acts as a library and even makes online holdings of the library available wherever the student is. Another example is the way asynchronous education plays havoc with the structure of the class, making it expand beyond the timeframe of set class schedules and makes the concept of a classroom expand to include discussions and activities occurring while logged on at home or work (Meyer, 2003). And perhaps another example of an assumption and structure that is changing is faculty "office hours." A mainstay of the faculty role, office hours become less and less necessary as students take advantage of email to access faculty 24x7 which transforms assumptions about how faculty perform their various teaching and advising duties and the way or structure by which these duties are offered.

Lastly, is it the Internet alone that is causing these changes or is it one of many forces acting on higher education at the current time, combining with other forces to augment or modify influences, so to speak? This is a difficult issue to untangle. In an assessment of means and ends and what is good and bad, the "inseparability and interdependence of many consequences should begin to shake the faith that such determinations can be so readily made . . . the very same effects can be regarded as 'good' or 'bad,' depending on other considerations, or when evaluated by different people" (Burbules & Callister, 2000, p. 12). For example, as technology made the possibility of increasing access to higher education a possibility, it also increased the potential size of the higher education market. This in turn contributed to the dot.com boom-and-bust cycle, which both increased the number of new providers but also the number of alternative or types of providers, including for-profit, online or virtual, corporate, and traditional universities with expanded continuing and distance education offerings. This changed the higher education landscape by increasing competition among providers, increasing choice for potential students, and increasing the likelihood that higher education institutions thought and acted more businesslike or like competitors rather than autonomous entities impervious to external pressures. There is a flaw in this argument, since with the expansion of the market and numbers of students to be served, competition over students did not occur as supposed (Meyer, 2004), but this is an example of how several changes are inseparable and interdependent and combine to create new conditions. In other words, complex systems are both difficult to unravel but even more difficult to evaluate consistently or predict accurately.

Responses to the WCET weblog are particularly interesting, identifying other forces at work as "budget-cutting" by the states, student "demographic changes" (e.g., the growth in adult, working students), the "public's demand for accountability," and higher education's "resistance to change." Occurring somewhat simultaneously as the popularization of the Internet, these forces are seen to combine their influences along certain trajectories: a demand for greater learning productivity, a need for accountability, and perhaps a growing lack of patience with higher education's usual sense of autonomy. Another example of a combination of influences that

includes technology but is not solely dependent upon it is the rise of virtual universities, beginning with the creation of Western Governors University (WGU). In this case, governors of western states were being pressured by the growing numbers of students demanding higher education and companies demanding well-prepared employees as well as on-demand professional development for existing employees; at the same time, governors were experiencing pressures on state budgets from the rising costs of health care, transportation, and prisons and various forms of taxpayer revolts. Technology, with its promise to increase access and improve productivity, was a fortunate development that made WGU an immediately important public policy tool for driving change in traditional institutions who were less interested in helping to solve the states' problems (Meyer, 2005a).

Untangling the precise role of each of these influences may be impossible, but it is essential to recognize that the Internet was likely not the only influence on higher education and may deserve less credit for either transforming or destroying higher education as we currently know it.

A Digression

Before we proceed to a discussion of the integrative or transactional view of technology's impact on higher education, it is important to take a short digression and discuss the ways in which the positive and negative views are similar and different. For example, both of these seemingly opposite views assume that technology is a change agent, that it has the power to influence an organism or organization such as higher education to change in some fashion. That power seems not to be at issue in either view. What is at issue is whether the change is a good or bad one. However, lest one thinks this is a matter of opinion or a simple matter of having different points of view – as in "he prefers apples but she likes oranges" – a careful reading of these writers leads one to conclude that the difference is more extreme or profound. The difference is more on the scale of "this way leads to destruction and that way leads to liberation."

In any case, it is important to remember – despite the extreme qualities of the language – that these views are based on the same assumption that technology can and will change us. This similarity should not be minimized, and while it is intriguing, it is not the current focus of this paper. However, further research is necessary to explore the precise circumstances or processes that are credited to technology and that do not seem to have any effect on higher education, and determine why this is so.

But let us return to the issues of how to characterize the impacts labeled as positive or negative. These impacts may have a nature of their own which is a simple description of the impact, but what is more intriguing are the different responses to them. For example, communications are rapidly being tied to the Internet, and more particularly to the use of email and web sites. This is true for universities that are rapidly placing various services onto their home pages and relying on emails to communicate with faculty and staff. This, using the earlier term, is the nature of the change. However, whether this change represents a *loss* as face-to-face communications decrease (if this is the case) or a *gain* as important information is shared in a more egalitarian fashion, is a result of your positive or negative view of a) technology, b) change, and c) the type of change. For instance, a negative view would likely expect damage from the introduction of email, look rather dimly on changes generally, and be more distressed by this particular change and its loss of face-to-face communications. This is not just a simple difference of opinion, but represents a difference in theory or world view that an individual applies to questions of technology and change. This assertion ought to be assessed further, but for our purposes, it may be sufficient to wonder if our positive and negative views work as theory or principles or beliefs that explain phenomena and provide a basis for action (Merriam-Webster, n.d.).

This has been a long digression, but an important one. It has set out two areas of research – investing ways technology does *not* change higher education and whether the positive and negative views are *theories that shape personal perceptions*. One benefit of having answers to these questions will be a better and perhaps more shaded or rounded perspective of technology and change, one that recognizes that no changes may occur and any positive or negative qualities are the result of an individual's world view which can be tested. The importance of this testing would be a search for instances that disagree with the theory or world view and finally, perhaps a more balanced point-of-view of technology. Rather than all-good or all-bad, such an exploration might lead more individuals to see technology as producing varied results – some good and some bad and others that are no change at all – or at minimum, that the results are interpreted differently by persons with different world views. This grounds the discussion on the world views and assessing these views and less so on the technology.

We can now return to the development of another alternative view that focuses on how humans and technology interact, influencing each other, and creating a new, integrated view.

The Integrative or Transactional View

There is a third approach to the "technology/society divide" (Latour, 1991, p. 103). This divide is partially responsible for the two extreme positions: pro versus anti technology, technology as doom versus transformational agent. We can either stand "opposed to a technology outside of us, or . . . be transformed by that technology . . . [or] be neutral about technology, or see it as only a tool" (Bruce, n.d., p. 3). The technology/society divide is so fundamental to our thinking about technology that it is difficult to see it in any other fashion; it screens out other points-of-view and in fact makes other views impossible to conceive. This division is the result, in part, of our conceptualizing technology as different from social reality, which is a "linguistic convenience, one that ultimately causes more confusion that clarity" (Bruce, n.d., p. 3). It is a convenience – to help us put words to our ideas and making conversation possible -- that in turn contributes to the "autonomy myth" (Bruce, 1996). This myth supposes that technology works independently to shape practice or that social practice shapes everything in its path. Autonomy is a myth because it ignores the ability for each party to the divide to "dynamically reconfigure each other's meaning" (Bruce, n.d., p. 4).

These diametrically-opposed positions – the positions of the autonomy myth -- do not allow for a mutual relationship between humans and their tools, technology and higher education. A mutual relationship would recognize that each affects and is influenced by the other, and that this relationship is changing, on-going, and revising the relationship even as it is formed and reformed. This is a different point from the Burbules and Callister quote above, that different interpretations of good and bad are likely, but it focuses on the reflexivity between the change agent and the changed that is less simple and straightforward and much more complex than some technology proponents and opponents allow. In fact, "as we analyze, discuss, and use technologies, we change them" (Bruce, n.d., p. 4). This is, therefore, a "transactional" view (Bruce, n.d., p. 11).

This transactional view also incorporates Dewey's theory of constructing meaning that recognizes the reflection, reflexive, and changing nature of the process as well as the meaning resulting from the process that can, in turn, change the process and subsequent and different meanings. Knowing is a process whereby the individual learns through reflection and communication with others, and each interpretation is essentially transactional. Each time the learner encounters phenomena such as a new technology or use for technology, his or her interpretation is neither determined by the external encounter with technology nor is it independent of the encounter. To put this process more simply, one's understanding of technology is transactional, reflexive (going back and forth multiple times between the learner and his/her experience with technology), and ultimately

constructed in possibly very unique ways and with unique interpretations. The outcome is not pre-determined.

This process begs for some examples to ground it in real situations. Just as technology has increased access to higher education, it has increased the demands these students have placed on institutions for new online student services, 24x7 support, more classes online. Having more online classes and services in turn expands the number of students who may be attracted to the institution, further exacerbating the type and number of demands for service. Each affects the other in ways that create new higher education markets and services and perhaps, a new higher education organization. Or think of two possible interactions that might shape higher education's future. The first interaction focuses on the growth of web sites and online resources (e.g., online peer-reviewed journals), which might decrease the need of faculty to be the sole content provider and arbiter of course content; this would free up faculty time for other roles as Massy (2002) has proposed, which might improve the quality of student learning as faculty focus on taking student learning to higher (or deeper) levels. The second interaction focuses on the growth in availability of higher education, which as more programs go online and more providers enter the market, might make it easier for students to find a good match for their interests and abilities. In both cases, the interactions may be influencing the creation of new faculty roles or educated citizenry.

Reflexive changes are on-going, and each change has various potential trajectories. Let us return to the traditional college, which has several options when faced with the disruptive changes of the Internet. It can use technology to pursue new markets, compete in its current market, or focus on improving learning for students in on-campus programs. Certainly these options can be combined, but for now, let us assume they are separate options. The first trajectory – to pursue new markets – may well be successful, leading to more and more attempts at new markets, or it may be a failure, and sour the institution for further programs and confirm its traditional ways of doing business. These changes are reflexive – affected by success – and they confirm the institution's pursuit of a particular path or trajectory. Or perhaps the early attempts are not successful, but upon reflection and further study, the institution decides to continue its pursuit of new markets, but to do so using different means or practices. Again, reflexivity makes further learning possible as well as multiple trajectories. One might picture this process as an immense decision tree, where decisions flow from prior decisions leading to later decisions that in turn comprise a path in a direction or trajectory.

If there is value in this third, transactional view of technology and higher education, then it would argue for more careful analyses of how the Internet is precisely changing (or combining with other forces to change) higher education as well as how it is not. Or how uses made of the Internet may change one element of higher education (say, its role) but leaves other aspects (such as values) intact. For example, online learning, made possible by the advent of the Internet, has the potential of reaffirming the institution's mission to provide more and diverse students an opportunity to learn, but it certainly changes the means by which learning occurs. Is its use as a delivery mechanism a positive change but its use as learning tool a mixed blessing? Only further research and analysis can tease out this relationship further. As for another example, the faculty role might remain primarily focused on improving student learning, but the means by which faculty do this changes, by replacing lecture with multimedia and challenging traditions about class size with research on how students can best acquire the knowledge they need.

Furthermore, we need less indulgence in both extreme views and a more thoughtful and balanced approach to talking about higher education vis-à-vis technology, information technology, or the Internet. Less claims and better research that trace these influences might produce a better analysis of whether and how the Internet is or is not changing higher education, which can then be evaluated and altered by its leaders and inhabitants.

Let us take two more examples of what might be possible with a transactional approach. The pressure to achieve productivity gains through online learning is itself a result of states facing a growing population of traditional-age students and stagnant state budgets. Developing and delivering online education is a costly endeavor, requiring infrastructure, special staff with specialized knowledge, and various support services. Were one to rely only on the negative view, this consumption of resources would be criticized and the effort abandoned. The proponents of the positive view would likely remain focused on the potential of technology to solve the underlying problem and would advocate for proceeding. However, a transactional approach might recognize that both views have valid points, but that the role of technology is still uncertain and begs further research. It might recognize that – in this case – we have some research that demonstrates how to improve the quality and cost-efficiency of online learning (Twigg, 2003a, 2003b; Meyer, 2002, 2005b, 2006; Swan, 2003). But this drive for efficiencies should not overwhelm other processes or concerns, as one espousing the negative view might worry; perhaps the best alternative is one that is "cost-aware" (Ash, 2000) or at minimum, retains higher education's original focus on student learning without losing an appreciation for the costs attached to many of its choices.

The second example also combines changes magnified by technology that can be researched and altered, if need be. This example is drawn from the changing higher education marketplace, the one that is now inhabited by new providers, new programs, and new students. The negative view might characterize this as introducing competition into what is best a tradition of calm and reasoned study; the positive view might see this competition as a valuable tool to generate more behavior from higher education institutions that responds to the needs of the marketplace. Could not both views be true AND false? Are not institutions operating in this new marketplace in various ways? Is not one institution grasping the market opportunities and another satisfied with its current share of students, programs, and resources? The point here is to recognize the range of responses to this new, emerging marketplace, and neither assume either disaster or nirvana, but investigate what paths different institutions are taking, what decisions they are making, how their decisions are being evaluated and plans adjusted, and what effects these experiences are having on the values, practices, and programs of the institution. This would be the sort of research that would recognize that technology and institutions interact, again and again, change each other in subtle ways, and those interactions or transactions have a variety of effects and interpretations, which also change over time.

Conclusion

The transactional view is perhaps more tempered and therefore, more honest. It recognizes that technology does not probably "drive" or determine a particular change, although some changes are more likely to occur as a result of human needs and desires. It moves away from dichotomous assertions of doom and paradise and recognizes the role of research to tease out relationships and impacts that cause and result from the introduction of technology into such a complex organization as a college or university. It attempts to balance evaluation between the horns of the divide and recognize the transactions that shape various possible outcomes.

The transactional framework is essentially a hopeful one. It is founded on the presumption that humans are not helpless victims but that we can and do influence what happens to ourselves and the institutions we value. It recognizes our role in accepting, modifying, or rejecting so-called changes resulting from technology. It also recognizes that technology is neither the saint nor sinner some might suppose, but an ambiguous entity that depends on humans to ascribe it with meaning and power. And finally, it recognizes that simple answers most likely leave us in ignorance, and complex answers – while difficult to unravel, understand, and explain – are probably more nearly accurate. It will take careful, thoughtful, and honest research that eschews

the extremes for a more balanced and integrated view of technology. And it will take individuals who can see through the divide and appreciate the processes whereby we change and are changed by our technologies.

References

Ash, C. (2000). Towards a new cost-aware evaluation framework. *Educational Technology & Society, 3*(4). [http://ifets.ieee.org/periodical//vol_4_2000/ash.html]

Barone, C. A., & Hagner, P. R. (Eds.) (2001). *Technology-enhanced teaching and learning*. EDUCAUSE Leadership Strategies No. 5. San Francisco, CA: Jossey-Bass.

Barrett, W. (1978). *The illusion of technique*. New York, NY: Anchor Press.

Birkerts, S. (1994). *The Gutenberg elegies*. Boston, MA: Faber and Faber.

Bolman, L. G., & Deal, T. E. (1997). *Reframing Organizations : Artistry, Choice, and Leadership*. San Francisco, CA: Jossey-Bass.

Bruce, B. C. (n.d.). Literacy technologies: What stance should we take? Retrieved April 4, 2005 from http://www.schools.ash.org.au/litweb/chip.html.

Bruce, B. C. (1996). Technology as social practice. *Educational Foundations, 10*(4), 51-58.

Burbules, N. C., & Callister, T. A., Jr. (2000). *Watch IT: The risks and promises of information technologies for education.* Boulder, CO: Westview Press.

Christenson, C. (1997). *The innovator's dilemma: When new technologies cause great firms to fail.* Boston: Harvard University Press.

Duin, A. H., Baer, L. L., & Starke-Meyerring, D. (2001). *Partnering in the learning marketspace*. EDUCAUSE Leadership Strategies No. 4. San Francisco: Jossey-Bass.

Ellul, J. (1964). *The technological society*. New York, NY: Vintage Books.

Gurak, L. J. (2001). *Cyberliteracy: Navigating the Internet with awareness*. New Haven, CT: Yale University Press.

Healy, J. (1999). Endangered minds: Why children don't think and what we can do about it. New York: Simon & Schuster.

Hooker, M. (1997). The transformation of higher education. In D. Oblinger and S.C. Rush (Eds.), *The learning revolution*. Bolton, MA: Anker Publishing Company, Inc. Retrieved April 4, 2005 from http://horizon.unc.edu/projects/seminars/Hooker.asp.

Latour, B. (1991). Technology is society made durable. In J. Law (Ed.), *A sociology of monsters: Essays on power, technology, and domination* (pp. 103-111). New York: Routledge.

Levinson, P. (2001). *Digital McLuhan*. New York: Routledge.

Locke, J. L. (1998). *Why we don't talk to each other anymore*. New York: Simon & Schuster.

Massy, W. F. (2002). *Life on the wired campus: How information technology will shape institutional futures.* Stanford, CA: National Center for Postsecondary Improvement, Stanford University. [http://www.stanford.edu/group/ncpi/documents/pdfs/6-02_wiredcampus.pdf]

Matthews, D. (1998). The transformation of higher education through information technology. Retrieved April 4, 2005 from http://www.wcet.info/projects/tcm/it_fin.htm.

Merriam-Webster. (2005). Merriam-Webster online dictionary. Retrieved July 26, 2005 from http://www.m-w.com.

Meyer, K.A. (2006). Cost-efficiencies of online learning. *ASHE Higher Education Report Series, 32*(1). San Francisco, CA: Jossey-Bass.

Meyer, K. A. (2005a). Critical decisions affecting the development of Western Governors University. Innovative Higher Education, 30(3), 177-194.

Meyer, K.A. (2005b). Planning for cost-efficiencies in online learning. *Planning for Higher Education, 33*(3), 19-30.

Meyer, K.A. (2005c). Exploring the potential for unintended consequences in online learning. *International Journal of Instructional Technology and Distance Learning, 2*(9). [http://itdl.org/Journal/Sep_05/article01.htm]

Meyer, K.A. (June-August 2004). The impact of competition on program quality. *Planning for Higher Education, 32*(4), 5-13. [http://www.scup.org]

Meyer, K.A. (2002). *Quality in distance education: Focus on on-line learning.* ASHE-ERIC Higher Education Report Series, 29(4). [ED470042]

Morrison, J. (2003). U.S. higher education in transition. *On the Horizon, 11*(1), pp. 6-10. Retrieved April 4, 2005 from http://horizon.unc.edu/courses/papers/InTransition.asp.

Neiman, A. M. (1998). Spirituality, redemption, and education in the wasteland of technopoly. Retrieved April 8, 2005 from http://www.ed.uiuc.edu/EPS/PES-Yearbook/1998/neiman.html.

Noble, D. F. (1998). Digital diploma mills: The automation of higher education. *First Monday*. Retrieved April 4, 2005 from http://www.firstmonday.org/issues/issue3_1/noble.

Norris, D. (2001). The transformation of higher education: Five years later, where are we? *TechTalks*. Retrieved April 4, 2005 from http://www.campus-technology.com/techtalks.trans/010111transformation.asp.

Pittinsky, M. S. (2003). Transformation through evolution. In M. S. Pittinsky (Ed.), The Wired Tower (pp. 1-11). New York: Pearson Education.

Postman, N. (1993). *Technopoly*. New York: Vintage Books.

Roberts, P. (1998). Rereading Lyotard: Knowledge, commodification and higher education. *Electronic Journal of Sociology, 3*(3). Retrieved April 8, 2005 from http://www.sociology.org/content/vol003.003/roberts.html.

Swan, K. (2003). Learning effectiveness: What the research tells us. In Mayadas, F., Bourne, J., & Moore, J. C. (Eds.), Elements of Quality Online Education: Practice and Direction, vol. 4 (pp. 13-45). Needham, MA: Sloan Consortium.

Tenner, E. (2003). *Our own devices: How technology remakes humanity.* New York: Vintage Books.

Tenner, E. (1996). *Why things bite back*. New York: Vintage Books.

Twigg, C. A. (2003a). Improving quality and reducing cost: Designs for effective learning. *Change, 35*(4), 23-29.

Twigg, C. A. (2003b). Improving quality and reducing costs: New models for online learning. *Educause Review, 38*(5), 28-38. [http://www.educause.edu/ir/library/pdf/erm0352.pdf]

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Editor's Note: Master-teachers provide leadership for tomorrow's classroom teachers. They share their accumulated experiences as they react with the next generation of teachers. In the process, old ideas are revised and new ideas are generated. Some best practices persist in time even though the environment changes.

Time, Support and Follow-up: The Keys to Successful Professional Development.

Susan Abramson Lancaster

United States

Abstract

Twenty technology resource teachers (TRTs) participated in a study to determine the relationship between TRTs and the delivery of job-embedded professional development. Evaluation focused on collecting data through questionnaires, open-ended questions, surveys, and interviews. The questionnaires and interviews were conducted with Kentucky TRTs who had, as defined in their job descriptions, been responsible for delivering professional development for longer than 1 year.

This study concentrated on common concerns, strengths, and weaknesses of the job-embedded professional development model. Teachers, as adult learners, use a different learning style than their students. Therefore, professional development providers are required to accommodate the needs of the adult learning style. The objectives of this study were to determine the relationship between TRTs and the delivery of job-embedded professional development and to share that information with other providers of technology-related professional development.

The study determined that TRTs believe that technology can enhance learning, support effective instruction, and engage students. The participants concurred that teachers should not be barriers to allowing the students to integrate technology into their work. Technology is a tool that can change instruction, and the purpose of technology integration is to prepare students for careers of the future. The participants valued the role and support of principals and administrators, determined that time is an issue related to technology-related professional development, and believed that job-embedded professional development can enhance teaching and affect student learning. Follow-up is perceived to be a key component of professional development, and successful integration of technology resources occurs best when paired with content and curriculum activities.

Introduction

How can schools implement professional development to prepare teachers to integrate technology activities successfully into their content area classes? Many schools respond that a technology resource teacher (TRT) best provides job-embedded professional development for teachers and students.

The study of the relationship between TRTs and their role as providers of job-embedded professional development represented an opportunity to demonstrate that TRTs provide a much needed service for teachers and students endeavoring to integrate technology into content area classes. Although the focus of this study was based upon the Kentucky model, job-embedded professional development concerns teachers and students globally. Determining the concerns of job-embedded professional development providers may shape changes in classrooms throughout the world. The ultimate goal of technology integration is to provide hands-on experiences for students to use technology when completing their content area assignments.

Theoretical Framework

In order to effectively meet the needs of teachers, TRTs must be prepared to deliver Professional Development (PD) in a manner appropriate for adults. In doing so, PD providers develop a skill set separate from the skills they use when working with students. Adults learn differently than children. Knowles (1980) identified the learning theory of adult learners as andragogy. Successful delivery of PD warrants consideration for the way adults learn. When teaching adult learners, PD providers might consider and incorporate Knowles' seven steps: (1) set a cooperative learning climate; (2) create mechanisms for mutual planning; (3) arrange for a diagnosis of learner needs and interests; (4) enable the formulation of learning objectives based on the diagnosed needs and interests; (5) design sequential activities for achieving the objectives; (6) execute the design by selecting methods, materials, and resources; and (7) evaluate the quality of the learning experience while re-diagnosing needs for further learning (Carlson, 1989).

Adults prefer learning situations that are practical and problem centered, promote their positive self-esteem, and integrate new ideas with their existing knowledge. The PD provider must show respect for the individual learner, capitalize on the participant's experience, and allow choice and self-direction (Sweeny, 1996). When adults invest time in learning new skills, they want to see the relevance of the information, the connection of the information to their work setting, as well as have the time to practice, master, and become the owner of the new skills. Teachers, as adult learners, want to feel comfortable with the new information in order to answer questions, provide guidance, and keep their students on task.

Characteristics of effective staff development include, but are not limited to, (a) involvement by the staff in the planning, (b) time, (c) administrative support, (d) established expectations, (e) opportunity for sharing, practice, continuity, and follow-up (Hassel, 1999). Kentucky Revised Statutes (as cited in Hauser, 2002) defined *professional development* as, "those experiences which systematically over a sustained period of time, enable educators to acquire and apply knowledge, understanding, skills, and abilities to achieve personal, professional, and organizational goals, and to facilitate the learning of students" (p. 2). The features of job-embedded professional development are (a) follow-up, (b) peer interaction, (c) mentoring, (d) coaching, (e) modeling, (f) demonstration, (g) collaborative problem solving, and (h) self-directed learning (Hauser).

The stated purpose of professional development is to facilitate the learning of students. Engaging participants in meaningful activities will result in changes to classrooms and to students. Teachers who use technology to support instruction may achieve the ultimate goal of helping students have the opportunity to use technology in their assignments.

Statement of Method

A group of twenty technology resource teachers participated in this study to determine the relationship between TRTs and the delivery of job-embedded professional development. Evaluation focused on collecting data through questionnaires, open-ended questions, surveys, and interviews. The responses from the questionnaires were used to collect qualitative data (Brown, 2000). The questionnaires and interviews were utilized with TRTs who have, as defined in their job descriptions, been responsible for delivering professional development for more than one year. These teachers were selected from each of the eight regional educational divisions in Kentucky. The interviews included a series of structured questions in a prepared questionnaire and followed up with personal interviews to, according to Gall, Borg, and Gall (1996), "probe more deeply to obtain additional information" (p. 310). After the interviews were completed, the transcribed text was studied for direct quotes that captured the personal perceptions and experiences of the TRTs who were interviewed. Information from the structured questions in the

questionnaire was cross-checked with the responses given during the interviews. The study looked for common threads, statements, or expressions from the respondents with regard to offering job-embedded professional development to adult learners.

The limitations of this study were determined by the information gathered during the interviews and the willingness of those persons interviewed to share both good and bad experiences from offering professional development to teachers. The demographic data was gathered from the initial survey completed by the participating TRTs. This data was used to develop an awareness of the age, gender, years of teaching experience and created a 'snapshot' of the pool of teachers who participated in the study. The goal of the qualitative study was to understand the social phenomena, holistically and in depth. The study was inductive, made observations, then drew conclusions. The data collection involved interviews and the data analysis was inductive. The validity and reliability were determined by: confirmability, credibility, dependability, triangulation and trustworthiness of the responses to the written survey and the interview questions (Sorensen & Dorsch, 2001).

Technology Integration and Teaching

Technology and teaching have forged a strong partnership as the information age contributed to reshaping education. By using computers, students today have access to the Internet and productivity tools at home and at school. Students can process information and solve problems, develop multimedia projects, and increase personal productivity. Computers have changed the way students learn and have become valuable educational tools. "Teachers must learn how to use technology to promote the students' understanding of key concepts within a subject matter and help them achieve high standards of learning," (*National Foundation for the Improvement of Education*, 2000, p. 25).

Student achievement in America cannot change unless teachers use more effective instructional methods (Slavin, 1996). Technology has changed education and allows the teacher to become more of a facilitator for learning and less of a dispenser of knowledge (Herr, 2000; Johnson, 2001). The New England schoolroom model of the 1700s with the teacher leading instruction from the front of the room, "sage on the stage," has shifted to the role of the teacher as the "guide on the side." This shift from a teacher-centered to a student-centered environment allows the instructor to become a facilitator who guides the learners through the learning process and encourages students to be active in their learning (Leh, 2001). Rather than maintain the role of omniscient dispenser of knowledge, the teacher can become a coach who challenges and encourages students to use all aspects of the technology menu to learn more, to process information more effectively, and to develop conclusions independently. Therefore, introducing technology into the classroom helps the teacher become an effective facilitator of knowledge.

Technology-enhanced education allows teachers to benefit from cooperation with others by the exchange of lesson plans cooperative projects, the implementation of higher learning standards, and the capability to learn from experts in various fields. Teaching and the teacher's is changing as teacher transforms from a lecturer to a mentor of student learning through inquiry. The key recommendation of *President's Information Technology Advisory Committee* (2001) was to make effective integration of information technology with education and training a national priority (Reddy & Wladawsky-Berger). The ultimate goal of professional development is to improve student learning (Sparks, 2002). Successful technology professional development includes these principles: (a) setting relevant, realistic goals; (b) involving all stakeholders and capitalizing on all resources; (c) linking professional development to teacher and student needs and objectives; (d) modeling best practices; (e) encouraging by doing; and (f) providing resources, incentives, and ongoing support. The technique of learning by doing is extremely effective. The learning environment should empower teachers and students to learn to use technology through practical experience. Teachers should use technology to access professional development resources on-line

and at a distance. Teachers should use technology to communicate and to exchange ideas with peers and experts around the world. Students should also be encouraged to learn by doing and to share new knowledge with peers (CEO Forum, 1999).

Certain conditions should exist in a school for teachers to pursue professional development so they can implement useful applications of technologies in their classroom (Ringstaff et al., 1996). These include (a) administrative leadership, (b) shared vision, (c) opportunities for reflection and collaboration, (d) a long-term professional development plan, and (e) other supportive conditions. Classroom teachers are much more likely to teach other teachers how to use technology because teaching is their area of expertise. Teachers may not know all of the intricacies of a digital camera, but teachers are able to determine how to use the digital camera with the curriculum they teach. Teachers within a school become credible instructors who represent the best possible solution for supporting professional development

Connectivity to the Internet changes classrooms by permitting instant contact with parents, other teachers, experts in the field, and resources and information. E-mail can be used to contact parents, to plan field trips, and to reach community members. Even reluctant students can find a "voice" in the classroom by e-mailing the teacher, as well as other students in their classes and around the globe, to publish writing in their online-blog (Medina, Pigg, Desler, & Gorospe, 2001).

"Teachers need high quality professional development that leads to a professional community centered round the integration of technology into the curriculum," reported Hart, Allensworth, Lauden, and Gladden (2002, p.1). Experienced classroom teachers look for technology assistance by turning first to their peers (Jones, 2001, Becker, 1994). Teachers continue to require job-embedded professional development, not an occasional professional development 3-hour training session, to feel truly comfortable with the tools and to integrate fully technology into their curriculum (Johnson, 2001; Willis & Raines, 2001). "Professional development can no longer be viewed as an event that occurs on a particular day of the year; it must become part of the daily work life of educators," (Cook (1997, p. 2).

Technology as a tool has the potential to transform learning inside and outside of the classroom. Eib (2001) suggested that when looking for a technology-rich classroom, it is not just what is seen during the observation and evaluation that determines the successful use of technology by teachers. Technology integration is an ongoing process that makes a significant difference to the learning of the students. Excellent technology teachers have demonstrated the ability to teach the concepts included in the content curriculum at the appropriate grade level by using appropriate examples, analogies, and strategies. Including technology activities ensures a higher level of learning for all.

Professional development should focus on student-learning outcomes and should provide job-embedded training for the teacher. This type of professional development can best be accomplished by peer coaching, study groups, and curriculum integration. Well-planned, on-going professional development tied to the school's curriculum is essential for teachers to learn to use technology to promote student learning (Rodriguez, 2000).

Glennan and Melmed (2000) identified three common characteristics that enable schools to use technology well: (1) adequate time, (2) responsive assistance to teachers and to administrators, and (3) a clear vision to guide the technology program. Adequate time translates to schools finding opportunities for teachers to learn new technology, to collaborate with other teachers, and to organize curriculum. Suggestions include providing teachers with the authority and flexibility to adjust daily instructional schedules, to develop curriculum objectives that allow time each day for teachers to meet, to plan, and to provide time for teachers to reflect on their practice (Hart et al., 2002).

The U.S. Department of Education (2002) report, *E-Learning: Putting a World Class Education at the Fingertips of All Children*, stressed the importance of technology-related teacher professional learning. This report stressed that "states and districts should make professional development a priority to increase the quantity, quality, and coherence of technology-focused activities aimed at the professional development of teachers" (p 38). The report proposes that all teachers use technology effectively to help students achieve high academic standards. Teachers must help administrators understand what technology makes possible for their students (Wepner & Tao, 2002).

A teacher's attitude toward technology may impact how technology is used for teaching and learning. Students who are taught by teachers who attend technology staff developments do better on tests than students who are taught by teachers who do not attend technology staff development. In describing the requirements for effective professional development, Brown (2000) cites the importance of putting the focus on the curriculum and instruction, not the technology; expecting teachers to become active participants in planning, implementing, and expanding the use of technology in the classroom; sustaining training by follow-up and support; and providing teachers with mentors with whom they can work. Brown concludes that successful professional development requires time, budget, and administrative support.

School districts spend less than one quarter of their computer budgets for training, despite the knowledge that well-trained teachers determine the success of meaningful integration of technology into content related classes (Farenga & Joyce, 2001). Despite increased access to computers and related technology for students and teachers, schools experience difficulty in effectively integrating these technologies into existing curricula. The lack of teacher training is one of the greatest roadblocks to integrating technology into a school's curriculum. To be effective, staff development training must be extensive, hands-on and timely, and an ongoing activity. Professional development is strengthened by follow-up sessions that offer the time, support, and opportunity for teachers to reflect on how they might use technology in their teaching.

Professional development planning requires a focus on the teacher's top priority, which is helping students to learn (Sun, Heath, Byrom, Phlegar, & Dimock, 2000). Technology integration can become a catalyst for changing instructional strategies. Effective use of technology allows a teacher to adopt better instructional practices: first the learning, then the teaching, and then the technology. Technology success begets additional technology success as teachers and students celebrate the variety of ways in which they have integrated technology into content classes and projects. Success then becomes focused on the learning and not on the technology. This seamless merger may be the strongest test to evaluate true integration.

Job-Embedded Professional Development

Professional development should no longer be an event that takes place on one particular day of the school year. Teachers must view professional development as a part of their daily work. Ongoing professional development can be incorporated into teachers' daily work through (a) joint planning, (b) research, (c) curriculum and assessment work, (d) study groups, and (e) peer coaching (Richardson, 1996). The Kentucky Standards of Professional Development (as cited in Hauser, 2002) indicate that professional development should focus on what learners are to know and be able to do to support student learning and well-being based on national standards, academic expectations and school-aligned curriculum. Professional development actively engages learners in the use of effective, varied, and research-based practices to improve student and staff performance and reduce barriers; is data-driven and results-driven; and fosters an effective learning community.

National Partnership for Excellence and Accountability in Teaching (NPEAT, 1997) Standards

indicate that professional development should be: connected to a comprehensive change process focused on improving student learning, primarily school-based and built into the day-to-day work of teaching, and continuous and ongoing, involving follow-up and support for further learning.

Administrative support must be committed to make technology a priority by writing grants, forming corporate partnerships, accepting donations, and implementing pilot programs. Supporting technology costs a lot of money because there is always new technology being developed. Technology availability is strongly associated with the principal's and or administrator's support (Hart et al., 2002).

Job-embedded, peer-to-peer modeling of technology skills and professional development activities reflect the essence of highly effective on-the-job training (Marsh, 2001). Teachers view other teachers as their role models. Today's issue is no longer about creating the interest of the teachers for using computers; the challenge is to find the time and most efficient methods to show teachers how to make the best use of the equipment they have in their classrooms (Marsh).

Research findings indicate that teachers utilizing computers expect more from students, spend more time with individual students, are more comfortable with students working independently or in small groups, and spend less time lecturing and teaching to the whole class. These teachers are willing to take more risks and see themselves more as coaches and facilitators. Teachers using technology collaborate more with other teachers, which results in a more productive work setting, and a better sense of professional competence (Johnson, 1999). The digital divide does not create a disadvantage for students, rather the disadvantage occurs when a teacher chooses not to use technology with his or her students.

Results

Fifteen women (75%) and 5 men (25%) participated in the study. The number of males in this study mirrors the number of men in education according to the National Education Association (2003) study. According to the data collected in 2001, 21% of the teaching population was male, and 79% was female. A condition for participation in the study was for the TRTs to have been in that position for at least 1 year. One hundred percent of the TRTs who were interviewed worked at the district level. One hundred percent of the TRTs agreed that the computer is an important educational tool, that technology plays a role in strengthening student skills, that technology helps to promote student engagement in the classroom and project-based learning, and that technology contributes to strengthening educational objectives such as engaging students in the classroom activities.

Time

Providers of professional development identify time as a key consideration, issue, and factor. Whether the professional development occurs during the school day, after school, or in the summer, time remains a paramount concern and a vital factor to the teachers. Time becomes a consideration because teachers have so many commitments before they come to school and when they leave. After school training is problematic because everyone is so exhausted from being at school all day.

When is the best time to offer training? With many schools adopting alternative calendars, some training has been scheduled for the breaks when teachers are not meeting with students. Schools with alternative schedules can offer training during the 2-week break periods in October, December, and in the spring. Training is more effective if there is plenty of time so participants are not rushed.

TRTs are instrumental in providing training on professional development days although, in most districts, professional development topics are decided at the district level. The TRTs reported that

some teachers attend professional development days because they need to or because they are required to attend; however, the mandated learning never sustains itself. Teachers attend the classes, but their investment in learning does not grow. Job embedded professional development differs from mandated training, because the TRT provides 'just-in-time training' traveling to meet with teachers at any time during the day.

Time is a horrible, horrible problem, indicated one TRT. As the only TRT for 350 teachers in his district, there is no way to assist everyone. Despite trying several models, the TRT realized he would spend more time with some schools and some teachers. Sometimes, the result is that 50% of teachers are using the TRT 100% of the time and some teachers never see the TRT. Some TRTs focus on one grade level such as working with third-grade teachers and students. Generally, a TRT will go where he or she is requested. According to the interview information provided by a TRT, when someone says, "I need you," then, the first part of the battle has been won. If teachers ask for help, they are saying they cannot learn the technology alone.

TRTs indicated that the most effective use of time was to work with the teacher during class time or during planning time. Job-embedded professional development is described as the best option due to time constraints on teachers. Job-embedded professional development offers real time training which is more relevant and teachers do not have to stay after school, work weekends, or attend classes in the summer. Teachers are already at work and the training is not an imposition on the teachers' time.

Support

TRTs indicated in their written comments that they received adequate support from principals and teachers. In the interviews, the TRTs attributed a significant degree of importance to the principal who serves as the instructional leader of a school. Teachers follow the leadership model set by the principal's attitude toward technology. A principal can encourage teachers who are not technology users. Conversely, without the motivation from the principal, there will be little incentive for the teachers to integrate technology into content area classes. If the principal acts as an advocate for technology then that principal's push is significant. For change to occur, it is vital to have support of the administrator. If the administrator does not use technology, then the teachers may not use technology. TRTs pointed out that when a principal has the vision of technology integration, it makes all of the difference regarding teacher and student expectations for the usage of technology in that school.

Job-embedded PD can effectively occur when the principal hires substitutes to cover classes a grade level at a time so that teachers were relieved to attend technology professional development during the school day. All grade level teachers receive professional development training for 1 hour and 15 minutes, then the substitutes rotate to the next grade level classes. The TRT had the opportunity to see every teacher in that building in 1 day for 1 hour and 15 minutes per rotation. As a result professional development continued to build on the skills of the previous training.

The TRTs reported that as the administrators feel more comfortable with technology, the administrator values the integration and use of technology and understand what teachers are asked to do with technology. The TRT often represents a safe person for the administrator to ask for technology assistance and becomes the administrator's own technology resource. Sometimes, TRTs reported, the best way to get invited into a school is to help the principal with his or her technology needs. The principal will, in turn, give his support to the TRT and make a difference in supporting teachers and students with their technology usage.

Principals who understand about the power of integrating technology may be younger principals who may feel compelled to have technology used in the building.

Principals who have the vision will ask for help with school plans and will talk about the

possibilities. Often, the TRT is requested for training in a school based on the importance of technology to the principal. If the principal sees the value of technology, the teachers are aware of what the principal values and will strive to please the principal. Teachers, even the reluctant teachers, will try on even a small scale to use technology to please principals who value technology and have visions for their schools.

Partnering with content specialists makes technology integration more relevant in some districts. Content resource teachers can become strong advocates for technology integration. Many integrated teaching teams find ways to embed technology into interdisciplinary units. For example, if the subject matter deals with Columbus's ships, then a reading assignment in language arts, a science activity focusing on waves and winds, and a math grid can each involve some aspect of technology. In one class, each student had a cell on a grid that they drew to represent a section of the ship. The result was a life size, scale chalk drawing of the vessel. The last step in the social studies based project was the creation of a videotape containing all of the information the students had researched on the Internet and learned to create the drawing.

In many middle and high schools, TRTs can suggest small changes. Too often, traditional middle and high school teachers still believe that all students must be doing the same thing at the same time, although newer teachers are often more computer literate.

In the interviews, TRTs conveyed excitement regarding schools and districts where technology is in use. The computers come on, the printers work, the Internet is on, and teachers are using technology to enhance instruction. TRTs described situations where the students are engaged and actively involved in their learning. Usually, when students are engaged, there are fewer, if any, discipline problems in that classroom. Students with learning disabilities work more freely when using computers. Technology can be adapted to assist the students with reading needs and technology can help to level the playing field for all students. Technology integration is about the end product and getting technology into the hands of the students. Integration is not about the software, it is about how the tools are used to support instruction.

Follow-up

TRTs becomes the critical follow-up tool regardless of when the training is offered. Frequently, communication is a part of the follow-up service. Communication includes e-mailing, phone calls, or answering questions.

Learning to use technology, indicated one teacher, totally changed all of her teaching strategies. She eloquently explained that teachers, like their students, are all gifted; some just open their packages sooner than others. She firmly believes that technology integration can change the way a teacher teaches.

The TRTs indicate that they see their roles changing, for when they began in this role, the original focus was on technology Now the focus is on integrating the technology to support and enhance instruction within the curriculum. The change that has occurred reflects the integration of technology as a tool for change and the belief that technology should be a part of all lessons. Technology appears to be changing the way teachers teach and students learn as students today realize the potential of the Internet as a research tool and are more actively engaged in their learning. Technology appears to be changing the way teachers teach and students learn. The challenge will be to continue to develop effective ways to use the technology to support the curriculum.

A TRT acknowledged that educators who do not utilize technology cheat their students. Technology integration helps students learn to become more critical thinkers and problem solvers and technology classes help students learn problem-solving skills that they are able to apply to other areas of their lives. Often scores on state assessments reflect those problem-solving skills, in

part because technology experiences have taught students the value of looking for alternative solutions. Learning has become more student-centered when the learning is delivered into the hands of the students. The question of equity in a student's educational experience is affected by a teacher who does not use technology versus a teacher who does use technology in the classroom.

An important observation suggested honoring the teachers as the subject-matter experts, thus allowing the TRT to pursue the role of a resource who suggests ways to use technology to enhance the lesson. His concluding comment represents the prevailing enthusiasm of all of the subjects who participated in the interviews. "I love what I do. I think it is one of the best jobs I have ever had. I love this job!"

TRTs recognize that the purpose of their work is to facilitate the integration of technology into all content area classes. The TRTs unanimously agreed that technology (a) plays a role in strengthening student skills, (b) helps promote student engagement in the classroom, (c) contributes to strengthening educational objectives, and (d) helps to prepare students for future jobs. Successful partnerships were being forged between the technology specialists and the curriculum consultants resulting in training that blended technology skills in collaboration with the appropriate curriculum applications. Previous models of solely offering tool training were no longer considered an appropriate use of technology training time.

Job-embedded professional development, which provides technology training to teachers during the school day, allows an effective use of time and training for already overworked, stressed teachers. By providing on-demand training, TRTs are able to assist teachers where, when, and how they need to learn new skills. Job-embedded professional development enables TRTs to (a) offer one-on-one training for teachers, (b) model lessons for students, (c) coach teachers, and (d) collaborate with administrators.

Implications

Successful staff development incorporates strategies to advance student success. The ultimate goal of infusing technology into the schools must be to get students to learn more (Solomon, 1998). Technology integration depends on professional competency. Educators must learn to use technology throughout the curriculum in unique and creative ways (Coughlin & Lemke, 1999). Technology training for teachers is an important component of successful technology implementation by students. Professional development for educators must be tied to the curriculum and sustained by adequate funding (West, 2002 and Bybee 2001). Effective use of technology depends on adequate training of teachers (Brand, 1997) that is supported by ongoing sessions that provide the time, support, and opportunity for teachers to reflect on technology integration in to their content area classes (Byrom & Bingham, 2001).

This study corroborates the belief that teachers are the key in determining if technology will be used effectively (Trotter, 1999). Although fewer than 20% of all schools have full-time technology coordinators (Kerrey, 2000), teachers successfully demonstrate that they can act as models for others (Hart et al., 2002). Consistent with the research findings of Wolinsky (1999), this study also suggests that one-on-one, just-in-time, on-demand training changes the technology culture in schools that have access to a technology resource teacher.

Interpretation of the Findings

A consistent principle that resulted from analyzing the interview information is that these professionals view true technology integration as getting the technology into the hands of the students and using the content as the means to accomplish this task. All of the participants in this study expressed the conviction that technology is a tool that, if used properly, can enhance

learning, support effective instruction, and engage students. They agreed it is important to get technology into the hands of students in order to address the needs of students with alternative learning styles and to provide students with alternate methods of technology-based instruction. All of the participants agreed that (a) teachers should not be barriers to allowing the students to integrate technology into their work, (b) technology is a tool that can change instruction, and (c) the purpose of technology integration is to prepare students for careers of future.

Synthesis of the interview data also revealed these results:

1. The teacher's role is to ensure that students have technology rich curriculum experiences. Integration should be used to support instruction and not be viewed as 'an add-on'.
2. Technology integration changes the way that teaching occurs. Classrooms that use technology tend to be more student centered, research focused, and project based.
3. The principal sets the tone in a school as the instructional leader. When the principal has the vision regarding the importance of technology, teachers are encouraged, evaluated, and enthusiastic about the possibilities that technology can bring to their classrooms.
4. Integration is not limited to or by grade level. The principal contributes to the level of successful integration in a school without respect to the grade organization in that building. The principal determines the success of technology in the building; the teacher determines the success of technology integration in the classroom.
5. Time is an issue when offering technology-related professional development. Although there is no ideal solution about when professional development should be offered, there appears to be significant consensus that job-embedded training offers the best possible resolution for teachers. Follow-up is perceived to be a key component in moving teachers toward technology integration. Successful integration of technology resources occurs best when paired with content and curriculum activities.

Technology is perceived to be a motivational tool for teaching because technology is a significant element in the lives of students. Technology has become an important tool to increase student learning via the research potential of the Internet and e-mail possibilities. Technology skills will continue to be a necessity as students enter the 21st century job market.

References

Beavers, D. (2001). Outside the workshop box. *Principal Leadership, 1*(9), 43-46.

Becker, H. J. (1994). *Analysis and trends of school use of new information technologies*. Washington, DC: U.S. Congress Office of Technology Assessment.

Brand, G. (1997). Training teachers for using technology. *Journal of Staff Development, 19*(1), 10-13.

Brown, B. (2000). *Technology mentorship: A staff development opportunity for educators*. Unpublished master's thesis, University of Alberta, Edmonton, Canada.

Bybee, R. (2001). Effective professional development for technology teachers. *The Technology Teacher, 61*(3), 26-29.

Byrom, E., & Bingham, M. (2001). *Factors influencing the effective use of technology for teaching and learning: Lessons learned from the SEIR-TEC intensive site schools.* Greensboro, NC: SEIR-TEC.

Carlson, R. (1989). Malcolm Knowles: Apostle of andragogy. *Vitae Scholasticae, 8*(1). Retrieved January 20, 2001, from http://www.nl.edu/ace/Resources/Knowles.html

CEO Forum. (1999). *School technology and readiness report (Year 2): Professional development: A link to better learning*. Washington, DC: CEO Forum on Education and Technology.

Cook, C. (1997). *Critical issue: Finding time for professional development.*

North Central Regional Educational Laboratory. Retrieved April 12, 2002 from http://www.ncrel.org

Coughlin, E., & Lemke, C. (1999). *Technology in American schools: Professional competency continuum*. Santa Monica, CA: Milken Foundation.

Eib, B. J. (2001). Evaluating technology use in the classroom. *Principal Leadership, 1*(9), 16-23.

Farenga, S. J., & Joyce, B. A. (2001). Hardware vs. brainware: Where are technology dollars being invested? *Journal of Technology and Teacher Education, 9*(3), 313-319.

Gall, M., Borg, W., & Gall, J. (1996). *Educational research*. White Plains, NY:

Longman.

Glennan, T. K., & Melmed, A. (2000). *Challenges of creating a nation of*

technology enabled schools. San Francisco: Jossey- Bass.

Hart, H. M., Allensworth, E., Lauren, D. L., & Gladden, R. M. (2002). *Educational technology: Availability and use in Chicago's public schools*. Chicago; Consortium on Chicago School Research.

Hassel, E. (1999). *Professional development: Learning from the best*. Oak Brook, IL: NCREL.

Hauser, B. (2002). *Question and answer handbook for professional development.* Frankfort: Kentucky Department of Education.

Herr, P. (2000). The changing role of the teacher. *T.H.E. Journal, 28*(4), 27-34.

Johnson, D. (1999, March). One step back, two steps forward: What's needed to teach teachers to use technology effectively. Paper presented at the Kentucky Teaching and Learning Conference, Louisville, KY.

Johnson, D. (2001). Now that you know the basics: Meeting professional growth targets. *Learning and Leading With Technology, 28*(5), 22-27.

Jones, C. (2001). Preparing teachers to use technology. *Principal Leadership, 1*(9), 35-39.

Kerrey, B. (2000). *The power of the Internet for learning: Moving from promise to practice* (Report of the web-based Education Commission to the President and the Congress of the United States). Washington, DC: U.S. Department of Education, Education Publications Center.

Knowles, M. (1980). *The modern practice of adult education* (Revised and updated). Englewood Cliffs, NJ: Prentice Hall Regents.

Leh, A. (2001). Action research on training students to be independent learners. *Tech Trends, 45*(1), 39.

Marsh, M. (2001.) *Teachers teaching teachers*. Palo Alto, CA: Computer Learning

Medina, K., Pigg, M., Desler, G., & Gorospe, G. (2001, April). Teaching generation.com. *Phi Delta Kappan, 82*, 616-620.

National Foundation for the Improvement of Education. (2000). *Connecting the bits*. Retrieved August 10, 2001, from the www.nfie.org

National Partnership for Excellence and Accountability in Teaching. (1997). *Revisioning professional development: What learner-centered professional development looks like*. Oxford, OH: National Staff Development Council.

Reddy, R., & Wladawsky-Berger, I. (2001). *President's Information Technology Advisory Committee, panel on transforming learning. Using information technology to transform the way we learn*. Arlington, VA: National Coordination Office for Information Technology Research and Development.

Richardson, J. **(**1996). *Teacher knowledge, skills most important influences on student learning. The developer*. Woodbridge, VA: National Commission on Teaching & America's Future.

Ringstaff, C., Yocam, K., & Marsh, J. (1996). *Integrating technology into classroom instruction: An assessment of the impact of the Apple Classrooms of Tomorrow teacher development center project*. Cupertino, CA: Apple Computer.

Rodriguez, G. (2000). *Critical issue: Providing professional development for effective technology use*. Naperville, IL: North Central Regional Educational Laboratory.

Slavin, R. (1996). Reforming state and federal policies to support adoption of proven practices. *Educational Researcher, 25*(9), 4-5.

Smerdon, B., Cronen, S., Lanahan, L., Anderson, J., Iannotti, N., Angeles, J., et al. (2000). *Teachers' tools for the 21st century: A report on teachers' use of technology*. (National Center for Education Statistics, Statistical Analysis Report). Jessup, MD: Education Publications Center.

Solomon, L. C. (1998). *Progress of technology in the schools: Report on 21 states*. Santa Monica, CA: Milken Family Foundation.

Sorensen, C., & Dorsch, N. (2001). *Study guide for Nova Southeastern University course ITDE 7003/7004: Research and development I*. North Miami Beach, FL: Nova Southeastern University.

Sparks, D. (2002). *Designing powerful professional development for teachers and principals.* Oxford, OH: National Staff Development Council.

Sun, J., Heath, M., Byrom, E., Phlegar, J., & Dimock, K. V. (2000). *Planning into practice: Resources for planning, implementing, and integrating instructional technology*. Durham, NC: SouthEast and Islands Regional Technical Education Consortium.

Sweeny, B. (1996). *Using the "training of trainers" model to develop an effective mentor training.* Wheaton, IL: Best Practices Resources.

Trotter, A. (1999, September). Preparing teachers for the digital age. *Technology Counts, 19*(4), 37. Retrieved February 5, 2003, from http://www.edweek.org/ sreports/tc99/articles/teach.htm

U.S. Department of Education. (2000). *E-learning: Putting a world class education at the fingertips of all children*. Washington, DC; Author.

Wepner, S., & Tao. L. (2002). From master teacher to master novice: Shifting responsibilities in technology infused classrooms. *The Reading Teacher, 55*(7), 642-651.

West, P. (2002). 21st century professional development: The job-embedded, continual learning model. *American Secondary Education, 30*(2), 72-86.

Willis, E., & Raines, P. (2001). Technology and the changing face of teacher preparation. *Contemporary Issues in Technology and Teacher Education, 1*(3), 1-10.

Wolinsky, A. (1999). What works in staff development. *Multimedia Schools, 6*(2). Retrieved September 26, 2001, from http://www.infortoday.com/MMSchools/ mar99/wolinsky.htm

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