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Upcoming 2010 Conferences and Meetings

16th IVETA International Conference
Manila, Philippines.
November 3-5, 2010
Conference Information: http://iveta2010.cpsctech.org/
Conference Theme: Education for Sustainable Development in Technical and Vocational Education and Training (ESD in TVET).

IVETA Conference Meeting
Las Vegas, NV., USA
December 1, 2010
Conference Theme: Technical Vocational Education and Training (TVET)
Staff Development: Meeting the Needs of the Knowledge Economy.
Conference Information: http://www.iveta.org/members/index.php/Conference-Information/

Association of Career and Technical Education (ACTE)
Las Vegas, NV. USA
December 2-4, 2010
Conference Information: http://www.acteonline.org/convention.aspx

As a refereed journal, the *International Journal of Vocational Education and Training* depends on qualified individuals to serve as manuscript reveiwers. We send feature article manuscripts to three reviewers. So as not to overwork our reviewers, we need some of you to join us for a one-year term.

If you have a record of publications, research experience, and an interest in gaining additional practice in the use of the Publication Manual of the American Psychological Association, please submit your vita to Dr. Davison M. Mupinga, Editor, International Journal of Vocational Education and Training, School of Teaching, Learning, and Curriculum Studies, College of Education, Health and Human Services, Kent State University, P.O. Box 5190, 316 White Hall, Kent, OH 44242-0001, USA, Email: dmupinga@kent.edu.

Message From the Editor

The impact of information and communication technologies (ICT) in everyday aspects of our lives needs no further elaboration. Private and public organizations, educators, and trainers have likewise jumped on to the bandwagon and are using ICT to enhance training, teaching, and learning. Common applications of ICT in education include: delivery of education and training programs; collaboration among students, teachers, and the outside world; and for communication. However, disparities in accessibility, affordability, and ICT developments between countries and communities make application of ICT challenging. Furthermore, application of ICT varies according to educational programs, technological savviness of instructors and students, and available technologies. Therefore, it is not easy to do justice to the topic in a single publication. Based on examples from across the globe, this entire issue of the *International Journal of Vocational Education and Training (IJVET)* is devoted to the role of ICT in technical vocational education and training (TVET).

The first article discusses the use of ICT for workforce training in the private sector. With specific reference to Kosovo, the authors discuss the gains from a training program and the inherent issues that post-conflict countries need to pay attention to. The second article focuses on the elimination of geographic boundaries by ICT, or 'flattening of the world' as Tom Friedman would say. Using examples from Finland, the authors discuss the digital divide created by ICT between developing and developed countries, and preconditions of applying ICT to education and training. In the third article, the focus is on the use of ICT in TVET classrooms. The article describes the use of the Internet and Web2.0 tools in teaching career and technical education. The role of ICTs in delivering educational programs is the focus of the fourth article. Results of a collaborative project to transform a face-to-face module to online learning using Blackboard (a course management platform) are presented. Benefits and challenges to online learning are highlighted. Based on the need and high demand for qualified IT professionals, the fifth article describes the implementation of a new educational initiative to train the professionals faster using continuous multi-level education at various universities in Russia. The sixth article compares the traditional face-to-face method of teaching to online learning, discusses advantages and potential benefits of online learning, and challenges to adopting the technology, particularly in developing countries. Efforts needed to adopt new technologies are outlined. The last article was a presentation at the IVETA annual conference in November 2009. It discusses

the role of ICT, specifically an open-source technology, *Ushahidi* (testimony), to deliver TVET. Based on experiences from Liberia, the relationship between ICT and TVET, the kinds of ICT to effectively deliver TVET, and the training necessary to deliver TVET using ICT is outlined. As noted, ICT has broken geographic barriers and brought lots of promises to many, including developing countries in which, once communities are connected, providing education and training even to rural communities becomes easy.

Once again, this IJVET issue touches on a current and relevant topic to TVET. As always, I am indebted to a number of people for their help in the production of this journal, specifically the reviewers, authors, and editorial staff whose input is always valuable and critical to the success of this journal. Readers are reminded that articles published in this journal come from all over the world, and as such some authors do not speak English as a first language. While great care has been taken to correct the verbiage, there may be some errors that went unnoticed. Readers should also note that the articles in IJVET do not necessarily reflect the position or policy of IVETA or the Journal's editorial staff or reviewers.

Davison M. Mupinga
IJVET Editor

Contributions of Private-sector ICT Workforce Training to Post-conflict Reconstruction: A Case Study from Kosovo

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Abstract

Limited empirical data exists about the effects of private-sector information and communication technology (ICT) workforce training initiatives in post-conflict environments. Such initiatives may enhance social and economic stability by creating opportunities for entrepreneurship and formal-sector employment. Using data from 79 Cisco Networking Academy (NetAcad) participants in Kosovo, this study examines the ICT workforce training program's impact in terms of participants' (a) perceptions of training quality, (b) career aspirations, (c) intended sectoral and geographic labor market destinations, and (d) overall training-to-work transition readiness. Semi-structured interviews with local ICT-sector employers and NetAcad instructors complemented quantitative data collection from program participants. While the overall program impact on participants was positive, issues emerged around brain drain and desired labor market destinations.
Keywords: private-sector workforce training, ICT, post-conflict capacity-building, training-to-work transition

Introduction

A decade after the end of armed conflict with Serbia, Kosovo's post-war reconstruction process has yielded basic social and political stability. The country has declared independence, adopted a new constitution, and built fundamental institutional capacity under the guise of United Nations and European Union administrative mandates. Despite these positive developments, Kosovo continues to grapple with significant challenges. A de-industrialized economic landscape and dependence on primary commodity exports present major obstacles to the young country's transformation into a modern service economy (United States

Agency for International Development [USAID], 2008). This transformation, however, is critical to stimulate the labor market and mitigate the effects of unemployment-based poverty.

Kosovo's unemployment rate of 44% is the highest in Europe (Statistical Office of Kosovo, 2007a). GDP growth has averaged 4.75% during 2006/07, yet current projections consider a sustained growth rate of 7.3% a prerequisite to halve unemployment by 2020 (Domi, 2008). The vast majority of formal sector work is either temporary or part-time, and 50% of all employment relationships occur in the informal sector, which is generally subject to dismal working conditions and minimal pay (European Training Foundation, 2008a; Haan, 2006; International Labor Office, 2000). Emigration has been the principal strategy used to overcome weak domestic labor demand. Notwithstanding tighter immigration policies imposed by European Union countries, pursuing employment opportunities abroad continues to be a highly desirable option for over half of Kosovo's youth (United Nations Development Project, 2006). Active labor market policies (i.e., internship programs, on-the-job training interventions) as alternatives to emigration have yielded disappointing results. In fact, less than 2% of the unemployed target population has benefitted from such state-organized capacity-building measures (Luxembourg Agency for Development Cooperation, 2006).

Educational attainment and occupational training are directly related to the ability to secure employment and generate income in Kosovo (Kosovo Ministry of Education, Science and Technology, 2008; Statistical Office of Kosovo, 2007b). Individuals with advanced information and communication technology (ICT) skills are among the most sought-after professionals throughout all sectors of the economy. The country's public education system, however, is underresourced and its capacity to equip students with in-demand ICT skills remains severely limited. Inadequate curricula, an ill-trained and underpaid teaching force, and obsolete equipment and instructional methods negatively affect student achievement and persistence (European Training Foundation, 2008b). The public vocational education and training (VET) system offers no viable alternative due to a lack of integrated pathways that would allow students to transition from vocational schools to further education or training. The severe backlogs in human and institutional VET capacity have resulted in situations in which local employers are confronted with applicants who are ill-equipped to bring any specific skill sets to the job (USAID, 2009). Although government institutions are collaborating with the international donor community to improve public ICT training provision, a local USAID workforce expert estimated the development of a market-oriented ICT training system to require years before reaching a functional level (V. Mullatahiri, personal communication, June 28, 2009). Overall, the absence of public ICT training infrastructure severely weakens Kosovo's potential for economic development and modernization.

Given the limitations of public education and training systems in post-conflict environments, the contributions of private-sector workforce training initiatives that focus on market aspects of education should not be overlooked (Sesnan, Wood, Anselme, & Avery, 2004). In many situations, private-sector workforce training represents a more viable alternative for the provision of human resource training and the transfer of knowledge and technical expertise (Date-Bah, 2003; Hanson, 2006; World Bank, 2005). Private-sector workforce training initiatives can be particularly effective in the area of ICT. The Cisco Networking Academy (NetAcad) is one example of a sustained private-sector training initiative aimed at building ICT workforce capacity in Kosovo. With training operations in 168 countries, NetAcad's structured training and certification system has come to represent an important industry standard in the preparation of ICT networking professionals. NetAcad provides extensive ICT networking curricula and equipment to local and regional training centers free of charge. Training centers can include both local for-profit businesses and non-profit institutions/foundations. Courses are taught in hybrid form, combining substantial in-class instruction with structured hands-on laboratory learning components. Since the beginning of Kosovo's post-war era in 2001, NetAcad has trained over 4,200 ICT networking professionals and has developed into a major driver for local capacity-building efforts.

While anecdotal evidence supports the efficacy of NetAcad's workforce training concept in Kosovo, little empirical data exists to determine the program's actual labor market impact. Here, labor market impact denotes the extent to which participants successfully transition from NetAcad training into the workforce. The general dearth of information about the effects of private-sector ICT capacity-building in post-conflict environments intensifies the need for collecting and analyzing impact data. The benefits of such research are fourfold. First, the availability of impact data is a prerequisite for monitoring curriculum-relevance and delivery methods of private-sector ICT workforce training programs. Second, more information is needed to assess the extent to which private-sector capacity-building programs can support participants' training-to-work transition under challenging post-conflict conditions. Third, local policymakers require impact data to weigh the potential benefits and limitations of integrating private-sector ICT workforce training programs into national qualifications frameworks. Finally, impact data can generate insights into brain drain and related detrimental effects of private-sector ICT workforce training provision.

Purpose

In this article we present findings from a research study that examined the labor market impact of a sustained private-sector ICT training program (i.e.,

NetAcad) in post-war Kosovo. Specifically, we analyzed questionnaire data from program participants and interview data from instructors and local ICT employers to answer the following research questions:

1. How do participants rate their training experience in terms of instructor performance, course and curriculum quality, and peer collaboration?
2. Is there a relationship between participants' perceived training benefits and career aspirations?
3. What sectors of the economy are most sought after by participants in terms of prospective employment?
4. How do local ICT employers evaluate the employment readiness of hired program participants?
5. How do instructors perceive their pedagogical preparation to ensure effective instruction?

Method

Sample

The sampling frame for this study consisted of all NetAcad participants who were enrolled at the American University in Kosovo (AUK) during the summer of 2009. Through its Training and Development Institute, AUK enrolls approximately 40% of all active NetAcad participants in the country. The sample size for this study consisted of a convenience sample of 79 participants from different NetAcad training modules (i.e., stages of progression) within the Cisco Certified Networking Associate (CCNA) curriculum. Specifically, our sample consisted of 19 (24%) ITE, 21 (27%) CCNA1, 19 (24%) CCNA2, and 20 (25%) CCNA3 participants. ITE is an introductory course that familiarizes participants with basic computer hardware concepts and networking tasks. The CCNA curriculum itself consists of four modules that lead up to a voluntary, industry-recognized ICT networking certification exam. At the time of data collection, no CCNA4 course was in session. Depending on individual learning speed, all four CCNA course modules can be completed within a one or two-year period. Select descriptive data for the sample is provided in Table 1.

Table 1

Descriptive Data for Sample Participants (n=79)	*n*	*%*
Gender		
male	77	97.5
female	2	2.5
Urbanicity		
urban	67	84.8
rural	12	15.2
Highest education completed		
currently in high school	10	12.7
high school diploma	61	77.2
apprenticeship or vocational program	2	2.5
university degree	6	7.6
Secondary school type		
general-academic	51	64.6
vocational	28	35.4

Measures

Data was collected from NetAcad participants at AUK in Prishtina (Kosovo's capital city) during June 2009. A pilot test was conducted with a convenience sample of 15 participants who were asked to complete a 54-item custom online questionnaire. Results from the pilot study were used for item improvement and instrument validation. The final instrument was then group-administered to intact NetAcad courses, for course-based administration ensured high response rates and an efficient data collection process. Given that all NetAcad teaching materials used in Kosovo are in English, the student questionnaire was administered in English as well.

The custom online questionnaire included multiple choice, Likert-type, and open-ended items. Thirty-five items collected data on student background characteristics, prior IT-related experience, and expectations about future labor market benefits based on program participation. Ten items focused on student perceptions of NetAcad training, including curriculum quality, instructor performance, and peer collaboration. The expected impact of NetAcad training on individual career choice, desired employment type, and salary level was measured by three items with an internal consistency reliability estimate of $\alpha = .77$. A 9-item Likert-type Career Aspiration Scale (CAS; adapted from Gray & O'Brien, 2007) concluded the survey instrument. The CAS measured participants' career aspirations and had an internal consistency reliability estimate of $\alpha = .78$.

In addition to participant questionnaires, semi-structured interviews were conducted with local ICT employers and NetAcad instructors. Interviews with local ICT employers explored reasons for hiring NetAcad participants, as well as their job-readiness and overall performance. Instructor interviews covered areas including the quality and practical industry relevance of the curriculum, participant motivation, and an overall assessment of participants' training-to-work transition readiness.

Results

Participant Assessment of Training Quality

Participant assessment of NetAcad training quality consisted of three distinct parts, including instructor performance, course and curriculum quality, and peer collaboration. An overview of items and descriptive statistics is provided in Table 2.

Table 2
Means and Standard Deviations of Overall Perception of NetAcad Training (N=79)

Item	M	SD
1. I get along well with my NetAcad instructor	5.82	.56
2. My NetAcad instructor teaches well.	5.82	.50
3. My NetAcad instructor cares about my learning.	5.78	.52
4. My NetAcad instructor motivates me.	5.59	.95
5. The NetAcad training has many hands-on exercises.	5.27	1.04
6. The NetAcad course is interesting	5.67	.55
7. The NetAcad course is mainly theoretical. (*R*)	4.17	1.72
8. Other students are helpful in explaining material to me	4.64	1.45
9. There is good team spirit in the course.	5.54	.77
10. I frequently study together with other NetAcad students outside of class.	4.39	1.67

Note: *R* indicates a reverse-coded item. A six-point Likert-type scale was used where 1= Strongly disagree and 6=Strongly agree.

Over 90% of participants indicated high levels of satisfaction with the quality of NetAcad instructors. The results pattern was consistent across all four-course levels. While the assessment of course and curriculum quality (Items 5-7) was generally positive, participants perceived NetAcad courses to be mainly theoretical, which contradicts the intended application-focused nature of the curriculum. The combined ratings on peer collaboration were lowest in relative terms. Overall, mean ratings for all three assessment categories ranged from 4.17 to 5.82

on a 6-point scale, indicating that the overwhelming majority of participants perceived NetAcad training to be positive on the tested dimensions.

Impact of Perceived Program Benefits on Career Aspirations

Career aspirations, or occupational goals and preferences under ideal circumstances, are an important factor in the transition from education or training into the workplace (Rojewski, 2005). Career aspirations of NetAcad participants were measured using an adapted version of the Career Aspiration Scale (Gray & O'Brien, 2007). We applied a six-point Likert-type scale with categories including 1 (*strongly disagree*), 2 (*disagree*), 3 (*somewhat disagree*), 4 (*somewhat agree*), 5 (*agree*), and 6 (*strongly agree*). Two items were reverse-coded to avoid response bias. Table 3 provides an overview of participants' career aspiration scores.

Table 3
Means and Standard Deviations for Participants' Career Aspirations (N=79)

Item	M	SD
1. Once I finish the basic level of education needed for a job, I see no need to get more education. (R)	4.19	2.14
2. I hope to become a leader in my career field.	5.49	1.03
3. When I am established in my career, I would like to manage other employees.	5.37	.98
4. I would be satisfied just doing my job in a career I am interested in. (R)	1.91	1.47
5. I think I would like to pursue more training for the job/career I am interested in.	5.73	.55
6. I plan to devote energy to getting promoted at my future workplace.	5.59	.78
7. When I am established in my career, I would like to train others.	5.00	1.43
8. I hope to move up through any organization or business I will work in.	5.58	.73
9. I plan to become an expert in my job.	5.68	.65

Note: R indicates reverse-coded items.

Descriptive data indicated that participants' career aspirations profile was high regarding the pursuit of leadership roles, as well as the pursuit of further career-related education and training. Correlation analysis indicated the existence of a statistically significant positive correlation between perceived program benefits and career aspirations ($r=.35$, $p=.001$).

Desired Sectoral and Geographic Labor Market Destinations

The majority of respondents (43.1%) indicated a preference to seek employment in government or the public sector. Of the remaining participants, numbers were fairly evenly distributed between working for private businesses (27.8%) and working for their own company or business (29.1%). Over 60% of respondents indicated a preference to live and work outside of Kosovo. Principal destinations included the United States, Canada, the United Kingdom, Germany, Switzerland, and the Netherlands. Participants named low wages and overall poor career prospects in Kosovo as the principal motivations to emigrate.

Employer Assessment of Participants' Job Readiness

Semi-structured interviews were conducted with public and private employers of NetAcad graduates. Major themes emerged around the issues of hard skills, soft skills, and the retention of experienced networking professionals. Employers consistently emphasized the solid know-how that NetAcad hires brought to the job. Notwithstanding their superior technical preparation, employers suggested that graduates would greatly benefit from structured training in soft skills, with deficiencies in team work being among the most frequently cited shortcomings. Notably, the labor market for experienced networking professionals in Kosovo is becoming more efficient, rendering the retention of experienced NetAcad graduates a major challenge.

Instructor Perceptions of Instructor Preparedness

Semi-structured interviews were conducted with NetAcad instructors within the AUK-based program. Two major themes that emerged included issues of pedagogical training and work experience. Currently there is no requirement for pre-service pedagogical training for NetAcad instructors, nor are there any pre-service training opportunities made available to them through the program. Furthermore, in-service training is minimal and almost completely self-directed with no outside incentives for completion. Coupled with this lack of pedagogical training, many NetAcad instructors begin their teaching career having very modest amounts of practical ICT work experience.

Discussion

Our study had the objective to examine the impact of the NetAcad program in terms of (a) perceptions of training quality, (b) career aspirations, (c) intended sectoral and geographic labor market destinations, and (d) overall training-to-

work transition readiness. Several important issues emerged from this study, the most pressing of which revolve around participants' soft-skills, brain drain, limited collaboration between NetAcad program management and local employers, and the realistic assessment of labor market destinations.

Results indicated a highly favorable overall participant rating of NetAcad training, especially in the areas of instructor performance and curriculum quality. Perceived program benefits are linked to high career aspiration scores, although no causality could be determined with the present data. The relatively lower ratings on peer collaboration are congruent with employers' impressions of deficiencies in team work and other so-called *soft skills*, which generally include individuals' interpersonal, communication, and work ethic competencies (Harris & Rogers, 2008). Prior research on ICT employees has consistently identified these desired, non-technical attributes as crucial elements of workplace success (see Lewis, Smith, Belanger, & Harrington, 2008; Pant & Baroudi, 2008; Teaching and Learning Research Programme, 2008). Thus, we believe that NetAcad and similar ICT workforce training programs could be greatly enhanced by including structured training modules on soft skills.

In addition to concerns regarding soft skills training, some NetAcad instructors expressed concerns about the overall pedagogical preparation of the instructor pool. There is currently no formal training program for NetAcad instructors; instead, course participants who show competence and promise are offered the opportunity to work with an experienced instructor upon completion of the program (i.e., in a position much like that of a teaching assistant). This informal assistantship covers a three-to-six month period, at which point the instructor-in-training will be offered his or her own course to teach. This lack of formal, pre-service pedagogical training, coupled with the dearth of in-service training opportunities, leads to a wide disparity in the quality of the teaching force. Further complicating the issue of instructor preparation is the fact that some instructors for NetAcad have very modest amounts of work experience besides the lack of pedagogical training. Other instructors, however, have significant amounts of work experience. These instructors with greater experience are better able to facilitate the training-to-work transition because of the additional real-world know-how and practice-oriented skill sets that they bring to the classroom. Given the deficiency in soft skills expressed by local employers of ICT professionals, this is a critical issue for the future of NetAcad and potentially similar programs that operate under post-conflict conditions. Once a sufficient stockpile of personnel has been acquired, the program focus should shift to hiring instructors with work experience or some form of pedagogical training.

In order for private-sector ICT training initiatives to have an appreciable effect on post-conflict reconstruction in Kosovo, the issue of student retention

and certification must be addressed. The increasing complexity and difficulty of CCNA modules is an insufficient explanation for the high attrition rate, especially between the first two modules. Estimates of the number of students who drop out of NetAcad training between modules one and two ranged from 50-60%. One instructor estimated that less than 10% of his students complete all four modules and proceed to take the certification exam. NetAcad instructors attributed excessive attrition to a number of reasons, with the most consistent and salient being the lack of understanding on the part of both participants and employers about the nature of CCNA certification. Prospective employers in Kosovo have not been adequately informed about the difference between attaining certification and possessing a certificate of attendance. Since the difference is not clear to them, they often mistake the latter for the former.

In the current era of post-conflict reconstruction, misunderstandings about ICT industry certifications and limited communication between NetAcad program management and local employers has yet to reach a critical stage. In the future, however, negative consequences are likely to arise for NetAcad participants who leave the program prematurely. As more participants complete the NetAcad training program, businesses will have a larger applicant pool from which to draw prospective employees. With this increased competition for positions, students with more training and more certification will exhibit a higher propensity to be hired. This type of educational inflation (see Borghans & de Grip, 2000) will lead to a decrease in the value of the attendance diploma, leaving many NetAcad graduates without the requisite credentials to find gainful employment.

The *brain drain* of trained ICT professionals is among the foremost issues faced by education and training policymakers in Kosovo. The term itself refers to the outflow of a country's most educated and employable population strata on a scale that threatens the long-term needs of national development (Beine, Docquier, & Rapoport, 2001). Brain drain can have particularly dire consequences for emerging and post-conflict economies, especially when it leads to situations in which skilled labor has to be substituted with unskilled labor (Piketty, 1997). While a limited rate of skilled migration (i.e., less than 10% of a country's skilled workforce) is likely to have positive macroeconomic effects through remittances, return migration after additional skills have been acquired abroad, and an overall increasing return to education, an excessive outflow of trained workers is a major source of concern (Docquier, 2006). In our study, over 60% of respondents indicated a desire to leave Kosovo to secure employment. Clearly, emigration on this scale is a serious threat to the country's human resource base that is needed to promote long-term economic development. Myriad factors have been found to motivate a country's educated workforce to seek employment beyond its borders, such as the lure of

higher salaries and better working conditions (Jalowiecki & Gorzelak, 2004). For our sample of NetAcad participants, earnings and professional development prospects represented a fundamental concern. Even though salaries of ICT networking professionals in Kosovo are up to four times above the national average of US$ 320 (Investment Promotion Agency of Kosovo, 2008), wage differentials to European Union and other industrialized countries remain substantial. This issue was reflected in the data gathered from current NetAcad instructors who consistently cited the lure of higher salaries to have a strong influence on participants' desire to emigrate. Unless wages rise considerably over the medium term, newly trained ICT professionals with highly portable skill sets will continue to turn their backs to the domestic labor market as soon as they acquire sufficient work experience.

A further policy-relevant issue revolves around respondents' desired sectoral labor market destinations. The tendency of roughly one-third of NetAcad participants to strive for eventual entrepreneurship is highly encouraging, for new business ventures carry the promise of macroeconomic growth and job creation. However, the strong gravitation toward public-sector employment (42%) is a source of concern given the current structure of Kosovo's labor market. The perceived advantages of relative job security and regulated working hours appeal strongly to many NetAcad participants. Yet, few recognize the public sector's limited capacity to absorb high numbers of additional ICT professionals, as well as the fact that salary levels in government ICT positions remain well below those attainable in the private sector.

While survey data indicated that participants are leaving the NetAcad program with the skills necessary to successfully transition into the workforce, data from interviews showed a need to improve communication between NetAcad program management and local area ICT employers. Symptomatic of this lack of communication is the absence of career placement mechanisms that assist participants in gaining preliminary work experience or securing employment after graduation. The lack of formal internship opportunities or career placements hinders those participants who successfully complete the training program, yet do not have an informal network to assist in their job search. Moreover, this lack of established career placement infrastructure exacerbates the issues surrounding certification. NetAcad and similar ICT training programs in Kosovo should be encouraged to carefully manage ties with local employers as a means to improve the odds of successful labor market entry.

Conclusion

Our study has yielded insights into NetAcad's capacity to prepare participants for the transition from training to work. In general, individuals who are best

positioned to move from training to work exhibit strong career aspirations (Mortimer, Zimmer-Gembeck, & Holmes, 2002; Rojewski & Yang, 1997). Such individuals further demonstrate a common set of characteristics, including (a) generalizable work skills, (b) clear and realistic plans, (c) optimism about plans, and (d) resilience in the face of obstacles (Phillips, Blustein, Jobin-Davis, & White, 2002). While soft-skills and the realistic assessment of emigration options and employment destinations were somewhat limited, our sample of NetAcad participants was overall well prepared for a successful transition into the workplace. In fact, beyond their strong motivation and career aspirations, we considered participants' positive attitude, energy, and confidence to succeed in the labor market to be among their most valuable assets. The skills acquired through the NetAcad program appear to set an important foundation upon which such confidence can continue to thrive.

Overall, building workforce capacity in post-conflict environments requires years of steady, incremental progress. In the ICT sector, such skills development activities need to be managed with particular care to ensure high training quality. At the same time, sectoral analyses need to monitor labor supply and demand in order to avoid training an overabundance of ICT professionals *for the shelf* (see Middleton, Ziderman, & Van Adams, 1993). Our study supports the notion that, in the case of NetAcad, private-sector workforce training initiatives can contribute to ICT capacity-building in Kosovo meaningfully and effectively. However, further research and, ideally, longitudinal analyses are necessary to guide major policy decisions, such as the inclusion of NetAcad and other private-sector training initiatives into Kosovo's newly emerging national qualifications framework. Given our current insights, we believe that such a step merits serious consideration.

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Worldwide Challenges of ICT in Education and Training

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Abstract

Information and communication technology (ICT) has reshaped occupational structures, job classifications and skills requirements. Concurrently, ICT has impacted education and training by making it possible to produce authentic and engaging learning tasks. Furthermore, new technologies have enabled students to bridge school, work, and social activities. ICT has expanded learning beyond school-based education through participation in virtual activities that would otherwise be beyond reach. However, globally, the growth of ICT has promoted a digital divide between developed and developing countries. This paper focuses on the function of and the preconditions for applying ICT in education and training and in the production and dissemination of knowledge. Furthermore, it describes how the Finnish educational system is meeting the challenges posed by ICT.
Keywords: ICT-supported education and training, globalisation, technical and vocational education and training, digital divide

Introduction

A knowledge society is characterised by the unparalleled growth of information and the informatization of society. Informatization, the extent by which a society is becoming information based (Kluver, 2004), is inextricably linked with technological development. A synthesis of computers and telecommunications has given birth to knowledge networks linking schools, homes, workplaces, banks and shops on a national, continental and global level. The new technology has also affected the economy as a whole, the changes occurring both in occupational structures and in the content of work, and the new forms taken by information flows (Commission of the European Communities, 2009). Information technology has profoundly reshaped occupational structures in terms of occupational classifications and occupational profiles. Many

occupations have seen a rise in the use of information technology and demand for skilled labor in the last few decades (Brown & Attwell, 1999; O'Mahony, Robinson, & Vecchi, 2008). In Finland for example, in 1984 information technology was used on the job by 17 %, and in 1997 by 66 % of wage and salary earners. In addition, a great proportion of the working population consists of information workers. In 1980 about a third of the workforce were information workers, while in 1997 the figure was 44 % (Statistics Finland, 1997).

At the moment there are extensive programmes in most industrialised countries intended to boost the development and introduction of information technology and promote its application to the operations of society. The introduction and utilisation of information technology is seen as a central national-level strategy. Countries such as Finland, the United States, Japan, the UK, Germany, Canada, Sweden, Norway, Denmark, Singapore, France, Spain and South Korea have found common development targets, such as information technology at schools, health services, and promoting multimedia. Shared trends discernible in knowledge-society strategies adopted and action programmes launched in different countries include:

- increasingly versatile and integrated networks;
- simpler architectures (web computers);
- commercialisation of the Internet;
- a need to regulate the market;
- increasing electronic commerce.

At the Lisbon European Council held in March 2000, the Heads of States and Governments acknowledged that the European Union is confronted with a quantum leap coming from globalisation and the new knowledge-driven economy and set, among others, a strategic goal to develop eLearning (Commission of the European Communities, 2009). E-learning seeks to mobilise the education and cultural communities, as well as the economic and social players in Europe, to speed up changes to move to a knowledge-based society. The European Union has undertaken extensive measures in the field of knowledge-society policies. This expansion is due to the inclusion of much emphasis on research and development (R&D) activities into knowledge-society policies. A plan drawn up in 1994 started with the most basic considerations such as deregulation and creating a market. Information technology was presented as a means of promoting economic growth and creating new jobs. The current programme stresses social questions, such as acceptance of the information or knowledge society in different population groups and the prevention of polarisation.

As for the Organisation for Economic Co-operation and Development's (OECD) activities related to the knowledge society, their focus is on reforming the relevant legislation and the public administration, on formulating political targets for a knowledge society, and on international co-operation. The OECD

distinguishes four categories of information workers: 1) producers, 2) processors, 3) distributors of knowledge, and 4) people in support services.

The growth and wide distribution of information do not in themselves indicate the function and quality of knowledge. In public debates, the concept of the knowledge society has been joined by that of the learning society. The *White Paper on Education and Training* by Commission of the European Communities (1996) considers the construction of a learning society an indispensable precondition for making good use of the globalised economy, the development of the knowledge society and the growth of scientific knowledge, and for averting the risks that these processes give rise to. A factor that must also be taken into account on the global level is the increasing imbalance between developed and developing countries which has been created and promoted by information technology (Gorski, 2008).

ICT in the Context of Education and Training

By all measures ICT has become ubiquitous at the onset of the 21st Century and has established viable alternatives for education and training aided by the appeal of "anytime/anywhere" access (Allen & Seaman, 2008). However, as the impact of ICT becomes more pervasive, questions about the quality of related teaching and learning, authenticity of student experiences, and meaningful use of technology have become louder in recent years (Carr-Chellman, 2005; Hernandez-Gantes, 2009). In response to these lingering questions, researchers of pedagogy have discussed ways of restructuring the teaching and learning practices of school to make them more supportive of the development of the information-processing skills characteristic of experts or competent workers. These discussions emphasise the importance of ICT.

The new information and communication technologies make it possible to develop cognitive practices of a kind that guide students towards the acquisition of progressive problem-solving skills characteristic of a competent professional (Lehtinen, 1998). Cognitive practices developed through ICT support problem-centred studying that can be brought closer to various occupational practices. ICT can also foster studying aiming at learning and understanding. Learning is motivated particularly by technology that makes it possible to organise individualised work processes, varying task contexts and links with society's authentic occupational environments (Bronack et al, 2009). Network-based action models and new technologies enable students to move, in a natural and relevant way, between school and the institutions of the surrounding society. This has meant the expansion of learning environments beyond the confines of school to occupational activities and contexts outside formal education. ICT has expanded our learning environments. Computers and information

networks enrich school-based learning by making possible virtual participation in activities that would otherwise be beyond reach. Learning is seen as the active construction of knowledge and skills rather than as the passive reception and storing of information.

Learning does not necessarily involve an increase in knowledge elements in students' minds but, instead, a gradual transformation of cognitive structures. In the course of their learning history, individuals develop rather abstract and general assumptions and beliefs about the nature of things. In part, these unconscious framework theories guide and direct learning. This feature of learning is emphasised also when operating within networks. Metacognition is an ability to set the aims, to be aware of one's own cognitive processes and to guide and monitor ones' own intellectual performance. The more self-directed learning becomes, the more responsibility learners themselves take for their learning. To this effect, the concept of "chunking" has been used to explain how people with varying levels of expertise process information. Briefly, chunking is formed by a few pieces of information (or "chunks") for easy access and meaning making when put together (Conlon, 2002). The applications of chunking for education and training facilitated by instructional technology have been suggested for the promotion of expertise and understanding in a given domain (Hernandez-Gantes, 2009).

Albeit the promising uses of information technology on the design and development of teaching and learning practices, it can also pose many challenges. How can we exploit information technology to foster the growth of competent skilled workers and professionals and the development of their information-processing skills? Technology-based learning environments can promote (a) research-based learning and problem-solving, (b) the development of students' self-evaluation skills and other metacognitive skills, (c) the formation of motivation, (d) organisational learning, and (e) closer ties between the culture of school and the culture of the workplace. As mentioned above, the learning society has recently emerged as a concept used alongside that of the knowledge society. Lifelong learning and, in this context, making use of information technology to support learning in all age groups, has become an increasingly important consideration (Merriam, 2008). For instance, Pelgrum and Anderson (1999) coordinated a study of twenty-six countries on the educational assessment of ICT infrastructure, goals and practices in the context of International Education Attainment (IEA) studies. Their findings indicated that students at primary, lower secondary and upper secondary education levels experienced most satisfaction with learning activities involving computer-related technology concerning their information-processing, production and communication/collaboration activities.

Constructing networks and communities supporting lifelong learning with the aim of enabling local and global enterprises and communities and different

work cultures to contribute to the learning projects of educational establishments may be considered a central strategy for developing the pedagogy of vocational education and training. Developing a knowledge and learning society to meet human and societal needs poses a particular challenge regarding the creation and maintenance of learning networks using ICT.

A National Case of Preparing for ICT for the 21st Century

In a knowledge society, knowledge is an important resource. The development of the techniques of producing and transmitting knowledge exerts an essential influence on the structures and contents of and the working methods used in education and research. In Finland, knowledge-society policy has been implemented on the basis of two extensive strategy documents, *Koulutuksen ja tutkimuksen tietostrategia* (official English translation: *Education, Training and Research in the Information Society*) and *Kulttuurinen tietoyhteiskunta* (*A Cultural Information Society*) (Sinko & Lehtinen, 1999). In education and research the knowledge society is being promoted through the gradual digitalisation of the cultural capital that makes new information and communications technology possible and the provision of a more versatile and equal access to it.

The first knowledge strategy for education and research in Finland, covering the years 1996-1999, was formulated by the Ministry of Education in 1995. The current strategy was devised for the period 2000-2004. The Government's aim is to use information technology to promote employment and national competitiveness and to ensure that citizens have access to, can exploit knowledge and that they possesses the basic skills in using knowledge and information technology. This strategy also proposes measures to guarantee high-performance computing capacity with a view to supporting scientific research and improving the preconditions of producing and using network-based multimedia. The Ministry of Education defined its vision of developing a knowledge society as follows:

> By the year 2004 Finland will be one of the leading knowledge and interaction societies. Success will be based on citizens' equal opportunities to study and develop their own knowledge and extensively utilise information resources and educational services. A high-quality, ethically and economically sustainable mode of operation in network-based teaching and research will have been established (Sinko & Lehtinen, 1999, p.34).

The overall theme of the strategy, the systematic development of learning environments based on research, can be divided into six subthemes:

- provision of information-society skills for all;
- the information-society skills of educational staff,
- the knowledge of professionals in the information and content industries;

- the consolidation of virtual learning environments;
- electronic publication, classification, and distribution of research information and teaching materials;
- strengthening the structures of the knowledge society.

The strategy draws guidelines for an information and knowledge policy for the 21st century by proposing 85 detailed strategic measures. The following measures stand out as central goals:

- Once-and-for-all education is replaced by continuous, lifelong education
- Everyone is ensured the acquisition of the basic skills needed in an information society
- Vocational education and training is guaranteed to deliver information-society skills that meet the requirements of a networking, constantly changing and increasingly global working life. The competencies of different knowledge workers are developed in the direction of the multidisciplinarity presupposed by the changing contents of jobs.
- The preconditions and contents of teachers' pre-and in-service training are developed to meet the requirements of the emerging knowledge society.
- Support is given to the development of knowledge products and services.

In a knowledge society, the development of research activities is guaranteed among other things by seeing to it that the equipment needed for scientific computing is kept up to date. At the same time, encouragement is given to research on the political, social and cultural effects of a knowledge society.

The school system and the library network as a whole will be rapidly linked with the services provided by information networks. All educational establishments will be guaranteed a minimum level of services, while an education and research information network will be constructed as a part of a global open information network along the lines suggested by the present Internet and the standards of the emerging broadband networks and services.

Expanding use of information technology also affects culture profoundly. The report *A Cultural Information Society,* completed in 1996, outlines a developmental strategy for cultural policy in an information or knowledge society by considering how the new technology influences the various areas of culture and what kind of trends can be discerned and anticipated in the near future. The strategy covers the following central considerations arising in an information society:

- provision of native contents;
- access to culture, regional policy and equality;
- new products and new services;
- international opportunities.

It also presents a number of theses as a basis for the cultural political measures proposed:

- Culture promotes the economy, employment and competitiveness.
- Culture promotes technology.
- Culture promotes democracy.
- Culture prevents exclusion.

The starting points of developments towards a knowledge society are often linked with the development of ICT, but quality of life should not be forgotten among its aims. The Finnish Ministry of Education has emphasised a vision of an information society providing a high quality of life in the national strategies launched every fifth year since the 990s. In an endeavour to develop an information society characterised by a high quality of life, the considerations such as people's real needs, high-quality pedagogic and cultural contents have been foregrounded. The discourse of information society has changed to the discourse of knowledge and learning society. Finnish Ministry of Education (2004) is emphasising to educate the abilities of criticising, selecting and applying the knowledge and use information technology for developing stimulating learning environments. Researching ICT in education and training has become an essential development instrument conceptually and for practice.

ICT should be based on faith in the power of education. It must be used to look for means of promoting parents' and schools' ability to bring children and young people up as human beings who can make ethically valid choices and distinguish between right and wrong. The following ethical aspects make ICT human-centred:

- An information society that violates privacy should not be allowed to emerge.
- Both the advantages and the social and psychological disadvantages of communication over telecommunications networks must be recognised. The emerging division into knowledge-rich and knowledge-poor areas should be prevented.
- New information and communications technology must be developed particularly with a view to guaranteeing various minority and special groups, such as the disabled or people living in outlying areas, a good life and equal participation.
- In teaching and training, new technology must be exploited to support learning that is individualised both in its forms and in its contents.
- In developing an information and learning society, support must be given, apart from the technological sciences, particularly to research on the information of knowledge society within the humanities and the social sciences.
- An information society is seen, from the perspectives of education, research and culture, as the richness of individual diversity and as an opportunity for individually defined quality of life.

The Information Strategy Group of the Ministry of Education monitored the implementation of the strategy in 1995-1999, and the Finnish National Fund for Research and Development (Sitra) was also commissioned by the Parliament to assess its implementation through a national evaluation of the educational use of ICTs (Lehtiö, 1998; Sinko & Lehtinen, 1999). Harnessing new technology to support education and learning has had a positive effect. However, universities and other educational institutions have used the new educational technology in quite heterogeneous ways. Likewise, there have been marked differences in the degree of commitment to the strategy. Only a fifth of the educational staff uses new technology extensively in their teaching. Almost all teachers and students would be willing to make more use of it in teaching and studying. The majority of the appropriations made for developing an information society were intended to finance the acquisition of equipment by and the building of information networks in schools, colleges, universities, libraries and archives. There were also appropriations for strengthening education, training and research related to the information or knowledge society by increasing the student intake and the number of teachers and researchers (Fabos & Young, 1999).

ICT in the Production and Dissemination of Knowledge

In recent years, the development of computer technology, diverse user applications and the experiences with collaborative research and development projects and networks have created a new situation characterised by decentralised and dispersed structures of knowledge logistics, electronic communication and virtual networking. The first step towards the new era involved the development of web-based resources and the increased and varied uses of electronic publication and communications media. Gradually, a number of new structures and environments have emerged to meet the needs of electronic communication and knowledge sharing among research communities that are developing collaborative research patterns. Alongside needs arising in the research communities, new providers have emerged to develop simple gateway services and user-friendly overviews of current research (Manning, 2009). At the same time other new providers have emerged to develop electronic communications and knowledge sharing environments for European projects and networks (see, Brown & Attwell, 1999). Finally there is the emergence of project-related initiatives to develop telematic tools for the contextualisation and enrichment of interim research results and for the further processing of knowledge.

Given the dynamic and continuous development of ICT, it has become imperative to produce knowledge on emerging technologies used facilitate education and training including course management systems and delivery formats. The use of technology to facilitate social networking, virtual interactions, simu-

lations and video gaming, and collaborative activities central to education and training should be at the core of a global research agenda in years to come (National Science Foundation, 2008).

Intellectual Property Rights

The development of a knowledge society and information technology is a global process. The problems involved in digital environments are not problems of individual countries. Their solutions must be found through international harmonisation. Copyright has traditionally been an international branch of jurisdiction. Copyright and neighbouring rights are governed by several international conventions. Attempts to meet the needs to develop and harmonise copyright legislation that arise from information networks and digital technology have been made both on a global level and within the EU

The World Intellectual Property Organisation (WIPO) has for years worked for a reform of international copyright treaties. Its copyright treaty, concluded in Geneva in 1996, and performances and phonographs treaties set down the first international rules for copyright in the digital age and for using works on information networks. The WIPO (2000) treaties recognise the following rights:

> Copyright protection generally means that certain uses of the work are lawful only if they are done with the authorization of the owner of the copyright. The most typical are the following: the right to *copy or otherwise reproduce* any kind of work; the right to *distribute* copies to the public; the right to *rent* copies of at least certain categories of works (such as computer programs and audiovisual works); the right to make sound recordings of the performances of literary and musical works; the right to *perform in public,* particularly musical, dramatic or audiovisual works; the right to communicate to the public by cable or otherwise the performances of such works and, particularly, to *broadcast,* by radio, television or other wireless means, any kind of work; the right to *translate* literary works; the right to rent, particularly, audiovisual works, works embodied in phonograms and computer programs; the right to *adapt* any kind of work and particularly the right to *make audiovisual works* thereof (p. 3).

Both agreements also include measures intended to protect digital materials and regulations concerning rights management information.

Challenges of ICT

To return to a more general consideration of the issues involved, in developing knowledge-society policies particular attention should be paid to the following considerations:

- preventing exclusion;
- recognising the teacher's changing professional role;
- preparing for the establishment and development of virtual schools;
- mastering the information overload;
- supporting evolution of indigenous cultures;
- guaranteeing the preconditions of acting as a critical citizen in a knowledge society;
- allowing for individual learning needs and styles as a starting point for education;
- teaching students versatile media readinesses on all levels of the educational system;
- preventing inequity between the industrialised and emergent countries; and
- considering gender inequity in using the resources of ICT.

There are a number of general ICT-related skills that are indispensable in a knowledge society. In the near future, the following skills will be foregrounded as basic media readinesses entailed by communications technology:

- using e-mail;
- using information search and retrieval systems;
- systematic distance education over information networks;
- assessing the reliability of knowledge;
- being able to use audiovisual methods and materials in one's occupation.

There is no doubt that general ICT-related skills are becoming a basic necessity for people living in a knowledge society who need communication skills and the ability to cope with change, to learn, and to think ecologically in an increasingly diverse world.

The civic skills possessed by the citizens of a knowledge society must meet the requirements of a networking, constantly changing and increasingly global life style but be based on independent initiative, self-directedness, understanding, and independent search for knowledge. Such civic skills include technical skills, communication skills and a network ethics, the skills needed in acquiring and using information, consumer skills, and influencing knowledge-society policies. On the global level the contents and relative priorities of these goals will vary. As it is, there is little balance in the way such goals are materialised. The rich industrial countries should assume some of the responsibility for preventing ICT from becoming one more factor creating inequality on earth.

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Enhancing the Teaching of Technical and Vocational Education Using Information and Communication Technologies

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Abstract

Information and communication technologies (ICT) have revolutionized education and training by changing the way we teach and train as well as how students learn. Since the manner in which these technologies are used in teaching and learning varies, their application to educational settings needs to be examined. This study sought to establish how ICT, specifically the Internet and Web 2.0 tools, are used to enhance the teaching of technical and vocational education and training (TVET). Data were collected from literature sources and interviews of vocational/career center instructors in northeastern Ohio. In addition to online education, Internet tools and technologies such as blogs, podcasts, wikis, digital storytelling, and social networks are being used to enhance teaching and learning in vocational education.
Keywords: TVET, information technologies, blog, podcast, Web 2.0, wiki

Introduction

Nowadays, it is almost difficult to imagine how individuals survived or can survive without the technologies that seem to control our lives today. A look around at everyday activities illustrates our dependency on existing technologies: there is Internet banking, online dating, online political campaigns and fund raisings, online games, online education, online churches, and lately, even online doctor's visits are possible. These online activities show how our everyday activities have become so

intertwined with existing technologies. Since technology plays such a central role in our lives, educators are taking advantage of the opportunities the Internet and its tools, especially Web 2.0 tools, offer to enhance teaching and learning.

With most of today's students accustomed to the Internet and its tools, incorporating these technologies in the classroom in order to meet the students in their comfort zones makes sense (Inoue, 2010). Furthermore, integrating the technologies into classrooms ensures that students are engaged (Williams, 2007), especially the "millennials" or "digital natives" (Prensky, 2001) who find traditional classrooms boring (Brydolf, 2007). As the use of the Internet and Web 2.0 tools such as blogs, wikis, and podcasts, gains popularity in the classroom, many schools are providing their faculty with support and training necessary to effectively incorporate them into teaching. This paper describes how information and communication technologies (ICT), specifically the Internet and Web 2.0 tools, are being used to enhance the teaching of technical and vocational education and training (TVET).

Encompassed by ICT is a broad range of technologies used for storage of information and communication purposes (United Nations Economic Commission for Europe, 2007). Examples of ICTs include the computer, Internet, cell phone, PDA (personal digital assistants), and MP3 (MPEG layer 3) player, as well as other Internet tools such as Web 2.0 tools. Web 2.0 is not a new version of the World Wide Web (WWW), but a term commonly used to refer to the latest use of the Internet. Unlike the WWW that originated in the 1990's, where content was created by web developers (Imperatore, 2009) and visitors to sites were not permitted to contribute or edit content, now it is common for sites to allow user input. Therefore, Web 2.0 tools use the Internet platform to enhance functionality, communication, and collaboration (Rhoades, Friedel, & Morgan, 2009).

According to M. Engelhart, a technology instructor and coordinator at the Medina County Career Center in Ohio, Web 2.0 tools provide "users with opportunities to provide content or interact with websites" (personal communication, April 17, 2009). Furthermore, in Web 2.0 people have control of information, can rate and respond to what they like and do not like, and can share their favorite resources (Imperatore, 2009). According to Fluss and Eisenfeld (2009), the most prevalent Web 2.0 applications are found in social networking technologies such as social networks (Facebook, Twitter, LinkedIn); blogs (MySpace, Xanga); online communities (Yahoo, Google Groups); user-generated content (YouTube, CNN iReport); widgets (WidgetBox); and wikis (Wikipedia, WikiWikiWeb). While many of the Web 2.0 applications which influence business and knowledge sharing practices in many organizations (Kane & Fichman, 2009) were not originally intended for educational purposes, they are quickly being integrated into the classroom (Churchill, 2009).

Lately, a number of technical and vocational education teachers, trainers, and students are using the Internet and Web 2.0 tools in teaching and learning. For example, students use blogs to publish writings, discuss assignments, review each other's work, and collaborate on projects. And, as the Internet and its technologies become more readily available, their use in educational settings is set to increase. Therefore, it is important to describe how the technologies are currently being incorporated into teaching and learning, specifically in TVET.

Purpose of the Study and Objectives

This study sought to establish the ways in which the TVET teachers are using the Internet and Web 2.0 tools to enhance teaching and learning. The specific objectives of the study were:

1. Identify the common Web 2.0 tools being used by TVET teachers.
2. Describe the common uses of the Internet and Web 2.0 tools by TVET teachers.
3. Describe examples of student activities involving the use of Web 2.0 tools by teachers.

Method

Data for this study were collected through literature review, interviews of two instructional technology experts, and from two focus groups (nine per group) of career center instructors from northeastern Ohio. The teachers taught the following career and technical education (CTE) programs: horticulture, medical assisting, physical education, criminal justice, and pre-engineering. The instructional technology experts and technology instructors at the two career centers in Ohio were considered essential to this investigation because they provide the instructional technology support to the technical teachers at their career centers. The experts were also a valuable source on how ICTs are being used in other programs at the vocational/career centers. Data triangulation (Denzin, 1989) was accomplished through interviews of other career and technical teachers who were taking CTE licensure classes at a local university. Additional data were obtained during classroom visits to some of the career centers. The classroom visits enabled seeing firsthand the application of the Internet and Web 2.0 tools in classroom settings.

Findings

Among the common Internet technologies, specifically Web 2.0, applications used in TVET classrooms are social networking sites, blogging, wikis,

podcasting, and digital storytelling. These Internet tools are available free of charge to the teachers and many teachers are incorporating them into teaching and learning. However, the manner in which the Internet tools are used to enhance teaching varies with subject area and the expertise of instructors on using technology. The next sections describe each of the common ICTs and how each is being used in the classroom to enhance the teaching of TVET. The specific Internet technologies presented are: blogs, podcasting, wikis, social networking, Google documents, and digital story telling. The in-service teachers for the most part were in agreement with the application of the Internet and Web 2.0 tools as identified by the focus group.

The Internet and Education

The Internet has revolutionized education; it has changed how we teach, how students learn, what and where learning can take place. There are now numerous online courses which have become a selling point for many educational and training programs as well as academic institutions. Comprehensive statistics are not available on the extent of growth of distance education in technical and vocational education. However, according to the National Center for Education Statistics (2008), it is estimated that of the 12.2 million enrollments in college-level credit-granting distance education courses (in the year 2006 and 2007), 77% were in online courses, 12% were in hybrid or blended online courses, and 10% were reported in other types of distance education courses. As technology becomes more available, more programs are expected to be offered online. The Internet has also made it possible to break the geographic boundaries and allow teaching, training, and learning to take place from a distance. Furthermore, the Internet has allowed for prompt delivery and flexibility of instructional strategies, especially with asynchronous approaches that allow students to learn at times convenient to them.

Included among the uses for the Internet in the teaching of TVET are: research, a medium for the delivery of educational material through course management platforms such as Blackboard and VISTA, sharing documents and files among users, and collaboration among students and teachers through online discussion boards. The Internet has also enabled the use of other instructional strategies such as gaming. In online games or gaming for instance, content is packaged and provided to students in games via the Internet. The idea of 'edutainment,' which is the combining education and entertainment, is ideal when dealing with students that spend a greater portion of their time surfing the Internet and playing online games (Etuk, 2008). While there are other uses of the Internet and its tools in educational settings, many such applications are yet to be documented.

Blogs

The term blog comes from the word weblog, commonly referring to "online journals" (Hillan, 2003). According to Ajjan and Hartshorne (2008), blogs are interactive platforms that allow other users to provide comments on the information posted by the blog author or blogger. Furthermore, blogs can be used for research purposes, collaboration, keeping class or personal blogs, and for other multiple uses such as posting cultural events or other news. Blogs can be accessed by students and teachers outside of the classroom and tend to engage students that may not normally participate in classroom discussions (Hillan, 2003). Therefore, many teachers find them ideal for class discussions. Commenting on the benefits of blogging, Jason Kaczay, a high school English teacher at Medina County Career Center, observed that "students that are typically quiet and reserved enjoy having online discussions because they feel more comfortable expressing their opinions or observations in an online [anonymous] post rather than verbally" (personal communication, April 29, 2009).

Blogs can be easily used for an assignment where the students are required to read an article and then sign on to the blog spot and respond to questions, discuss issues, or summarize their perception of the reading. Additionally, students can be assigned different chapters in a book and have to summarize their chapter in the form of jig-saw sharing on a blog. Blogs can provide students with career-related, authentic writing experiences. For instance, motorsports students asked to post comments on NASCAR driver Jeff Gordon's motor racing blog, or culinary arts students reading and posting comments on Ramsey Nightmare's blog (the BBC kitchen critique). By doing so, the students are interacting with real experts in the field and are not writing to a fictional audience. As opposed to writing to the teacher (as is the case with most class assignments and homework) who may not be an expert in the field, it is believed that writing to a real audience is more enriching to the students and it gives credibility to the students' writing.

If a classroom blog is set up, students could post or submit their own material for both fellow student evaluation and teacher evaluation on the blog. Lastly, students may be asked to blog about their experience with a particular lesson or field trip, which in turn could clarify or share elements that other students missed. Teachers interested in creating classroom blogs are encouraged to visit WordPress (http://www.wordpress.org). This free open-source blogging software makes it easy to create classroom blogs. Alternatively, teachers and students can visit http://www.edublogs.org to set up free classroom blogs.

Podcasting

Podcasting is one of the fastest growing technologies of all time (Association of Career and Technical Education [ACTE], 2008). A podcast, also known as "internet broadcast," is an "audio or video file that is automatically delivered over a network and then played back on any Mac, PC or iPod" (ACTE, 2008 p.7). Even though video and audio streaming has been around in education for a while, podcasting seems to be one of the newest technologies used in the classroom. Podcasts can be created by students or teachers and also be available for download from numerous podcasting websites, for free or through a subscription. Visit http//www.itunes.com for more information on podcasts.

Among the educational uses of podcasts is disseminating lectures and publishing to a real audience. According to M. Engelhart, "being able to publish podcasts gives students a real-world audience and provides a sense of purpose and motivation to create and produce content for the internet" (personal communication April 29, 2009). Apple's iTunes U (visit http://apple.com/itunesu) offers user-created educational podcasts at no charge. Using a form of digital recording technology such as a Flip Video camera, an instructor can record a lecture or demonstration for podcast and review by students at a later time. Students who may have missed a lesson can obtain the missed information from podcasts. Students may create videos or movies documenting a skit or presentation and podcast them on YouTube or post them to a blog. Audacity (available at http://www.audacity.sourceforge.net) is open-source software that can be used for creating audio documents that could then be turned into podcasts. Teachers and students can use Audacity to create their own electronic books, audio reports, speeches, reviews, interviews, and observations. In general, podcasts are considered to be fun, educational, and instrumentally valuable in teaching students a variety of 21st century literacy skills.

Wikis

According to Wikipedia, a "wiki is a collection of web pages designed to enable anyone with access to contribute or modify content... the collaborative encyclopedia." Wiki is a Hawaiian word for "fast" (Wikipedia, 2009). Wikipedia is one of the most popular wikis on the Internet and it is "argued" that the online collaborative information source "is not a reliable source of information because it is not authored by one person" according to Engelhart (personal communication, April 29, 2009). On the other hand, it is argued that because wikis are not authored by one person, they are more reliable than traditional websites. Wikis allow collaboration by people all over the world, and therefore, make physical distance much less of a barrier for cooperation and teamwork.

A number of TVET teachers use wikis for class collaboration projects, and staff collaboration on their professional development. In the classroom, teachers use the technology to engage in online brainstorming and as an evaluation tool to measure the students' knowledge of researching and reporting skills as well as to identify their understanding of a specific topic (Yan, 2008). For example, one automotive instructor used wikis to direct students to research the Chevy Camaro. Rather than have the students create and print papers on the topic from the web, a wiki allowed the students to post their findings onto one document, thus creating one comprehensive document on the Chevy Camaro. Additionally, other Camaro enthusiasts were able to correct the students where they felt the students' information was incorrect.

Social Networking

Social networking sites, such as MySpace, Ning, and Facebook, permit people to build their own websites to self-express; connect with friends, family and colleagues; and build relationships. According to Wikipedia (2009), social networking sites "focus on building online communities of people who share interests and/or activities, or who are interested in exploring the (similar) interests and activities of others." Lately, social network sites have brought about new ways to communicate and share information and they are growing in popularity by the day. Fisch (2007) summed up the popularity of social networks for the year 2006 by saying, "if MySpace were a country, it would be the eighth largest country [60 million subscribers]."

These days, it is common for Internet users to communicate with each other on forums and discussion boards and general social networks such as MySpace and Facebook (Imperatore, 2009). There are also smaller social networks that bring together those interested on a particular topic or a selected group of people. Communicating with a large audience gives students a chance to learn about different cultures and to understand and respect diversity. With a focus on communication, TVET classes could have an invitation-only style of social networking site (such as Twitter.com or Ning.com) that could keep students posted about homework, changes in class schedule, or reminders of due dates. Additionally, students could carry on discussions that begin in class and with the use of a social networking site, may continue outside the classroom walls. For example, a Landscape Design and Turf Management program at the Medina County Career Center finds a social networking site very helpful for keeping students up to date on summer opportunities, job postings, and trade area competitions. Nowadays, many colleges and universities are on Facebook, MySpace, and Twitter for the purposes of connecting prospective students and current students, connecting with alumni, and communicating sporting events and other news.

Google Documents

Another common Internet tool used to enhance teaching and learning, which is specifically for file sharing and storage, is Google Documents. Google Docs, as it is commonly referred to, is an online office suite currently offering text documents, spreadsheets, and presentation applications. One can create a new document with Google Docs or upload an existing document onto it. Within Google Docs, one can edit, store, and share a file with other users all online. Although its editors are not currently as functional as Microsoft Office, they have an MS Office look interface and are easy to use. Another advantage for Google Docs is its share function. The function can let one decide whether to make the document available to the public or to selected individuals.

Many people argue that it is not so much Google Docs ability to create and edit a document online that lures users but it is its connection to other Google products such as YouTube and its functionality of document sharing that make it useful for classroom teachers. A number of TVET teachers share word, spreadsheet, or presentation documents with their students. Sharing documents this way can avoid file attachments to emails, some of which may be too big to send via email. Teachers can also embed presentations to a website for students to view. Google Docs can be viewed and/or edited by shared groups, thereby enhancing team collaborations.

Digital Storytelling

Long ago, educational lessons used to be shared with generations in the form of storytelling, and now with the help of Web 2.0 applications, storytelling has been made a popular educational tool once again. According to M. Engelhart, "digital storytelling is a powerful and simple method of instruction that helps students sort out complex issues and subjects" (personal communication, April 29, 2009). Electronic devices, such as digital cameras, video cameras, editing software, and an assortment of the Internet applications, enable teachers to help students construct their own ideas and present their knowledge through multimedia (Sadik, 2008). Furthermore, students and instructors can use free programs such as Microsoft Photo Story and Windows Movie Maker to create these digital stories.

Digital storytelling is an incredible way of differentiating a lesson for students. Students ranging from very high to low levels of functioning do very well with this form of creative communication. Students can use free programs such as Microsoft Photo Story and Windows Movie Maker (see, http://www.microsoft.com) to make historical timelines, create movies to indicate the proper process of a laboratory activity, summarize their views on a pro-

cess they investigated and add related images, and create digital biographies and autobiographies (M. Engelhart, personal communication, April 29, 2009). Students generally get engaged in digital storytelling because they can use lots of creativity and personalize their work with art, photos, and their own music. Many CTE programs visited use digital storytelling videos created as podcasts for new student recruiting promotions.

Suggestions for Using Web 2.0 Technologies in the Classroom

The integration of Web 2.0 technologies can strengthen students' communication, collaboration, and critical thinking skills (Williams, 2007). However, with all that the Internet and Web 2.0 tools have to offer, it is easy for teachers to get overwhelmed, let alone figure out how to tie the technology into their respective programs. Web 2.0 tools are useful in the classroom because they are an easy and inexpensive way for students to learn, create, and share with each other and their teachers (Imperatore, 2009). A lot of the current ICTs can be used in the classrooms, independently or in collaboration, to enhance teaching and learning.

With all the information that is available to the students on the Internet, students now more than ever must know how to critically assess, validate, and evaluate the information they find online and integrate it into their existing knowledge (Anonymous, 2008). While many Web 2.0 technologies present opportunities for students to engage outsiders in learning, there are also inherent risks of which the teachers need to be aware. Students using these technologies must be wary of potential risks with security, "harassment, copyright infringement and plagiarism" according to M. Engelhart (personal communication, April 29, 2009).

Even though students have a sense of anonymity when they are online, they must be careful what sites they visit and information they post/share on the Internet. Furthermore, students must be careful not to post inappropriate material or share their personal information on the Internet. Inappropriate material posted to the Internet may take the form of cyberbullying which includes taunting, teasing, threatening, harassing, and causing emotional distress among their victims (Willard, 2005). Students must be educated that harassment or inappropriate content is unacceptable at all times on the Internet or anywhere else. Teachers need to be aware that acts of copyright violations and plagiarism are becoming more prevalent due to the abundance of information and files available on the Internet. With the ease of access to songs and video clips, Internet users are both intentionally and unintentionally running into problems with copyright violations. School policies must be crafted to include specific documentation on copyright violations and acts of plagiarism. Additionally, schools should also

post copyright and plagiarism laws and rules in easily accessible locations to model for teachers and student how to stay in compliance.

Conclusion and Implications for Practice

There are many educational benefits to using ICTs, including the development of soft skills which employers have noted as lacking in most of today's students. Despite these great benefits, teachers need to be aware of the risks that come along with using the Internet and its technologies. As long as the proper steps are taken by teachers, administrators, and school districts to ensure the safety and security of the students, the advantages of using Web 2.0 applications outweigh the disadvantages. Many TVET students who were informally surveyed when this study was conducted recommended that instructors incorporate Web 2.0 technologies into teaching and learning.

While the information and communication technologies have changed how, what, and when to teach, there are still disparities between schools in the developing world and those in industrialized countries (United Nations Conference on Trade and Development [UNCTAD], 2006). Such disparities may hinder the full adoption and application of the Internet and Web 2.0 technologies in the classroom to enhance teaching and learning of TVET. Teachers are therefore expected to take this fact into consideration when designing instruction to incorporate ICTs.

Most of the Web 2.0 tools described in the above sections are being used in many CTE programs. However, the extent to which each of the tools will prevail in CTE classrooms will largely depend on the creativity of the teachers and students. Bearing in mind that CTE students may be more familiar with ICTs than their teachers, there is need for a paradigm shift on the part of the teachers – teachers becoming learners also. In some cases, it may mean working with the students to craft out projects or activities that integrate learning with ICTs. Assuming the necessary precautions have been taken, the Internet and its tools have a lot to offer in educational settings.

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Transforming Online Learning in TVET Using Blackboard

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Abstract

In view of the rapid need for using information and communication technology (ICT) in TVET, teachers need to realize and generate technology-based strategies. This study aimed to transform modules to online learning by using engaged learning theory via Blackboard system. Through a collection of students' and teachers' reflections, assignments and online records, it was found that students and teachers increased their level of participation in an e-learning environment but some costs and challenges were also identified. This paper employs a Business Studies module to illustrate the online learning transformation with Blackboard to report students' and teachers' responses. Furthermore, it identifies their changing roles throughout. The costs, benefits, and challenges of using Blackboard in TVET are also discussed.
Keywords: Transforming Online Learning, Blackboard Platform, Engaged Learning, Technical and Vocational Education and Training, Business Studies, Hong Kong

Introduction

Online learning is a commonly used component in technical and vocational education and training (TVET). However, it is hard to be successful without genuine support from TVET teachers and students. For example, the Blackboard Learning Management System (Blackboard) was simply used as a tool for disseminating course materials instead of empowering students' learning when it was first introduced in the researcher's institute. In view of the rapid need for using information and communication technology (ICT) in TVET, it is necessary to provide opportunities for TVET teachers and students to realize that the vast technological advances will generate new learning environments that lead to a new definition of where and how learning can occur. Much work needs to be done to change the mindsets of TVET teachers and students.

A special project that aimed to utilize Blackboard to support four TVET teachers to develop and implement partial online modules in the areas of Business Studies (BS), Home Economics (HE), Design & Technology (DT), and

Information Technology (IT) was conducted at the researcher's institute. The four module lecturers-in-charge were the project team members who managed the transformation of changing their practices from the traditional face-to-face practices to online delivery mode gradually. The main emphasis was on the use of technology-based pedagogy that incorporates the principles of 'engagement theory' to achieve greater collaboration and interaction between students. The researcher, who was one of the project team members, was in-charge of the BS module.

Throughout the progressive development of the online BS module using Blackboard, both students' and teachers' responses to online learning were collected from multiple sources including students' and teachers' reflections, assignments, and online records. From these sources of data, it was realized that there is an extensive potential of using Blackboard as an online delivery platform to support students' active learning and to encourage teachers' professional development. For the overall project outcome, it was found that students and teachers increased in their level of participation particularly in an e-learning environment, which in the end had a positive impact on their learning and teaching experiences. The results reflect the significance and progressive development of using ICT in TVET. Moreover, the project recognized the possibility of a transformational culture that can develop around technology-based learning paradigms to support a changing student-based learning environment by taking an incremental approach of online delivery.

This paper aims to use the BS module as an illustrative case to: 1) display how it could be partially re-designed and implemented as online learning in Blackboard, 2) report the students' and teachers' responses, and 3) identify the changing roles of students and teachers in online delivery. This illustrative case also explores the costs, benefits, and challenges of using Blackboard in TVET.

Literature Review

Meaning of Engagement and Engaged Learning

Biggs and Moore (1993) used the term "engage' to describe in-depth learning, which takes place when the learner becomes actively involved in the learning task(s) in question. The meaning of engagement is concerned with a high level of interest and involvement being generated by the task in question (Pritchard, 2006). Learners would consider the task(s) in question from different perspectives when they engage in learning. Hence, engagement is an essential learning component that allows learners to search for materials in question and to develop a familiarity with the content and the context for learning, which can be claimed as an initial process of learning (Pritchard, 2006; Reid, Forrestal, &

Cook, 1989). Means and Olson (1995) suggested that engaged learning could be a measurement of effective learning if the following conditions exist:

1. Students are engaged in authentic and multidisciplinary tasks;
2. Assessments are based on students' performance of real tasks;
3. Students participate in interactive modes of instruction;
4. Students work collaboratively;
5. Students are grouped heterogeneously;
6. The teacher is a facilitator in learning;
7. Exploration is encouraged.

Engaged Learning Framework

Engaged learning is grounded in a notion of active learning where learners take responsibility of their own learning when they are actively developing thinking or learning strategies; thus, learners are constantly formulating new ideas and refining them through their conversational exchanges with others (Hung, Tan, & Koh, 2006). In other words, there is active engagement in the learning process when the learners are constructing knowledge from experience through their interactions with peers and teachers to make meaning or to interpret information and patterns observed (Hung, Tan, & Koh, 2006).

There are two important assumptions in engaged learning: 1) learning is a process that takes place in a participation framework, and 2) learning is distributed among co-participants (Lave & Wenger, 1991). Therefore, learners become participants in a community of practice that is a group of people with common interests who are interested in collaborating, interacting, and sharing their knowledge (Lave & Wenger, 1991). Other researchers further argued that thinking or learning is situated (Brown, Collins, & Duguid, 1989; Kimble, Hildreth, & Bourdon, 2008; Wenger, 1998). Brown, Collins, and Duguid (1989) stated that learning is a product of content, activity and culture. Thus, enabling students to acquire, develop and use content knowledge in authentic context through collaborative social interaction is essential. These discussions on learning form a useful theoretical construct for framing an understanding of engaged learning in 'situated cognition' that is a model of learning in which knowledge needs to be presented in an authentic context and learning requires social interaction and collaboration (Brown, Collins, & Duguid, 1989; Hung, Tan, & Koh, 2006; Lave & Wenger, 1991).

In order to stress both the problem (authentic context) and process (interaction and collaboration) of authenticity in learning, Hung, Tan, and Koh (2006) proposed an engaged learning framework that involves six design principles. Figure 1 shows their engaged learning framework:

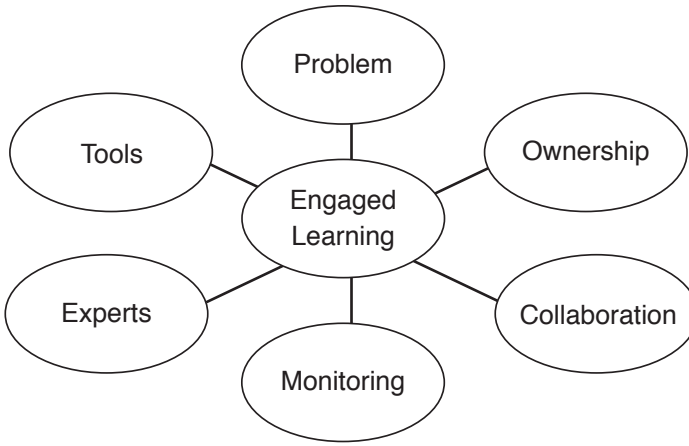

Figure 1 Engaged Learning Framework (Hung, Tan & Koh, 2006, p.41)

In *problem* design, the problems should be ill-structured with real life as anchoring problems/context and should contain relevant learning issues in curriculum. In process design, students should obtain their *ownership* by identifying their own learning goals, working in *collaboration* (groups) where they collaboratively solve problems, *monitoring* should be holistic with emphasis on process rather than product, *experts* and teachers should provide mediating tools and techniques for inquiry, and the problem should be solved collaboratively through open communication *tools* between the students, teachers and experts (Hung, Tan, & Koh, 2006). The process of all these six elements of engaged learning should be developed progressively.

Technological Support for Engaged Learning

Technology is a crucial tool in engaged learning because technology makes it feasible, scalable, and manageable for both students and teachers. An online system with appropriate upload and communication functions provides a common medium into which engaged learning activities are placed for further collaborative work (Collis & Moonen, 2006). For example, Blackboard is a flexible and comprehensive online learning and teaching platform (Hong Kong Institute of Education, 2009). It is not a new technology but it has been adopted in many tertiary institutions as an online delivery platform because of its special features. It can facilitate learning and teaching through basic features like uploading reading materials in 'Course Information' and collecting assignments through the

'Drop Box'. More importantly, it can foster communication by using mailing, asynchronous and synchronous communication functions. Teachers and students can send "Emails" to communicate with each other, set forums in "Discussion Boards" for asynchronous class discussion, and use "Collaboration" for idea exchange and instant text-based chats. Those communications can even be conducted by assigning different students into designated groups within "Group Pages." Thus, problems can be solved by different inputs from varied groups and or individuals. Students can construct and gain a better understanding of problem solving through communication and collaboration.

Apart from the availability of a suitable online learning platform, some technological key factors for supporting engaged learning should also be considered. King (2003) noted eight key factors for achieving a better flow in online communication:

1. maintaining a high level of interaction to avoid putting people off;
2. providing fast and straight forwarded feedback;
3. helping users to find their ways through a clear navigation;
4. keeping the layout neat and tidy to reduce the user's attention load;
5. helping users to control over the e-learning environment easily;
6. offering a rich responsive experience to help users accomplish goals quickly and easily;
7. using a common and friendly user technology to enable users to get their information easily, and
8. using lesser animation to avoid distractions to users.

Progressive Steps for Transforming Online Learning

According to the above-mentioned theory, framework, and technological support for engaged learning, some progressive steps are proposed for transforming online learning. *Step 1* is to select components of the module that can be designed for an online learning mode. *Step 2* is to select suitable topics that can be discussed online by using Blackboard. *Step 3* is to design authentic tasks and activities that can engage students in real world problems and challenges. Moreover, online tasks and activities enable students to contribute significantly to effective learning processes and experiences. A major segment of the activities concentrates on the use of forums and group discussion areas to insist on greater collaboration and interaction amongst students. *Step 4* is to make a clear weekly instructional plan to achieve a degree of effective online collaboration, interaction, and participation. *Step 5* is to set online student groups and assign student group responsibilities. *Step 6* is to ensure that (a) each student is able to post their work online to be commented on by their peers, and (b) opportunities exist for groups to express their views asynchronously, and to

respond to each others views. Thus, it is more possible to lead students to ultimately construct their own new ideas and knowledge. All the communication functions of the Blackboard system including Emails, Discussion Boards, Collaboration, and Group Pages should be incorporated in the module delivery. *Step 7* is to prepare some additional online resources for meeting diversified needs by allowing students to use it asynchronously at their own pace. It is expected that students will achieve a deeper level of understanding of the selected topics through the online engagement.

Purpose of Study

This study aims to develop online learning in Blackboard based on engaged learning theory and progressive technological transformation. The following are four key research questions: 1) what are the students' perspectives toward online learning? 2) what are the faculty members' (teachers') perspectives toward online teaching? 3) what are the changing roles of the students and teachers in online learning? and 4) what are the costs, benefits and challenges of online teaching? The findings of the study can gain an insightful understanding of online delivery from both the students and teachers perspectives.

Method

Re-design, Implementation and Evaluation of the BS Module

The BS module, *Contemporary Issues in Business and Business Education* was chosen for the study. The module aims to provide opportunities for students to identify and critically analyze current debates, trends, and issues in the fields of business and business education. It is one of the final year modules in a four-year full-time Bachelor of Education (Business Studies) program. The program students are pre-service teachers who are being trained to be school business teachers. Originally, group discussions, debates, and seminars were used in the module. At the end of the module, students were able to: 1) identify and describe major trends and critical issues in business studies; 2) locate and selectively use relevant literature in developing annotated bibliographies on trends and issues in business studies; and 3) demonstrate through an understanding of the impact of social, cultural, economic, and technological changes on the content and process of business studies. The covered topics include the followings:

1. Current areas of concern for business and business education in the global and local contexts;
2. Managing major changes in social, technological, economic, political and education areas;

3. Role, development and implementation of business education in the local education reform;
4. Students with special education needs, equity, and ethical issues in business education;
5. General and vocational dilemma for business teachers, and business teachers' professional development; and
6. Business education in the 21st century.

According to the previously stated progressive steps for online transformation, the topics one and two were first selected for online activities because they are problem-based issues that are suitable for collaborative online discussion. The online delivery activities were carried out in an on-and-off mode during the first half module. The online activities for topics one and two were problem-based and consisted of four stages. *Stage 1* aimed to enable students to identify the current trends in business and business education. Students worked in pairs to identify the major changes in the areas of political, economic, social, technology and education on their own. *Stage 2* aimed to provide opportunities for students to work in groups to examine the changing impacts of the identified trends and issues on curriculum development, teaching and assessment practices in school business education via Blackboard. At *Stage 3*, after studying the major contemporary issues in business and their implications on business education via on-line pair and group activities, students were encouraged to conduct an individual study on an area of interest. In order to support students' individual study in a more diversified way and from a cross-cultural perspective via the online platform, students were linked up and co-worked with some postgraduate business education students at New York University (NYU) to exchange ideas and thoughts on the area of interest via the Blackboard platform at *Stage 4*. In fact, this was a joint project with those postgraduate students at NYU. With their contributions, it was possible to have meaningful collaborative online activities and fruitful discussions between Hong Kong Institute of Education (HKIED) and NYU.

As a result, the module was re-designed to have approximately 60% face-to-face and 40% online delivery modes. Table 1 shows the weekly plan of the new design.

Table 1
Weekly Plan of the Re-designed Business Studies Module

Week	Face-to-face Teaching Modes: lecture, case study, discussion, debates and seminars	Online Learning Modes: Internet searching, on-line interaction and discussion
1.	Current areas of concern for business and business education in the global and local contexts: e.g. legislation, current reform movements in business and education	
2.	Managing major changes in social, technological, economic, political and education areas;	
3.		Stage 1 Identity Major changes Students work in pairs to identify the major changes in the areas of political, economic, social, technology and education
4.	Role, development and implementation of business education in the local education reform eg cross curricula perspectives and strategies	
5.		Stage 2 Examine the changing impacts Students work in group to examine the changing impacts on curriculum development, teaching and assessment practices in school business education via Blackboard
6.	Students with special education needs, equity and ethical issues in business education	Stage 3 Conduct Individual Study Students conduct an in-depth investigation on an interesting topic individually but discuss their preliminary findings openly with others in the Blackboard

7.		Stage 4 Co-work with NYU students
8.		Students work on the individual study and exchange views with the graduate students at NYU by using the Blackboard Output: Final report and presentation
9.	General and vocational dilemma for business teachers, and business teachers' professional development	
10.	Business education in the 21st century: e.g. partnerships between business education and the commercial sector.	

Upon the implementation of online activities, students were allowed to pair up and form groups freely, but they were clearly informed of the required tasks as well as their individual and or group responsibilities in advance. Moreover, they were encouraged to express their views and respond to other students' views actively throughout the four stages. Guidance on when and how to use the communication functions of Emails, Discussion Boards, Collaboration, and Group Pages were provided from stage to stage. A particular guidance for the collaborative work with NYU at stage four was provided in the middle of stage three (see Appendix 1 on page 62). Finally, to cater for diversified needs, some additional trendy topics such as competence-based assessment, using case study in teaching business, globalization, business ethics, and e-commerce were uploaded allowing students to use the technology asynchronously at their own pace.

Berk (2004) stressed the importance of focusing on "how well you train rather than how much you train" and that the evaluating methodology should be scalable, practical and replicable in a cost-effective manner (p.1). Wright (2004) also highlighted the importance of evaluating the fulfillment of course objectives when launching e-learning program by using quality measurement. The major objective in this study was promoting students' engaged learning via technology-based strategies. Hence, both students' and teachers' responses to the online delivery approach were evaluated by collecting both quantitative and qualitative data but paying special attention to the qualitative data. In addition, data were collected from students' online participation records, reflections, and assignment performance, but more attention was paid to students'

reflections since these indicate how well the students have learnt. Teachers' responses were also collected by individual reflections and from discussions in the team meetings.

Results

Students' Responses

Online records showed that the average participation rate in each of the four online stage activities ranged from 82% to 100%. Both stages one and four got 100% participation rate. Twenty-four local students engaged in online information sharing and online discussions one to three times a week. Stage two got a second highest participation rate at 92% and stage three received the lowest rate of 82%. These two lower rates indicate that some students may hesitate to examine the changing impacts with others at stage 2 and may lack motivation to share with peers when they worked alone on individual studies at stage 3.

In order to promote students' constant reflections on using online learning, a forum on 'General discussion on the implementation of this module' was created in the Discussion Forum. The students were asked, 'How do you feel about online learning?' and were encouraged to share their personal reflection throughout the four stages. Throughout the four stages, 15 out of 24 students typed in their reflections, below are some selected insightful comments that were extracted from the student forum from stages one to four:

Students' comments on stage1.

Students showed positive attitude towards using Blackboard despite it being new to them.

> "In previous years, we used this system to get course materials but we have never tried to discuss here [online]. It's new to me too. Let's practice using it more, so as to get familiar with it!"

More importantly, students were able to engage in the online learning and share various ways of searching for information.

> "This week was so busy. It is because we need to find more information about our topics. I always went to library to find the related books. Also, I search the resources online. But I think I don't have enough time to do [the assignment]. I hope we can have more time and work harder."
>
> "Knowing how to use different keywords when searching information through internet is very important, for example, my topic is e-business, so I can key in the words "e-business", "e-business in Hong Kong", "e-commerce", "B2C""technological development in business" and etc ... Using different keywords can help us find more useful information!"

At the end, some students illustrated their good experiences and reviewed their collaborative work with their partners.

> "I think the work of this week is excellent. I didn't talk to Susan in person on this issue until Thursday,… we talked on our discussion board. I think this is quite interesting as I've found that we are really sharing the views we've got after searching. And I've found that it was really helpful to use my partner's hints or website links to explore more on the web. This actually helps me to discuss the issue independently. Actually, we only spent 3-4 hours to write the report. This time, we wrote the reports together instead of writing them separately. I was really delighted that I can ask my dear partner whenever I have a problems in mind. This is a good experience."

Students' comments at stage 2.

Student showed a strong awareness of the challenges ahead but most of them were willing to accept the challenges and look forward to achieving good learning outcomes.

> "I think it is another challenge for all of us as we need to find related information about our topic again. Also, we have two more members to co-operate with us. It means that we need more time and skills to communicate effectively. I think it is very challenging and I hope I could cope with it!"
>
> "As we have investigated issues in different areas, I am sure all of us have become little "experts" in that area. We can always share our thoughts and ideas with concrete examples. I look forward to getting inspiration from my new group mates."
>
> "It is a very difficult task because it covers a lot. It is not easy to summarize the overall impact of all issues in business education. I will try my best and do it better!"

Students' comments on stage 3.

At this stage, students were able to identify useful information from varied sources and extract key points from the identified information.

> "Similar to most of my classmates, I was busy this week. I mainly searched resources from internet and library. The most gain for me was finding out the useful information from so many books and websites. In fact, it was not easy work, but I am sure it was a good start."
>
> "I agree with you that doing online work is tough but fruitful. I need to spend quite a lot of time searching and reading books and journal articles, I learned how to jot down important points after reading different journal articles for my reference in writing the review report."

Students' comments on stage 4.

Both HKIED and NYU students expressed that the online exchange activities were not easy especially due to the limitation of online exchange and time zone differences.

"It's difficult to make deeper connection with only online interaction and time zone difference!" (NYU Student)

"We communicated with each other by using email instead of Blackboard since it's more convenient." (HKIED Student)

"It's difficult to communicate with NYU students because of different time zones we have had but I found useful information for my project." (HKIED Student)

Fortunately, most of the HKIED and NYU students broke through the barriers and achieved some good online learning results.

"It's tough but deep learning!" (HKIED Student)

"Time consuming but I've learned interesting viewpoints!" (HKIED Student)

"I found interesting aspects of Hong Kong students and Business Education in another country" (NYU Student)

"It's good to share research and journal articles with HK counterpart." (NYU Student)

"Sharing research articles with those in different countries was helpful." (NYU Student)

From the above students' reflections, it can be seen that they were actively engaged in their online activities. Most of them were very willing to share and support each others. Their independent and self-directed learning abilities improved quite a lot by referring to their self-evaluation and reflection. Some other students' comments on using Blackboard include the following:

1. Easy tool for discussion
2. No restriction on time and place
3. East accessibility of module materials
4. Easy to use
5. Will continue to use platform and in teaching
6. Better to have word limits for discussion
7. Time consuming and sometimes files cannot be read
8. Prefer to discuss face-to-face

Finally, about 64% of the students got a grade B or above in their final report on their individual study. Some were even able to provide some impressive data and examples to support their analysis on the concerned area from varied perspectives. These qualitative learning outputs were the result of students' in-depth study via online learning.

Teachers' Responses

Regarding teachers' responses, all the teachers-in-charge of the BS module were very satisfied with the online learning because it helped students to gain deeper understanding and more independent learning. Particularly, through the collaborative work with teachers and students at NYU, the local teachers engaged in an active cultural and global exchange too. The whole process also enabled them to generate more fruitful resources for their future teaching. Those communication tools not only enhanced the collaborative work in online learning but also the relationship of teachers and students throughout the process. As a result, more positive thinking of online learning was established through the study which in fact was an enlightenment of teachers' professional development in online teaching. However, teachers needed to spend intense time and effort on mastering the system and technical skills to manage the collaboration through varied communication functions like Discussion Forums and Group Pages, preparing clear instructions for each four stages and communication closely with students throughout. Such a huge workload only represented 40% of the module delivery, but in fact, it amounted to almost one full module workload!

Changing Roles of Students and Teachers

From the students' responses and the teachers' firsthand experience in transforming online learning in the BS modules, it was found that whether Blackboard works well or not is the result of both teachers and students being able to change their conceptions and strengthen their skills of using it. Although teachers and students had previously used Blackboard for module delivery, it appears that the extensive potential of Blackboard had yet to be fully utilized by changing their roles in the process of online delivery. According to the illustrative case of BS module, teachers' and students' roles would be changed as follows:

Changing roles of teachers.

1. Confront and analyze module content in new and different ways
2. Rethink teaching beliefs and student needs in today's technological environment
3. Re-evaluate the current teaching and learning approaches
4. Re-examine activities particularly the ones that can be conducted online
5. Active facilitation throughout the online learning process
6. Provide as much speedy feedback as possible
7. Master the system well and gain technical support when necessary

Changing roles of students.

1. Engage in a greater degree of collaboration
2. Inculcate self-directed learning habits
3. Achieve a greater degree of positive attitudes and motivation on online learning
4. Willingness to participate and understand that leaning is not a passive process of absorbing information

Costs, Benefits, and Challenges of Online Learning

By referring to the illustrative BS module, TVET teachers who consider developing an online delivery should be aware of some possible costs. Workload management and quality assurance concerns are the two major issues that must be well addressed. Firstly, given that developing, implementing and running online activities involves a tremendous amount of time and great efforts, teachers need support! As Fein and Logan (2003) stated, the pedagogical design, delivery, and follow-up should not be left to the course instructor alone due to the heavy workload of online teaching, and therefore, rethinking the workload distribution among teaching staff by using new workload management models is a way out. Secondly, regarding the quality measurement, the illustrative BS module received a comparatively low students' evaluation score, 2.75 out of 4 whereas 2.9 is the faculty average score, even though some remarkable comments were received on the online engaged learning. Most students indicated that the module met the objectives but it demanded more workload and time than the other modules. Since online delivery is obviously different from the traditional one, thus measuring the student's success through the same student-based evaluations may not truly reflect the quality. At the same time, it is hard to evaluate students' online sharing efforts such as insightful interactive dialogues and comments created in the four stages in terms of score and grade. Thus, more innovative ways to measure teachers' and students' performance in online delivery are absolutely necessary.

However, the online learning platform helps teaching and learning to a large extent and gives a recognition to the possibility of a transformational culture that can develop around technology-based learning paradigms. Furthermore, it develops a culture which focuses on the learner and on the creation of an infrastructure that supports a changing student-based learning environment. In the BS module case, the benefits gained by the students included: aroused interest, more self-disciplined, more interactions among local and non-local learners, engaged in active learning, and more self-directed and independence in their learning. Students' benefits in the project seem more

than the ACCOMMODATE model of online teaching benefits: accessibility, convenience, critical thinking, offers, model organization, dependence, accountability, technology and encouragement (Coyner & McCann, 2004).

The other project team members who transformed the HE, DT and IT modules also found similar benefits for students. Moreover, they listed their thoughts on the advantages of the online delivery as follows:

1. Re-analyze the module subject and pedagogical content knowledge
2. Re-design more interesting learning activities
3. Learn new technological skills
4. Can generate an extensive list of resources
5. More capable of managing Blackboard System as it is not difficult as they thought before
6. Communicate with students more and easier
7. More interactions between the lecturer and the students
8. Change the mindsets of online delivery

Simmons, Jones and Silver (2004) listed three things required for a successful transformation to online delivery from traditional class: course content materials, ability to teach and technological skills. Therefore, "the success of e-learning depends on the degree of human support" (Bolivar, 2001, p.1). Many challenges are encountered when teachers develop online delivery. Teachers need to shape and reshape their attitudes toward online delivery, redesign the curriculum to focus on active engaged learning, assist students to understand their strengths and weaknesses in using ICT and encourage them to become active online participants (Lee, 2006). Also, no matter what web management system or online programs they are using, teachers need to maximize the use of those technologies, which are necessary to enhance communication and interaction during the programs. The components may include announcements, bulletin board postings, chat room discussions, e-mail communication, treaded discussions, virtual classrooms, and virtual lectures.

The challenges do not only affect teachers but also students; the students' technological and interpersonal skills may challenge their online learning effectiveness. It is necessary to prepare students to use the interactive tools with proper attitudes and language usage throughout online interaction because online interactive activities are expected to be more academic in nature, which might be very different from the language used in students' daily online interactions on Facebook and/or blogs. Moreover, some students often have misconceptions about online learning and many believe it will be easier and less time consuming (Crews, 2006). Draves (1999) proclaimed that it takes approximately 25% longer to read the same content from a computer monitor than a hardcopy. In addition, students must accustom themselves to the online management system and the design and layout of the content. Each person

involved with online learning and teaching must overcome the challenges associated with it.

Additional challenges encountered in TVET online learning include: what is the most effective approach to be used in the online design and how this approach can be evaluated. By incorporating the rich sources of research and experience of the business sector, Lee and Duncan-Howell (2007) proposed a blended approach that creates new scenarios and possibilities to be integrated and embedded within more traditional modes of delivery for learning. There are five assisting guidelines in accommodating the blended approach: 1) learning scenarios will be learner-centered and networked, 2) learning will be active, 3) learning design will be more visual and interactive, 4) learning will become mobile, and 5) learning will rapidly change and evolve (Lee & Duncan-Howell, 2007). In fact, there is no universal approach to online program development. Different TVET courses seek different objectives, students, approaches, assessment modes, and outcomes, which bring up their uniqueness and challenges. More sensible and flexible means of online learning evaluation and management need to be considered.

As location, time, and some other communication barriers are removed when online programs are offered, students are more attracted to online courses than traditional courses (Allen & Seaman, 2003). Online programs are expanding locally and internationally. Some programs are totally online while others are partially online. This innovative step offers an opportunity to individuals seeking TVET certification, especially to those who work in full time or do not live near a TVET site. However, when certification is involved, student teaching internships and placements are a vital part of a TVET program and present challenges to online program facilitators. Negotiations and alternatives may need to be explored by the teachers and students.

Besides, online TVET courses and programs may have specific participation regulations such as minimum test scores, different levels of competence-based performance indicators, professional recognitions, cohort groups, and required time for program completion. Certain TVET courses may also require course-specific software or additional hardware that would be very expensive and result in an increase of tuition and fees in some cases. This may decrease the enrollments and the courses' competitiveness, and create marketing challenges.

Conclusion and Recommendations

Blackboard provides teachers and students with the tools to interact, collaborate and form online learning communities. Therefore, this study is keen on advancing one step further to bring about changes to the modules in a number of directions, namely: 1) changing the mode of delivery to a mixed-mode, that

is face-to-face plus online weekly sessions; 2) shifting focus on the development of engaged learning environments, and 3) using the capability of Blackboard to promote a greater level of interaction and collaboration through effective learning communities to enhance learning outcomes.

However, the illustrative module shows that we need to transform online learning progressively with a very careful consideration of the authentic context, collaboration, facilitation, and technological support to sustain the active engagement throughout the process. The assumption of computer literate TVET teachers possessing the immediate ability to integrate ICT into their teaching should be avoided. Realizing that TVET teachers need to be provided with learning opportunities for going beyond computer literacy and becoming competent in developing technology-based pedagogies is important. Lee (2006) reminds us that all teachers must ask and reflect on the following issues before initiating the transformation of online delivery:

1. How would integrating ICT in my classroom compel me to go beyond my daily work and do things differently?
2. Am I ready to be pushed out of my comfort zone?
3. Does my usual practice in the classroom fit into the scheme of ICT integration?
4. What changes do I need to make and am I flexible enough to want to make the changes?
5. How can I enjoy the adventure of upgrading my professional life?

TVET teachers must not limit their own and their students' ability on what they can or cannot do! In fact, teachers are the key changing agents to lead the ways of online delivery even if it is time consuming and effort demanding. Transforming online learning can offer TVET teachers a platform for learning and equip them to be more capable of meeting students' needs as well as achieving their meaningful lifelong learning.

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Appendix 1: Guidance on Collaborative Work with New York University

After studying the major contemporary issues in business and their implications on business education via a number of class and on-line activities, you are going to conduct a more in-depth individual study on your interested area. To support your individual study, there is an exciting opportunity for you to exchange ideas, thoughts, and issues about your interested area with other Business Education students in USA. The details of this collaborative work are as follows:

(1) What is the main objective? It aims to provide opportunity for you to study your interested area in a more diversified way and from a cross-cultural perspective.

(2) Who am I collaborating with? The undergraduate and or post graduate students in Business Education at the New York University (NYU) who are taking a similar course, "Current issues in Business and Business Education" as you are.

(3) What is the collaboration? It will be an interactive dialogues or interactions between you and a business education student at NYU. You can introduce your interested area, ask questions and share your views to the NYU student. The NYU student would discuss and provide feedback on your work.

(4) How would you run your collaboration? You can provide a simple profile or background about yourself (like a short bio or resume) including the business education degree you are studying, business jobs or projects that you are working on, and your personal views on a particular business topic or issue. You can provide more contact information (email mostly) to the NYU student too.

(5) What questions are you going to ask? "Have you thought about this...?", "Do you have specific and constructive feedback to offer to me?", "I recently read about this..., do you know how this may relate to my topic?", "Would you provide a good overview of the issue?", "What are some of those implications? If possible, would you offer specific suggestions?", "Can you offer additional reading/reference materials to me relating to this issue? If possible, kindly send me those electronic articles or reference listings." and etc.

It means that you will have a new friendship with those students who are in the same field at NYU! Do actively engage in this valuable collaborative online learning and share your views on business and business education issues with them from a cross-cultural perspectives!

Continuous Education of Information Technology Professionals at Novosibirsk State University

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Abstract

This article describes the main principles of information technology (IT) education in Russia and compares the vocational education and training (VET) and higher levels. Educational program content for a number of IT majors at such institutions is briefly outlined. The implementation of continuous multi-level education at various universities in Russia is described, and pedagogical technologies used over the past two decades at the Higher College of Information Technology of Novosibirsk State University are reviewed. Additionally, the authors mention creative contests and computer science projects for youth in the field of IT. Considerable attention is given to the new educational initiative supported by the Ministry of Education and Science of the Russian Federation.
Keywords: Russia, continuous education, information technology, higher education, training

IT Professional Education in Russia

Professional education in Russia is implemented at several levels. First, at the initial professional education level, that is, for training basic workers. Next, within vocational education and training (VET) programs where competencies for a middle level employees (expert - technician) are developed. Specialized secondary education institutions, that is, colleges and technical schools, typically provide professional training in VET. Finally, professionals are educated at the higher education level graduating with bachelors or masters degrees. There are also a number of higher education institutions in Russia that have five-year programs, particularly medical and military higher education institutions. The segment of supplementary education permits the improvement of qualification levels and to

obtain new competencies. Therefore, information technology (IT) professionals in Russia are trained at three educational levels: vocational professional level, higher education level, and in supplementary professional education levels.

Higher Education in Russia

Since there were no educational standards adequately reflecting requirements of IT industry before 2000, training of IT professionals in Russian universities was performed poorly in terms of the requirements of the labor market. In 2002, the Ministry of Education and Science of the Russian Federation created a new bachelors and masters degree major in information technology. This decision laid a foundation for the development of a new university course that has a great scientific, practical, and educational value along with traditional subjects such as mathematics, physics, and chemistry. Currently, IT professionals are trained in several majors: information systems, computer science and computer engineering, fundamental computer science and information technology, applied mathematics and computer science. The list of IT majors is currently being reviewed. In 2010 Russian higher education and VET institutions will start educating students according to the new, third generation federal educational standard for higher and vocational professional education. The new professional standard is a document of recommendations on standards developed by employer associations. The standards document reflects the minimum requirements for professional skills, professional competencies, and educational level, work, and certification experiences in accordance with qualification levels (ICTIA, 2007). One of the distinctive features of the new standard in comparison to the previous one is the focus on the resulting competencies and the lack of rigid requirements on educational content. The federal educational standard is obligatory for all accredited education institutions in the Russian Federation.

VET Programs and Information Technology

Vocational education and training (VET) of IT professionals is also performed in accordance with the Federal Educational Standard of VET. Vocational education and training in the IT field is offered by about 2,500 Russian colleges and technical schools (MESRF, 2008). Analysts indicate (TLM, 2009) a lack of experts in computers and office equipment services, service of communication equipment, network setup, and testing in the labor market. Majors in the field of IT persistently occupy the top positions listed and are preferred for admission to VET institutions. The educational majors mostly in demand are: Computer Systems and Complexes, Programming Computer Systems, Automated Systems of Information Processing and Management, and lastly

Computers and Computer Networks Maintenance Service. The Programming Computer Systems major is offered at 50 colleges and technical schools in Russia. The number of students majoring in Information Science and Computer Engineering was about 130,000 in 2007, compared to 2.3 million students at secondary professional education institutions (MESRF, 2008).

Each of the majors mentioned above trains students for a specific sector of the IT field. Within the Computers and Computer Network Maintenance Service major, the technicians for companies creating and servicing computer systems and networks (typically Internet providers) are trained. The students majoring in Computer Systems and Complexes learn to create information-measurement and control devices for service and adjustment of networking and server complexes. Unlike those trained in Computers and Computer Network Maintenance Service, the students studying Computer Systems and Complexes receive management competencies. One of the qualifying requirements is the ability to guide a small professional group.

Students majoring in Programming Computer Systems study algorithms, work with databases, mathematical models, and programming languages. A considerable part of the graduates from the VET institutions find jobs as software testers in software development companies.

Automated Systems of Information Processing and Management is a program relevant to all branches of industry. In manufacturing, banking, education, trade, real estate, and other spheres databases play an important role. Therefore, personnel are needed for creating and supporting the databases. Principles in working with software systems in different areas can differ considerably, and hence, majors are offered in branches directly related to, for example, trade, industry, education, and so on.

One of the features of VET curricula is the optimum relation of school hours in theoretical and practical training, including any internship at companies. This relation is sometimes referred to as the theory to practice ratio. This ratio is close to 1:1 for VET programs. The Federal VET educational standard regulates the amount of practical training. The practical training consists of: 1) internships at companies, 2) laboratory training, 3) yearly preparation, and 4) defending of a project. For comparison, the theory to practice ratio in programs of higher professional education is approximately 2:1. This means that the theoretical studies take two times more hours in higher education institutions. Apparently, after the introduction of the new third generation federal education standards, this relation is not being strictly adhered to and the share of practical training is likely to increase.

Besides the aforementioned general features of the VET curriculum, the selection of courses depends on the students' initial level of education. There are differences between VET programs for students with a general secondary

education through nine grades compared to the ones having a full high-school diploma through grade 11. During the first year those students who enter the college after grade 9 study the high school level natural sciences and humanities subjects. Over the following years the curriculum for the students entering on the basis of grade 9 and 11 coincide. Throughout the academic year, the general humanities and social economics courses such as the basics of philosophy and law, Russian and the standard of speech, a foreign language, and many others are studied. The general professional courses include: Information Technology, Operating Systems and Environments, Discrete Mathematics, and Computer Architecture. The main professional courses are part of the curriculum to provide general competencies. In the third year students study courses on Databases, Peripheral Devices, Electrical Engineering, Safety in Information Systems, and Basics of Electronics. The last academic year is completely devoted to the special major courses. Each academic year has 37 weeks with the maximum academic load consisting of 36 academic hours per week.

Internships begin in the first year of training and are viewed as introductory. During the second and third years, the students engage in practical internship. Interns are trained in IT departments of companies, in software development companies, and by Internet providers. Internships also assist students in obtaining jobs within the IT industry after graduation.

In 2007 the VET system in Russia graduated about 30,000 professionals in the field of Computer Science and Computer Equipment. At the same time there are problems with the system of vocational education and training of IT professionals. The main problems include: 1) absence of well-founded forecasts on the demand on IT professionals in the country and in regions, and too many majors and specializations; 2) insufficient response from the VET system to the requirements of labor market; 3) dissatisfaction of employers on the spectrum of competencies of VET graduates, in particular, the practical experiences; 4) insufficient numbers of qualified teachers; 5) lack of material resources for training in profile courses; and 6). unsatisfactory level of education of the high school graduates entering VET institutions, due to the higher professional education institutions preferring the well-educated students.

In Russia, VET is the subject of fundamental reform according to the Bolognese (higher education) and Copenhagen (VET) processes. In essence, this reform means introduction of the two-stage model of university education (bachelor + masters degrees), and a transition to European educational methods in VET for the purpose of entering the international educational space. Program documents at both regional and national levels have been ratified. The deficiencies in the training system of elementary professional education and VET are mentioned in the Concept of Innovative Development of Professional Training in the Novosibirsk region for 2008-2012 (DSIENR, 2008). According to these

documents, graduates of elementary professional education and VET have difficulties in getting specialized employment. The modern Russian educational system is characterized by the absence of responsibility by educational institutions on final results of the educational activities. Forms and mechanisms of participation of citizens, employers, and professional communities in the development of educational policy, including the processes of quality control do not last. Communication of professional training establishments with the requirements of emerging labor market is insufficient, and the content of professional training does not correspond to problems of providing competitive and well-prepared personnel in a considerable degree (DSIENR, 2008)

The complex measures of professional training improvement are offered by the Regional Concept (DSIENR, 2008). The purpose of this concept is to create conditions for regional systems to form professional training as the mechanism of steady social, economic and cultural development of the region, creation of the conditions providing availability, high quality and efficiency of professional training, its continuous improvement taking into account social and economic requirements of the area, needs of the person, society and the state (DSIENR, 2008).

In Russian education, the Concept of Modernization recognizes and provides professional development for elementary professional education and VET because of the increased demand in the labor market of highly skilled elementary and secondary level workers (MERF, 2001). Therefore, it is necessary to: 1) make the content of this education up to date and to raise its quality level to international standards; 2) intensify the activities on the extension and integration of professions; and 3) to turn the establishments of elementary and vocational education to the requirements of local labor market. However, funding has to be increased, especially to support the creation of modern methods and information training, research, and publication of educational literature for these educational levels.

Continuous Multilevel Educational Model

Higher College of Information Technology of Novosibirsk State University (HCITNSU) was created in 1991 at the request of the Novosibirsk Polytechnic School (NPS) and is a structural division of Novosibirsk State University (NSU). The main principles of the training system are oriented towards the requirements of employers and based on multi-level and modular educational programs.

The Siberian Branch of the Russian Academy of Sciences (SBRAS) is the main employer of the professionals graduating from the college. Training in the college is provided in two VET majors: Programming Computer System and Computer Systems and Complexes. A contract was made between the HCIT

and SBRAS allowing the students to perform internships and degree projects at the SB RAS institutes. Also, SB RAS offers employment to graduates after finishing college.

The base level for the teaching process is a two-year training at Specialized Secondary School of Information Technology and Programming. For students who have the secondary education certificate (grade 11), the base level course only takes a year. Besides general educational courses in this school, students learn theoretical courses on IT (that is, Information Science, Programming Methods, Architecture of the Computer, and Operating Systems) and also get practical skills in programming. Graduates of the school receive a secondary school certificate. When students finish the base level, they enter into the vocational education technical department where they are trained for two years. While at this level, professional competencies are developed. Considerable learning time is spent in special courses such as: computer drawing, GIS-technologies, programming languages, and designing of information control systems. During the fourth year, students do internships that aid in preparation of the diploma thesis. College graduates who receive VET diplomas work at SBRAS institutions and in IT companies as programmers, managers of local networks and databases, Web–programmers, and system administrators. Also, graduates of the college have an opportunity to enter the NSU information technology department and enroll in short multi-level continuous educational programs at HCIT-NSU complex.

Education Quality Improvement at HCITNSU

In order to improve the quality of students, the HCITNSU established a number of extensive elementary professional training programs. The programs include the following: the Sunday School of Computer Science for children over 12 years old; the Summer School, and the Correspondence School for IT and programming for students aged 12 to 18; and a course of Computer Alphabet for children aged 5 to 12 years. Each course is about 70 academic hours and the number of students in additional educational projects exceeds 1,000 per year.

Various methods of improving the quality of training are applied in the educational process at the college. One example is the project system in IT professional course. The project system begins at early stages of training. Interdisciplinary projects on courses such as modeling of physical processes, biocomputer science, and economic computer science are performed. The results of a professional project are currently undergoing public defense for the purpose of developing communicative and presentation competencies. Students perform both individual and collective projects. Implementation of collective projects improves teamwork competencies. During all periods of training, the

results of the student activity are displayed in the Web System of Monitoring of Educational Activity. The college also supports its own courses with a library of electronic training materials, lectures, and test materials.

Another traditional method of quality improvement is the establishment of continuity in both content and volume of training courses. The courses in different programs are coordinated. Selected committees analyze the results of the training achievement of defined competencies and then recommend to the teaching staff and college management. The coordination of interdisciplinary requirements is an obligatory condition.

The essential qualitative effect in education is reached by means of creative competitions and contests for university, VET, and school students. The HCIT-NSU is one of the recognized leaders in the so-called Olympiad activity among the establishments of VET in the field of information technology. The competitions and contests are in the form of sports programming and are conducted as both an individual and a team event. Continuous coaching work is provided at the college. Selection tournaments are also conducted to compose the teams. The Novosibirsk State University is well known for its high achievements in the World Team Programmer Contest conducted by the Association for Computing Machinery. The college's graduates are often members of several university teams. The students who have achievements in creative competitions become the leaders in groups of software developers and also grab the interest of many employers. During the year, the college organizes four to five competitions on software development/programming at various levels and formats. Several, all-Russia competitions of school students in programming and computer technology have been hosted at the Novosibirsk State University.

Implementing Continuous Education Training

Exponential growth in high technology manufacturing, particularly nanotechnologies, has led to revolutionary changes in the methodology of hardware design. Such growth has led to a sharp rise in the demand for professionals who have practical experience in the area of computerized measurement and control systems. As a necessity due to the new method of training, such specialists have appeared.

The applied bachelor's degree program is one of promising directions of training practically–oriented professionals. This means the organization of the continuous model of education, to permit the extension of vocational education to higher level one (bachelor's level). The goal of this integration is to develop the competencies demanded by the labor market.

In each part, graduates of secondary specialized education institutions had to enter the universities in the first year to obtain higher professional education.

In this case, the education in secondary specialized education institutions did not influence the duration at higher education institutes. The education programs at higher professional education institutes do not take into account the acquired knowledge, experience and competences of VET graduates. In fact, continued training at higher education levels was complicated for this category of students.

Since 2002, the educational program, which permits obtaining higher professional education for VET graduates with fewer requirements, was implemented in Russia (MERF, 2002). This program takes into account the knowledge obtained in VET. In most cases such programs are offered at universities, that is, combining VET institution programs with universities programs. The idea of such programs is the alignment of content and volume of different courses in VET with higher professional education institutes. This idea was realized at the Higher College of Information Technology of NSU and at the University complex of Yaroslav Mudryi Novgorod State University; it includes six VET colleges.

The demand for such an educational system comes from long and successful experience at Higher College of Information Technology of NSU. During the last several years, the number of graduates of HCIT continuing professional education at various higher education institutions of Novosibirsk and Tomsk in the short-cut model was more than 60%. Only 15% of the graduates have been working in specialized fields without further education. Hence, the need for high education experience by graduates of VET within the continuous training system. However, educational programs for a bachelor degree are basically considered as the preliminary step in obtaining a master's degree. This is an ordinary way to obtain high academic professional education. It does not take into account the demands of the labor market.

The applied bachelor's degree programs in the education model of college-higher education institution will combine the advantages of VET and have a direct connection to industry and higher professional education. This combination will permit students to obtain advanced knowledge of natural-scientific disciplines defined by modern high technology.

The investigation of labor market at Novosibirsk and Academgorodok (Academy Town), where the institutes of SBRAS are located, proves that continuous education trajectory is obviously required. The strategy for social and economic development of the Novosibirsk region up to 2025, confirmed by the Ministry of Economic Development of the Russian Federation, formulates the accelerated development of high technology innovative manufacture by creation of industrial park zones, and expansion of electric power industry and infrastructure. The strategic plan of the federal government is the reform in the Novosibirsk region as the main innovative centre in the east of Russia.

The industrial park of Novosibirsk Academgorodok is being created under the Federal Program "Creation in the Russian Federation of Industrial Parks in Sphere of High Technologies" approved by the Government of the Russian Federation. It is expected to attract 9,800 people to be employed by the companies, that is, residents of the industrial park by 2015. The average monthly salary level of an employee is expected to be 50,400 and 68,300 Russian Rubles (approximately US$1,705 and $2,310) in 2013 and 2015, respectively. The basic specializations for the industrial park programs will be information and telecommunication technologies, biomedicine and biotechnologies, instrument making and high technology equipment, power electronics and electrical engineering. Staff requirements in the field of information control and measuring systems are estimated at 35–40% of the current positions occupied. The need for quality training of IT specialists is therefore, obvious for the successful development of the industrial park.

The new VET educational qualification named "Practical Oriented Bachelor Degree" can be successfully introduced in existing university complexes, in particular, at the Novosibirsk State University and the Higher College of Information Technology. HCIT has long-term experience of practical work in continuous education. Since 2009 the college has considered the pilot project, "practically-oriented approach to the bachelor training in existing college–university system of continuous education" (Valishev, Kulakova, & Nikitin, 2009).

The purpose of the project is to create and realize new educational programs: training of practically-oriented bachelor's degree holders in the field of information-measuring, and control systems in the existing "College-University" structure of continuous education. To realize this project, a number of tasks were completed: 1) the theoretical and methodological foundation was developed for training at the bachelor's degree level in the field of IT in existing "College-University" sectors; 2) an educational program involving the development of curriculum, programs of several courses, and methodical materials was developed; and 3) a pilot group of students was gathered. The educational process started in September 2009 at the advanced VET level. A database of Novosibirsk companies for practical training of students was collected and cooperation with the companies established. Research was conducted on employers' requirements of program graduates.

Also, a web-based system of monitoring the educational processing of students in the pilot group was developed. Furthermore, a laboratory was created at HCITNSU for practice in information–measuring and control systems. Finally, at HCITNSU temporary regulations of training practically-oriented bachelor's degree students in modified high professional educational program "information technology and computer equipment" was established.

The theoretical and methodological foundation of the program of training

practically oriented bachelors was developed during implementation of the project. The concept of a bachelor's degree oriented to the labor market was created. The concept will allow estimating the progress in design measures as compared to specified indicators at every stage of the project. The following sections are presented in the concept: 1) goals, objectives and directions of activity in the training toward practically-oriented bachelor's degree students; 2) substantiation of the creation of practically-oriented bachelor's degree; 3) results of the analysis of existing educational scheme, and substantiation of the necessity for further development; 4) analysis of possibilities for training practically-oriented bachelor's students; and 5) main principles of the education of practically-oriented bachelors degree program.

The method of constructing the educational program is based on the following: 1). concept of continuous education; 2). analysis of bachelor's degree programs and training on the basis of the Russian third generation federal educational standard of higher professional education; 3). practically–oriented training approach; 4). use of the European experience in constructing education in the field of program engineering; and 5). use of new educational technologies, including training technologies based on the credit-modular system, and technology for students activities based on the need for the different projects.

The formation of the educational program for training practically oriented bachelor's degree students was realized in response to innovative economy requirements for a modern education system. To fully realize the benefits of this program at HCITNSU, it is necessary to carry out and develop a variety of tasks that include: 1) connection of the competencies obtained at the VET level and higher professional education; 2) assessment of individual requirements, leading to various educational trajectories; 3) practical orientation and defining education by employer formulated competencies; 4) proper methods of grading the knowledge and skills; and 5) evaluation of infrastructure at the university complexes.

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Perspectives on Using ICT in TVET: Reality and Challenges for Sudan

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Abstract

Throughout the world, learners interact with technology by means of computer-based instruction. Students can learn "from" and "with" computers to increase their computer knowledge and develop their thinking skills. This paper illustrates different aspects of information and communication technology (ICT) in education, and compares the traditional mode of assessing students' performance or pencil-paper test to the contemporary mode or computer-based test. The status of ICT in technical and vocational education (TVET) in Sudan is briefly discussed. Great efforts needed to adopt new technologies in education in Sudan, such as equipping TVET institutes with computer labs, including computer programs in curricula, and using ICT as a tool for teaching and learning are presented.
Keywords: computer-assisted instruction, information technologies, Sudan, TVET, international

Introduction

Nowadays information and communication technology (ICT), especially Internet plays an important role in the education sector, especially in the process of empowering the technology into the educational activities (Kaka, 2008). Therefore, teachers should be the main motivators and facilitators and implementers of ICT in schools, and they should be aware of the social change in their teaching activities, and must also be part of the global change in learning and teaching modification.

Information and communication technologies virtually deal with the software applications and computer hardware, and in no doubt, have become an essential part of today's world of work. In this regard, the World Bank recognizes the critical importance of effectively utilizing new ICTs to meet the growing need for a more sophisticated labour force, manage information systems, and contribute to poverty reduction around the world. Support for

ICTs in education include assistance for equipment and facilities, education management and information systems, teacher training and support, capacity-building, educational content, distance learning, literacy, education policy, and media outreach (World Bank, 2009).

Derek (2008) assumed that a modern labour market is almost unthinkable without ICT. Digital literacy is increasingly considered as an essential competency. In respect to this issue, Brown (1992) stated that education must keep pace with these global trends and developments, especially in the area of technical and vocational education and training. Based on a recent evaluation of a staff development program for information technology (IT) in teacher education, he also noted several factors which affect in-service teacher education and development of schools to use IT to enhance teaching and learning. ICT-based learning requires a high degree of self-organization and motivation while offering learners a high degree of freedom during the learning process. On the use of computers and other multimedia in education, international assessment studies have shown that the implementation of ICT in the classroom environment is still very limited in most countries (Pelgrum & Plomp, 1991). In this regard, Vladimir, Alexei, and Valery (1994) confirmed that the rapid development of IT has created a paradoxical situation in education; computer, audio and video as means for delivering and presenting learning materials became really open to general use, but they could not be effectively applied in classrooms because teachers cannot master potential possibilities of IT and include them in their didactic repertoire. Shields and Behrman (2000) assumed that the most effective use of technology in classrooms is as a tool for accessing information and interpreting, organizing, and representing personal knowledge. ICT-based learning environments enable vocational education and training to make full use of all available information and communication technologies from e-mail to video conferencing and other application sharing.

Computer-Assisted Instruction

Computer-assisted instruction (CAI) has now been part of our daily life for a long time. People everywhere are dealing with CAI lessons and applications (Steinberg, 1990). For instance, medical students are diagnosing illnesses of simulated patients. Factory workers are getting oriented to their jobs and so on. What makes these lessons attractive to learners? What makes them instructionally effective? No doubt, computer systems, videodiscs, expert systems, and other technologies make innovative and sophisticated presentations possible. Technology interacts with learners, and with presentations to generate issues unique to computer-presented instruction. However, there are still many things missing from the human computer that existed in the traditional classroom (learning by teacher). For example, students get meaning not only

from the subject matter content but also from indications such as facial expressions and the context of discussions. For instance, a teacher can smile to reward a correct response, shake his head, or raise an eyebrow (body language). These are not present in communication between a person and a computer.

Definition of CAI

To date there is no universal definition for the term computer-assisted instruction. Computers can assist instruction in many ways (Steinberg, 1990); they can actually present instruction by interacting with students in tutor-like fashion individually or in small groups. Computer-presented instruction embraces a wide range of techniques and can vary in complexity from simple drills to decision-making tasks. These techniques can also assist instruction by providing tools for learning. Communication capabilities of computer networks make it possible for students in different locations, even in different countries to engage in collaborative science experiments (Waugh & Levin, 1989). Bresler (1989) observed that networks allow students to engage in lively dialogues expressing views, listening to others, and developing critical thinking skills.

Functions of CAI

Some definitions of CAI encompass all the previous mentioned applications of computers to instruction, but three major functions can be determined for computer-presented instruction and these include: individualized, interactive, and guided.

- *Individualized*
  Instruction is individualized because the computer serves as a tutor for one individual rather than as an instructor for a group. CAI need not be confined to individual users and can be effective for students working in pairs or small groups. In this context the focus is on individualized instruction.
- *Interactive*
  CAI is interactive in that it involves two-way communication between a learner and a computer system. In some lessons the computer poses questions, the learner responds, and the computer presents feedback. In other lessons the user initiates the interaction and the computer responds.
- *Guided*
  Because CAI is instruction, some element of guidance is implied. The lesson should guide the student by suggesting an appropriate range of values to select, if the range selected by the student is too narrow or otherwise inadequate (Steinberg, 1990).

Traditional Classroom and CAI

According to Steinberg (1990) classroom instruction differs from CAI in three specific ways: modes of communication, instructor-learner interaction, and environmental factors.

Modes of Communication

One major difference between classroom and CAI is communication between a learner and an instructor. In traditional classrooms, instructors talk much of the time; they also write on the board, draw diagrams, and display illustrations. In addition, instructors communicate by their non-verbal physical actions. They point to an item to draw attention to it, smile to reward or to encourage correct responses, shake their heads, raise an eyebrow, or otherwise use body language to indicate approval or disapproval. The point is that instructors use several modes of communication, much of which is oral and physical. In CAI, the computer/instructor communicates almost exclusively in one mode, visual. As new technology becomes economically feasible CAI will be able to include oral presentations. Interactive videodiscs are also gaining popularity. Also in the classroom, learners listen, read, and observe, while in CAI learners only read and observe; they are rarely expected to listen. Finally, in the classroom, students communicate by speaking or by writing. In CAI they type, touch a display screen or manipulate a tool such as a mouse.

Instructor-Learner Interaction

An important aspect of classroom instruction is the interaction between an instructor and a learner. An instructor tries to monitor students understanding by asking questions. Usually only one student at a time responds overtly while the others respond covertly. All learners except one are supposed to think the answer. Instructors can also judge progress in learning by observing students' behaviour. Not so in CAI; a computer/instructor cannot see a learner. The only way a computer can monitor understanding is by asking questions and evaluating responses. Human instructor can be flexible in judging a student's response because they can draw on their large storage of knowledge. Another difference between CAI and traditional instruction is that a computer cannot answer just any question posed by a learner. Instructors, on the other hand, can usually answer learners' questions. If not they can suggest resources for finding the answer.

Environmental Factors

Students are familiar with the mechanical aspects of learning in the classroom from previous experiences. They know how much time they have to make responses, how to get help, and how to correct answers. This is not necessarily so in CAI. Students learn by observing and interacting with others in a classroom. A student who is unable to answer a question posed by a teacher can learn by listening to another student's response. A student who does not understand a concept can learn from a teacher's responses to other students. There are obviously considerable physical differences between a computer and classroom environment in terms of capacity for delivering instruction. A computer display screen is limited in size and sometimes both the illustration and the explanatory text cannot be presented simultaneously on the display screen. In contrast, an instructor can illustrate on the chalkboard or show an overhead transparency while providing extensive oral explanations (Steinberg, 1990).

ICT and Instructional Applications

Many technologies can be used to support and enhance learning. Everything from video content and digital movie making to laptop computing and handheld technologies have been used in classrooms, and these technologies deliver different kinds of content and serve different purposes in the classroom (Marshall, 2002). For example, word processing and e-mail promote communication skills, whereas database and spreadsheet programs promote organizational skills. Technologies available in classrooms today range from simple tool-based applications such as word processors to handheld computers, closed-circuit television channels, and two-way distance learning classrooms, and even the cell phones that many students now carry with them can be used to learn (Prensky, 2005). Each technology is likely to play a different role in students' learning. Rather than trying to describe the impact of all technologies as if they were the same, researchers need to think about what kind of technologies are being used in the classroom and for what purposes. In fact, two general distinctions can be made. Students can learn "from" computers—where technology used essentially as tutors and serves to increase students basic skills and knowledge; and can learn "with" computers—where technology is used as a tool that can be applied to a variety of goals in the learning process and can serve as a resource to help develop higher order thinking, creativity and research skills (Reeves, 1998; Ringstaff & Kelley, 2002).

According to Murphy, Penuel, Means, Korbak, and Whaley (2002), teachers use the Discrete Educational Software (DES) not only to supplement instruction as in the past. They also use DES to introduce topics, provide means for

self-study, and offer opportunities to learn concepts otherwise inaccessible to students. The software also manifests two key assumptions about how computers can assist learning. First, the user's ability to interact with the software is narrowly defined in ways designed specifically to promote learning with the tools. Second, computers are viewed as a medium for learning, rather than as tools that could support further learning (Murphy, et al., 2002). While DES remains the most commonly used approach to computer use in student learning, in more recent years, use of computers in schools has grown more diversified as educators recognize the potential of learning "with" technology as a means for enhancing students' reasoning and problem-solving abilities. In part, this shift has been driven by the shortage of new information and communication devices. Now these technologies are increasingly available to students in school and at home, each of which offers new affordances to teachers and students alike for improving student achievement. Technology access is increasingly centered on the learner experience and is no longer limited to school labs, school hours and specific devices.

Teachers' Role in Equipping Students with ICT

ICT does not automatically add quality to teaching and learning. It is possible to use ICT for trivial purposes and waste students' time or even worse, to use ICT for destructive or immoral purposes (Dellit, 2002). For these reasons teachers must be aware of policies and be able to specify how classroom practices correspond to and support national policy which aims to prepare learners, citizens, and a workforce to be capable of taking up new technologies so as to support social development and improve economic productivity. In this regard, UNESCO (2008) confirmed that teachers have many considerations and responsibilities of undertaking knowledge of the curriculum standards for their subject, as well as knowledge of standard assessment procedures. In addition, teachers must be able to integrate the use of technology and technology standards for students into the curriculum. Also, another factor required from teachers is to know basic hardware and software operations as well as productivity applications software, a web browser, communications software, presentation software, and management applications. Additionally, they need to understand how to use technology with the whole class, small groups, and individual activities and assure equitable access.

Assessment of Students Achievement by ICT

The traditional mode of assessing students' performance or pencil-paper test (PPT) is being gradually replaced by the new technologies or computer-based

test (CBT). This is happening quickly because of rapid technological advancements covering all aspect of human activity. The education, especially the test of the students' achievement process will therefore not be an exception. Big international organizations like the Organization for Economic Co-operation and Development (OECD) are now piloting the possibilities of transferring existing testing systems to the new modes of testing. However, the transition from the old PPT system to the sophisticated CBT system needs some essential requirements such as the possibility of the necessary technological conditions at schools, availability of energy and cost-efficient computers. These things could be solved easily in all developed countries, but this issue may need many decades to be applied in under developed countries. A study from Hungary introduced electronic testing and compared paper and pencil to online assessment of reasoning skills. This study found that there will be a shorter period for computer-based tests and less cost and efforts in comparison to paper-pencil based test (Benö, Gyöngyver, & Krisztina, 2009). On the contrary, several issues were raised during piloting the student mentioned above, for example to implement a successful assessment system requires that students, teachers, parents and stakeholders in general accept the results produced by the measuring instruments and this could not be an easy task, because designing a feedback system with rich explanations, familiarizing students with the system, training the teachers, and informing the stakeholders remain a true yardstick.

Finally, it is doubtful if computerized tests have the advantage over the paper-pencil tests. CBT can assess many things that PPT is not able to do them; however, the quickness, efficiency and the interaction between students and computer are positive points.

TVET in Sudan and ICT

Technical education in Sudan faces great challenges in such a way that most of industrial and agricultural projects; social and medical services and the exploitation of natural resources do not find the qualified technical cadres for their implementation. Moreover, these challenges increase and become more complex because of the rapid technical developments world-wide.

Training of technicians requires well-equipped laboratories, specialized workshops, qualified instructors/trainers, and review of the curricula in accordance with the needs of the labour market and development (Ministry of Higher Education & Scientific Research in Sudan, 2005). In Sudan, vocational education and training is delivered through a variety of government, nongovernmental agencies, and individuals at central and state levels. The vocational training centers (VTC) distributed throughout Sudan offer technical training in fields such as woodworking, general electricity, automotive, leatherworks,

buildings, carpet weaving, and welding. The target groups are basic education pupils, schools leavers, and dropouts who can be trained in a maximum two years. The training curriculum is composed of general subjects (10%), technically related subjects (20%), and practical training (70%) (Washi, 2004).

Status of ICT in TVET Institutions

Rawashdeh (2003) advocated that self-development through using available learning resources like multimedia technology including Internet, computer-based multimedia, and distance education facilities could be more practical and appropriate ways for continuous and effective developments of competent teachers as well as learners in TVET system. Here a critical question arises: what does the situation of TVET in Sudan look like? With respect to the answer for the above question, the author during his field research for this study (Capacity Building of Teachers and Trainers in Technical and Vocational Education and Training (TVET) in Sudan: A Case of Khartoum State) addressed specific questions by conducting interviews and questionnaires with administrators, teachers, and trainers involved in the field of technical and vocational education in Sudan. The questionnaires were used to collect information from teachers/trainers working in some technical schools and vocational training centers in Khartoum, the capital of Sudan, about the availability and usage of ICT. The responses were disappointing as shown below in Figure 1.

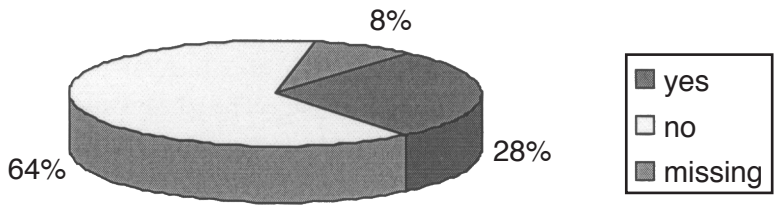

Figure 1: Availability of the Electronic Tools in TVET Institutes

About 64% of the teachers responded negatively. That means no electronic tools in the educational institutes; in other words, they use traditional methods in the teaching process like chalk, blackboard, and books. While, only 28% of the respondents answered "yes," indicating availability of electronic tools in educational institutes. However, this does not mean the teachers use such tools in their lessons. With respect to the use of computer and internet in the teaching process, 90% reported "no." "It's an honest response," some of teachers stated frankly. They do not know how to use the computers basically, not to

mention the Internet. Only 7% of them said, "we had a little bit dealing in specific programs of the computer in preparing lessons such as: Microsoft Word or Power Point; however the searching in the internet for general information or relevant subjects is considered imagination work". To solve the problem of the backwardness in using information and communication technologies at TVET institutions in Sudan, there are some suggestions to consider: (1) building school computer labs, (2) enabling teaching in computer programs and computer literacy, (3) developing new curricula and (4) using ICT as presentation tools.

Conclusion

After the review of the international situation in applying ICT in all aspects of the education domain, many factors concerning the computer-assisted instruction emerge. The use of the new technology for instruction has become well-recognized world-wide, and from now on all aspects of life could be unthinkable without ICT. There is an international consensus that the use of computers in schools has grown more diversified as educators recognize the potential of learning "with" technology as a means for enhancing students' capabilities. Unfortunately, the current situation of utilizing ICT in the institutions of vocational and technical education in the Sudan seem discouraging especially from the teachers' side and the general school environment. A study in Europe conducted by Korte and Hüsing (2006), revealed that there is a positive situation for teachers in European countries, since the overwhelming majority of teachers in Europe (90%) already use ICT to prepare their lessons. In general, the education in Sudan is still facing great challenges, and in particular TVET's adoptions of new technology into the teaching process. These challenges, in the author's view, require equipping schools especially TVET institutes with computer labs, enabling teaching in computer programming and computer literacy, developing new curricula and using ICT as presentation tools. Therefore, huge efforts are required from all relevant bodies such as politicians, policy -makers, teachers, and stakeholders in Sudan. They need to be aware of their responsibilities in crossing the bridge to the other side of river where people in today's world are living.

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The Ultimate Union Between TVET and ICT

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Except from a presentation at the 2009 IVETA Annual Conference, Nashville, Tennessee, USA.

Introduction

Ladies and Gentlemen, all protocols observed. I am very grateful to God and to the organizing committee for the opportunity to make a presentation at this thought-sharing conference; moreover, to be presenting one of the most talked-about issues today- technology. Before I begin my presentation, I would first like to tell you about myself, the organizations I represent and their roles in the promotion of technical and vocational education training in Liberia, where I come from, and the rest of the world.

Youth Crime Watch of Liberia

Youth Crime Watch of Liberia is a sister organization to Youth Crime Watch of America; it is working to change the minds of youth in order to make them productive and marketable in society, thereby turning them away from crime. This process, which has been described as tedious, considering the root of most youth within Liberia, has given Youth Crime Watch of Liberia even more reasons to engage in the following activities:

- Using ICT to transform youth as partners in community security. Making use of the open source technology called Ushahidi (meaning testimony), Youth Crime Watch of Liberia has trained hundreds of youth how to identify, report, and refute crime, especially those committed by fellow youth.
- Using ICT to deliver TVET education throughout Liberia.
- Currently, through the help of the Ministry of Youth and Sports, Youth Crime Watch of Liberia is expanding its vocational education programs throughout the sixteen counties of Liberia. With the Ministry's 60 youth centers in the country, Youth Crime Watch of Liberia is implementing Crabgrass (another open source technology that organizes and supports collaboration) in all of those centers.

- The Youth Crime Watch of Liberia is also partnering with government as well as other local and international organizations to upgrade youth participation in the political, social, and economic sectors of Liberia. Over the years, the youth in Liberia has been considered trouble makers and the mention of the word 'youth' had been synonymous to 'trouble'. Therefore, the youth has been frowned upon and driven away from most public discussions and activities. This did not only affect the political sector but also drifted the social and economic sectors downward. The Youth Crime Watch of Liberia with support from UNIDO and the Ministry of Youth and Sports is working hard to change that now.

United Nations Industrial Development Organization (UNIDO)

UNIDO is a specialized Agency of the United Nations that deals with:

- Industry Development
- The mobilization of knowledge, skills, information and technology to promote productive employment, a competitive economy, and a sound environment
- Enhancement of cooperation at global, regional, national, and sectoral level
- Poverty reduction through productive activities
- Trade capacity building
- Energy and Environment reform

UNIDO has launched the Multi-stakeholders Programme for Productive and Decent work for Youth in the Mano River Union Countries (Cote d'Ivoire, Guinea, Liberia, and Sierra Leone). The program is intended to provide technical and vocational skills, access it funding, and other forms of support to youth within the Mano River Union Basin in order to make them productive and minimize poverty amongst them. Within this framework the Mano River Union Youth Communication and Training Platform was conceived. The platform is a technology powered by Crabgrass (an open source application developed by the Rise Up Collectives) that has been used to reach out to many youth organized in groups (or classes) within networks (or schools) and provided them with useful information as well as technical and vocational education training materials. Because of the efficiency of this technology in reaching out to many in such organized and systematic way, the Ministry of Youth and Sports, through its Assistant Minister for Technical and Vocational Training, Mr. Sneh Johnson, requested the Minister of Youth and Sports to request UNIDO's assistance in providing the TVET department of the Ministry with such a tool. Fortunately, UNIDO granted this request and the rest of my presentation will be based on how the Ministry or any other institution can use this technology or any other ICT to deliver TVET instructions.

The Relationship Between ICT and TVET

In continuation with my presentation, I would like to draw out the vast relationship between ICT and TVET. This relationship, when tapped into, can make ICT more useful to academic society and can make TVET more fun than challenge.The relationship between ICT and TVET are enormous and it will not be fair to discuss all of those relationships in a 45 minutes presentation; however, the ones listed here are the most relevant as far as TVET in Liberia is concerned.

No.	ICT	TVET
1	ICT was designed to inform many people about happenings around them and the rest of the world. This process, in most cases happen simultaneously and users of ICT don't take track of how they happen	TVET on the other hand is more effective when it delivers its materials to many people at the same time, instead of trainers providing training for small separate groups here and there. Like this, the training become more expensive and time consuming.
Common Ground:	The bottom line here is that TVET can tap on the information disseminating power of ICT to reach more of its trainees at the same time and over a short period of time. Like this, less time is spent, human resources are properly managed and cost of transportation is reduced by far.	
2	ICT creates an integrated society where access to information is guaranteed without much difficulty.	TVET develops a lot of training materials that can be transformed into information for distribution. Without ICT, TVET materials will have to be printed out into manuals, flyers, etc; thereby making access to those materials difficult and/or expensive.
Common Ground:	TVET can use ICT ability to spread information with minimum cost in terms of monetary and time values. This way, the training materials are preserved and can be used as reference in years to come. Printed materials are good but their life span is very short in terms of durability. A TVET material sitting	

	on a well protected server is there forever. The server can be maintenance and the materials can be transferred under care. With the new cloud technology, which our platform will be migrating to shortly, anything saved is saved for almost eternity.	
3	ICT is very good at keeping performance track record	TVET needs to keep track records of students to ascertain their progress. It is also needs to keep track records of the kinds of contents teachers are delivering to students in order to get a clear picture of the standard of materials being delivered.
Common Ground	TVET becomes more effective if it has an automatic record tracking mechanism, which ICT can provide.	
4	ICT has a wider geographic coverage and can reach out to people of different geographical locations at the same time	TVET in Liberia is being spread throughout the 16 geographical locations of the country.
Common Ground:	With a single content developed from a TVET course, ICT can make sure it reaches thousands of people across different geographical locations without using any means of transportation, which has some risk, financial implication, and time factor attached to it.	
5	ICT enables professionals from different parts of the world to collaborate on a single project (content development) in order to achieve greater impact.	To get the best TVET materials, and to conform to international TVET curriculum, collaboration is highly needed. A country running a TVET a program will need a way to collaborate with the outside world.
Common Ground:	ICT provides the kind of collaboration TVET will need in most circumstances.	

What Kind of ICT Can Effectively Deliver TVET?

If you look around you today, there are thousand and more different kinds of technologies each of which perform different kinds of tasks and achieve different goals. How you choose amongst these technologies to get a suitable one for TVET delivery depends on the environment you find yourself. This is due to certain factors including:

- Connectivity: In poorer countries like mine, we live in a disconnected society. There are no metropolitan networks that connect urban areas to rural areas as you will see in most developed countries.
- Knowledge of ICT: To choose the best TVET delivery technology, you also have to consider to beneficiaries. Are they ICT proficient? How do they react to ICT? What is the overall usage level of technology amongst the people? In countries like mine, technology (or computers) reached us only in the late 1990's and those were the days our citizens were more interested in their survival than their skill level. As such, our people did not embrace technology (or computers) until the periods between 2003 and now. Because of this, only a few within our 3.5 million population took the time to learn how to use computers and till now, most of them have not even heard of what computers can do.
- Cost of Maintenance: If you are running a TVET program on ICT in a country where everyone depends on the government and the people are so poor that when you sell them a full copy of a software for $10.00, they beg to pay you $1.00, and when you tell them they can have it for free, they say "Please help me with plastic bag to put it in." The cost of maintaining a technology should worry you.
- The People: The part of the world where I come from is rich with cultural differences and the diversity amongst the people is almost certainly their power. Using ICT to deliver TVET in those areas requires some care and respect for those cultures.

Based on the above abridged points, I have narrowed down the characteristics of a technology that can be used to deliver TVET in Liberia and most other parts of the world to the following:

- The technology must be easy-to-learn and has a User-friendly interface.
- The technology must be made accessible to all involved in the training.
- The technology must be interactive so that users can interchange ideas in whatever way they want. This will enhance cultural and social interchange, which is highly welcomed in Liberia.
- The technology must have performance monitoring capability.

The characteristics of a technology used to deliver TVET are not limited only

to the above, but an insertion of one, more or all of the above will boast serious public participation.

Training

Training for TVET delivery with ICT is in two stages:

1. Training to use the technology to develop and deliver content (Teachers):

Teachers used to develop and deliver content on a TVET platform must be given enough time to learn and form a personal bond with the technology. Though there may be access to technology for many teachers in schools, they need time to learn the technology and gain the kind of learning experience that is sustained and personal. This can provide the human infrastructure so that teachers are able to use, demonstrate and create learning environments inclusive of the technology. The time requires sustained support in learning new practices. We should be cognizant of the time required for teachers to do this kind of learning, and we should be supportive of teacher training that allows individualized as well as collaborative learning. Too often the emphasis is learning the mechanics of how to use the technology to deliver a training material. Accomplished teachers with pedagogical understanding could be a bridge to the better use of educational technology as media for inquiry, communication, construction, and expression. Mentoring, collaborative projects, and outreach should be used to bridge the areas of need.

2. Training to use the technology to learn (Students)

We should know that most students develop interest in learning if and only if what they are learning is relevant to their survival (at least, this is the case in Liberia). Because of poverty and the high unemployment rate, most Liberians have become very impatient and would rather spend their time learning something that they believe can feed them tomorrow than "waste time playing with computers". Because of this, the training should be done in a way that relates only to what they intend to learn. For instance, on our TVET platform, a person learning carpentry is only required to learn the portion of the platform that deals with carpentry. This way, they can perfect their trade and concentrate on their target. This will also help to speed up the training process so that students don't have to learn everything about the technology before they begin their first lesson. Conclusively, the training for students must be precise, direct and brief before they get weary of the entire program.

ICT: Meeting the Costs and Challenges

In Liberia today, bulk of the population are poor and the most common jobs lie in the informal sector. So, forgetting about providing food, water and electricity (which are the most needed social services for the people) and talking about investing in ICT is a bit out of place; however, ICT itself can go a long way helping to diminish poverty by empowering citizens. The Technology needed to provide transformational learning tools are expensive, yet they can be achieved in the following ways that have worked for us:

i. Turn to the Open Source Community for Technology and Tools

In the world of programming today, there is a huge community of programmers committed to providing the best tools that enhance human resource development and other sectors of human life. They have very powerful tools that are free and can be adapted by anyone or any organization. In Liberia, we subscribe with the Riseup Collectives and Ushahidi (communities of Open Source Developers worldwide) for our most commonly used tools. Once we get those tools, we only hire very few and cost-efficient programmers to manipulate the tools to suit our settings and need.

ii. Solicit Support from related NGOs and Government

Getting the Technology to use is one thing, but you will also need the hardware like computers, generators (for countries like ours that don't have public electricity), Air Conditioners, etc. One way we have succeeded in getting these equipments is to solicit support from the UN, Government and other NGOs. We wrote proposals to the UN and got huge support from the United Nations Industrial Development Organization (UNIDO), government and other NGOs. The government has supported us with policies including tax waivers and import tariff reductions. The National Legislature supports us by using and referencing our tools and training programs. So, in conclusion, for TVET to succeed in the use of technology, it will require a lot of support, especially from government (in countries like mine

iii. Organize Income Generating Activities to sustain your programs

When you get the technology, get the hardware and necessary support, you also need to sustain them. So, for us, we have employed series of income generating activities that help us pay salaries, buy new equipments, pay rent and take care of a lot of things. Government gives us support by waiving taxes on

us and we enjoy huge publicity from the Legislature. Now, we have introduced an internet café with the fastest internet speed in our community, we have IT training programs, proposal writing and series of programs that community dwellers pay minimum fees for. This money is collected and added to our operational funds that help us sustain our programs. We also run regular face-to-face forums where government officials and law makers visit to make presentations and host training sessions. During these programs, we get advertisement agreements from the private sector and usually raise good sum to add up our budget.

The Promise of ICT

Now let me close with a couple of sentences about ICT. These villages – each one with about 5,000 people – should be on-line. The reason why that is important is that connectivity would first enable TVET to work in a new way. We could get TVET right down to the village level. We could monitor it; we could understand what is needed. There would not be a question of whether the training makes it to village level if it is given to the central government. We know it would not have to go through the six lines of government. Or we could deliver TVET with agreement of the national government right down to the community, which is where it needs to be for probably about half of the total investment. Connectivity would be wonderful.

ICT as a delivery means can do a lot more than teach, it can motivate the younger generation to strive harder and face greater challenges with hope that all can be solved with the implementation of the latest and most useful technology. ICT can go a long way to connect all the social dots that are left between physical teachers and students. Let's work to improve TVET instructions with ICT.

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The *International Journal of Vocational Education and Training* reflects regional contributions and is international in scope. Its purposes are to provide a forum For the discussion of vocational education and training issues and practices; to assist in the dissemination of information on research and practice; and to strengthen the lines of communication among individual researchers and practitioners, institutions, and organizations. In addition, a platform is provided for individual views on relevant issues.

The Editorial Board recently passed a resolution requiring membership in IVETA in order to publish in the Journal. This is effective with Volume 14, Number 2. The Journal publishes feature articles on research, theory, and practice broadly related to international vocational education and training. The largest section of the Journal is devoted to empirical research articles. General articles and research manuscripts submitted for publication should he between 1,200 and 5,000 words in length and should adhere to rules in the most recent edition of the Publication Manual of the American Psychological Association (APA) with the exception of placing tables in-column in the text where you prefer them to appear. Articles should deal with some relevant aspect of educational opportunity such as educational research, evaluation, instruction, teaching methods, policy making, or theoretical discourses related to education and training.

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