E-Learning Initiatives at CTEVT: An Attempt at Innovation and Paradigm Shift in TVET Pedagogy

Shesha Kanta Pangeni
Kathmandu University School of Education
sheshakanta@kusoed.edu.np
Gehendra Karki
Sakchyamta Project, CTEVT
gehendra.karki@gmail.com

Abstract

Information and communication technology (ICT) has brought innovative approaches to teaching and learning introducing pedagogical innovation that leads to paradigm shift in education. However, Technical and Vocational Education and Training (TVET) sector in Nepal has little exposure to ICT integrated pedagogical practices. In this context, this paper presents lessons from e-learning initiatives at CTEVT based on a study on e-learning pilot projects from three leading technical schools. It uses both qualitative and quantitative data received from 152 survey responses, two focused group discussions and 10 individual interviews. The study reports that e-learning is promising for TVET sector as an innovative ICT integrated alternative pedagogy. However, instructors and schools want additional support for training and ICT infrastructures to design, develop and implement courses for e-learning locally. The study also draws implications to scale up the initiations and interventions of e-learning at institutional level that are meaningful for expansion of similar pilot projects, ICT integration across TVET programs offered by CTEVT, pedagogical innovation, workplace learning opportunity for students, increase access and quality in TVET programs and institutional reform.

Keywords: E-Learning, Pedagogical Innovation, Paradigm Shift in TVET Sector, Workplace Learning, ICT Integration, Institutional Reform

Introduction

Innovative digital technology has potential to revolutionise our traditional educational institutions (Vassiliou & McAleese, 2014) providing learning opportunities with a flexible schedule for students to learn beyond the classroom settings yet provide social constructionist learning environment (Kafai & Resnick, 2011). The attraction of self-regulated learning design in an e-learning courses lies in its scalability where any number of students can take their own pace to learn as a cost-effective choice

(Conrad, 2008). Besides, self-regulated learning provides freedom and flexibility with learner-content interactivity (Ally, 2008) in learning. Technology bridges the gap of 'virtual' (internet-mediated) and 'real' (physical) settings (Woolgar, 2002). Such technology provides us with the opportunity to adopt all possible pedagogical methods that are used in the physical settings into the virtual settings. However, face-to-face dominated culture of education in Nepal (Pangeni, 2016) has created the gap of online learning design and pedagogy in practice. It may take some time to change the mindsets of people to understand the strength of the technology for pedagogical innovations.

As the "use of ICT in education has brought new possibilities for learning online" (Pangeni 2020, p.26), to integrate technology for pedagogical innovations, educational institutions need to develop their infrastructure, review curriculum, introduce policy for alternative modes of teaching and learning. Besides, teachers need to develop their competencies with sound knowledge of technology, pedagogy, and content together as stated in the TPACK model (Mishra & Koehler, 2006). It demands huge interventions in teacher training and ICT infrastructure that helps teachers to integrate technology along with content and pedagogy. Therefore, educational systems in Nepal including TVET sector need to learn more about how to contextualize and integrate experiences of modern ICT tools for e-learning supportive to online and distance education. To be effective, we must find the

ways to connect our students and teachers beyond face-to-face classrooms reaching out to their workplace and home. Such effort would also facilitate in crisis times such as COVID-19 and other natural disasters.

E-Learning Initiatives at CTEVT

E-learning program piloted at Centres of Excellence (CoEs) was an effort to initiate and create awareness on ICT integrated alternative pedagogical innovation. There are three CoEs under CTEVT to represent one each TVET discipline: agriculture, tourism and construction. These CoEs are expected to serve as one stop resource centers, a place where successful examples come together and best practice training models in industry are identified and promoted. The e-learning pilot program was an attempt to explore and examine the possibilities of introducing new ways of teaching and learning across the schools under CTEVT. The pilot project was initiated during December 2019 to February 2020 by assessing need, establishing e-learning server, orientation to all instructors to use e-learning portal and providing some IT infrastructure support to CoEs. These initiatives were funded by European Union through SAKCHYAMTA project at CTEVT. However, from March 2020, it was hard to visit CoEs because of country wide lockdown. Meanwhile, IT team at CTEVT with expert support extended online support and conducted basic level virtual training sessions to all instructors from CoEs to design, develop and implement courses using e-learning

portal. Modular Object-Oriented Dynamic Learning Environment (Moodle™), an open-source learning management system (LMS) was used to create web-based learning opportunities responsive to mobile devices too so that students and teachers without technological expertise can easily handle applications and tools available for learning facilitation. During lockdown orientation to e-learning portal was extended to other affiliated schools of CTEVT too. The e-learning portal had been the main site for CoEs to provide learning resources during COVID-19 pandemic.

In the background context stated above, this study was conducted to explore the status of e-learning platform use by students and teachers at CoEs. The platform was hosted from central server established at Council for Technical Education and Vocational Training (CTEVT), Santorini Bhaktapur. The study was focused to explore the status including problems and prospects of e-learning portal use at three CoEs.

Though the main streaming general education programs are transforming with ICT integrated approaches and are successfully offered in the form of e-learning/online mode, it is rare for TVET sector in Nepal. In this context, this study has explored successful stories and experiences of e-learning/online mode of teaching and learning from piloted schools. Problems and prospects observed from the study would be supportive as data driven practice to scale up the alternative pedagogy and innovation

to other schools selected by CTEVT across the country focusing the education through e-learning for quality, equity, efficiency, and sustainability of impacts.

Method of the Study

The study used qualitative interviews, FGD and quantitative survey methods. Three centres of excellences (CoEs) recognized by CTEVT namely Pokhara Technical School (PTS), Lahan Technical School (LTS) and Tikapur Polytechnic Institute (TPI) were selected as study site because e-learning was piloted from these institutions. Students, teachers, and principals from the COEs were included in the study as research participant. Survey was distributed among the students and teachers who registered in the e-learning system established at the central server of CTEVT. Likewise, students and teachers who expressed their interest to participate in research communication in response to a question in survey were selected for interview. In addition, principals, and project focal persons from the CoEs were also included as participant for the interview. Thus, this paper is developed based on data received from 152 survey responses (59 from PTS, 63 rom LTS, 23 TPI and 7 Other institutions), two virtual FGDs (students and teachers), and 10 telephone interviews (students-2, instructors-2, principals-3, and coordinators-3).

In addition to survey, interview and FGD, user log from e-learning server was extracted and analysed accessing the e-learning server established at CTEVT to host LMS/Moodle.

Table 1
Distribution of Survey Participants by Institution, Role and Gender

	Staff (IT)	Instructor/Teacher		Student		Total
	Male	Female	Male	Female	Male	
LTS	0	1	3	14	45	63
PTS	1	0	4	22	32	59
TPI	0	0	8	6	9	23
Other	2	0	3	1	1	7
Total	3	1	18	43	87	152

As a part of user log tracing, all users registered into the server for e-learning are reported in the paper.

Findings and Discussion

This section presents findings, conclusion, and implications. As implications are important for CTEVT for further actions, the implications are detailed out into different themes and sub themes.

Status of E-learning

E-learning is considered as an alternative process of teaching and learning in TEVT programs that utilizes modern ICT and web/mobile based LMS. E-Learning is also considered as easy and supportive tools for both teaching and learning. Students and teachers believe that e-learning promotes quality with audio and video materials. The statement *"It will add value to my organization CTEVT"* reflects the reality. With basic level of training teachers have developed and implemented their courses for e-learning, without any orientation or training students started using the system. 90.8% (n=152) of survey respondents used

e-learning rest 9.2% did not use because of various problem. Lack of learning materials, lack of awareness about existence of e-learning site, support for learning, lack of orientation, connectivity/network, and personal family related problem are reported as the reason of inability to access the site by 9.2%. To access the e-learning WIFI (used by 55.8%) and Mobile data (used by 61.6%) are the dominant medium of connectivity for students and teachers. Likewise, smart mobile phone (used by 89.1%) and laptop (use by 21.7%) are two major devices that students and teacher used to access the e-learning site. IT admins suggest providing internet facility support for data package to students and teachers for connectivity and appropriate use of e-learning at CTEVT. More than 50 teachers and 400 students got initial orientation to use e-learning during COVID-19 pandemic. This initiative has created greater awareness among teachers and students. Teachers who responded to the survey claim that they have created at least one course in e-learning, and they handled different group of students in e-leaning (Minimum 10-20 students and Maximum

above 50). 100% instructors/teachers want to participate in training related to online teaching using e-learning system and 85.7 % teachers recommended e-learning courses to be available for all subjects and all schools at CTEVT. 92.8% of teachers expressed higher importance of e-learning and they stressed to expand e-learning across CTEVT systems. Same percentage of teachers also have highlighted to continue e-learning parallelly with face-to-face. They also shared that they had valuable experience by creating online courses.

80% student who responded survey had attended 2 or more courses in e-learning. 72.8% students expressed the higher importance of e-learning for them. 89% students agree to expand e-learning across CTEVT systems. 75% students wanted to continue e-learning site parallelly with face-to-face classes. However, 38% student disagree to accept e-learning as better option to classroom learning. Nonetheless, e-learning was valuable experience for 72% students and 75% agreed that they got good support for e-learning during COVID-19 pandemic.

The e-learning system established as a pilot project only for three CoEs has now been exposed to a total of 52 institutions all over the country within a noticeably short period. However, the status of e-learning portal use is unknown. A separate study for the study to include all 52 institutions is needed. As of December 14, 2020, the e-learning portal established at CTEVT's central server accessed via _http://elearning.ctevt.org. np_ has a total 2283 registered users (378 teachers, 1683 students, and 222 others). 1961 users are confirmed, and 322 users are not confirmed. The number of not confirmed users indicates that users did not get support to complete their account registration on the site. There is a small number of active users (N=243) comparing to the total confirmed registered users (N=1961). In this regard, students and teachers who create account must get prompt support for confirmation of account and further use. Nonetheless, active user's data (330 during last three months and 125 during last 15 days) shows that the use of e-learning portal is continued. LMS – Moodle (version 3.8) installed at the beginning has not been upgraded yet. Moreover, a latest version of the Moodle 3.10+ is available with many more features for interactive, collaborative teaching-learning and secure use of the system. Therefore, a system upgrade is expected.

Furthermore, extension of the e-learning project pilot is envisioned. In this regard the project has planned to capacitate 25 schools with installation of e-learning labs and ICT enabled and equipped classrooms. In addition, process of developing electronic teaching learning material (eTLM) for 127 subjects of agriculture, construction, tourism, and health related diploma level programs are started. Likewise, trainings to all instructors who are involved in writing eTLM are started.

Prospects of E-Learning at CTEVT

Teachers participating in survey, FGD and interview highlighted e-learning as means to engage students when teachers are absent "*If teachers are in leave, they can assign self-learning tasks on e-learning site to engage students in learning*" (T1). Another situation mentioned by teachers to use self-learning was bout completing course content set by curriculum when they are unable to cover all lessons indicated by curriculum in classroom. In addition, teachers highlighted that it is also a technological innovation that paves the base for anytime learning from anywhere. Features of e-learning exemplified by teachers are time saving/flexibility "*Teacher can be available from any possible place and time*" (T2). In addition, teachers reported that e-learning system is easy to explain, easy to prepare lessons, comfortable to team, easy to deliver e-materials, easy to update and share knowledge, and possible to engage learners with interactive activities.

Features of e-learning in student's view are presented her. A student said, "*It is the best option for study during lockdown at home surfing internet where we were able to get much more knowledge than a particular learning in classroom" (S1)*. The e-learning provided an opportunity to continue classes from home even in lockdown. In addition, students were privileged getting notes and new materials from e-learning website. They got more knowledge in less time, opportunity to study anywhere, it was easy to reviewing lessons, easy to contact teachers,

technological innovation in study, all time access to course lecture/assignments even classes are not running, time utilization, learning new things from smart phone, quiz and other interesting materials to study and most importantly no disturbance of classmates and pay full concentration in study in peaceful manner "*In the eLearning classes the most satisfying thing I have experienced is that I can study without any disturbances of my classmates. I was able to concentrate in a peaceful manner. It was beneficial for me" (S2)*. In addition, students also got all subjects in one place, surfing more for extra knowledge and alternative ways to learn. Students were also benefitted during COVID-19 lockdown, "*I got chance to continue my studies during the lockdown time...that was the best part*" (S3). It means students e-learning could be an alternative to continue education during crisis time like COVID-19 pandemic.

Challenges of E-Learning at CTEVT

Some challenges for teacher in using e-learning at present are data cost, quality of network connectivity, "*I spent money for data but connection was not stable. So, it is hard for developing course in e-learning site*" (T3), time for development of e-learning materials, conversation and interaction with students, lack of skill to handle all tools available in provided LMS, "*I cannot use all tools available in e-learning website. I need more training to develop my course*" (T4). Teachers also expect simplified layout, uninterrupted

connectivity, reward for extra work "*I used my time and money for data/internet but there is no return for me. No incentives*" (T5). It indicates demand pay and incentives for extra effort and time that teacher use for e-learning course development and implementation. In addition teachers also highlighted the need of intensive training, support for computing devices, integrated synchronous communication, school wise e-learning system, and guideline to handle tools.

Problems faced by most of the responding students are: network problem, cost for data and device "*E-learning is not better than classroom learning due to slow network connection while study. It is expensive for all student while using mobile data and there is connection problem*" (S5). In addition, students reported not opening downloaded materials and other technological issues "*Most challenging thing about the e-learning is technical problem. We can't ask teachers immediately when we don't understand*"(S6). It was about asynchronous mode of e-learning. Likewise, there was problem of access to device and connectivity, sometimes e-learning site was not responding, electricity cut, file upload limitation, not clear sound and visuals in live class, long online classes.

Therefore, students suggest to provide free WIFI and support for device to access e-learning, complete set of e-learning package in each subject, electricity and internet facility, encouragement and orientation to use e-learning, school wise and course wise easy access to e-learning, updated contents, more presentation and research work to be included, offline features, video calls from e-learning site, full lecture notes of all subjects, practical experience beyond the e-learning "*I think engineering student must need practical rather than theoretical, so eLearning is not the best way to produce engineer*" (S7). Perhaps this student was indicative to field based practical part of lessons. However, there was demand for continuation of e-learning forever.

Provided infrastructure support for e-learning lab with development cabinets and lecture share facility has not been sufficient for CoEs. Intensive training package for teachers to develop courses in e-learning site, orientation session for student to use the system and user guidelines for both students and teachers are highly demanded.

Way Forward for E-learning Implementation at CTEVT

The study has shown greater prospects of e-learning as an innovative alternative pedagogy for CTEVT programs that has capacity to cater the service even in time of crisis. In normal situations e-learning can go parallelly to face-to-face classroom teaching and learning activities as supportive extension for day-to-day workshop/lab/field practical or theory classroom teaching and learning. Therefore, scaling up the provision and implementation of e-learning initiatives at CTEVT are fruitful for the following

reasons.

Lessons From Piloted COEs

Efforts from SAKCHYAMTA project on e-learning program piloting at CoEs were too little – 1) basic orientation to use LMS for e-learning course development. 2) Support for infrastructure such as computer, interactive board, server, and computers depending on local demand. 3) Additional virtual training for interested teachers during lockdown period. However, impact of these efforts has been reflected in greater extent. Some teachers developed courses in e-learning with full of contents and learning activities. After developing courses in e-learning students were enrolled and engaged in e-learning to obtain lecture notes, reading materials and participate learning activities such as quiz and assignment. COEs were able to connect their instructors and students during school closure period of COVID-19 pandemic.

In the study, both students and teachers expressed their greater interest to move ahead with full flagged e-learning in parallel fashion to face-to-face mode. In addition, they demand training, orientation, digital contents, and technological support with greater prospects of e-learning. They also have highlighted some issues they encountered to use e-learning. These are good lessons to learn for further interventions towards e-learning program scaling up to other schools. It is obvious to place greater effort on scaling up the initiatives by providing basic level of infrastructure, training for instructors, eTLM, orientation to students, follow up trainings, regular meetings with implementing bodies, motivation for teachers, support for students, and user guidelines or manuals. Support for access to connectivity and computing devices would be meaningful when programs are to continue in distance mode. However, e-learning lab with development cabinet, video conferencing capability and other infrastructure support for schools would open the door to integrate ICT for e-learning as extended support in students' learning parallel to face-to-face classroom activities.

Integration of ICT Across CTEVT

One of the major concerns on scaling up e-learning programs would be the support for integration of ICT across CTEVT's programs because it would add value for access and quality of TVET programs offered by CTEVT. Ubiquitous nature of ICT would offer higher accessibility of TVET programs to the focused group. In addition, ICT has been the major skill these days demanded by employer in the marketplace. Graduates from CTEVT without having ICT skills required for their job-related tasks would fail to compete in global market. Therefore, 21st century education offered at CTEVT without integration would be meaningless.

On the other side, UNESCO (2009) claims "when used effectively", ICT can make education more accessible by improving access to information, enabling greater access to education, providing affordable any where any time learning, and sustaining

life long learning. The same literature advocates that ICT can improve the quality of eduction by improving students' motivation, personalizing student learning, enhancing student learning, giving feedback and reinforcement, enhancing the quality of teaching, and improving teacher education. Different form of teaching materials such as audio, video, animations simulation would encourage students for interactive learning boosting up the learning quality. Different teaching methods and varieties of options with ICT would also set the base for quality teaching.

Integrating ICT and introducing e-learning in education programs offered by CTEVT would take time following a process. An advanced practice of ICT can gradually be developed as it must be started from level zero at CTEVT. There are certain steps of initiating practice of ICT in education process. UNESCO (2009) states that learning institutions are under pressure to prepare students for the changing face of society and the workplace,

forcing the issue of integrating ICT into education. Institutions are at differing stages in the process of integrating ICT. Emerging, Applying, Infusing and Transforming are the major steps in adopting ICT as shown in the figure given below.

CTEVT can use this idea to identify its status in the integration process of ICT and e-learning into its skill focused technical and vocation education programs. Once the status is identified, further plans can be redirected to upper steps of integration process.

Pedagogical Innovation and Institutional Reform

Currently pedagogy in CTEVT programs is dominate by conventional classroom-based activities. It needs reform to be relevant in the time of 21st century education. Use of ICT and e-learning are at the front for pedagogical innovation and institutional reform for relevancy of TVET education to produce graduates for global and local marketplace. At the age of innovative ICTs,

Table 2

Stages of ICT Integration in teaching and learning

Specializing in the use of ICT		Transforming		Creating innovative learning environment
Understanding how and when to use ICT	⇑	Infusing	⇑	Facilitating learning
Learning how to use ICT		Applying		Enhancing traditional teaching
Becoming aware of ICT		Emerging		Supporting work performance
Stages of ICT usage				Pedagogical Usages of ICT

(Adapted from UNESCO, 2009)

schools under CTEVT should introduce use of e-learning as an innovative alternative pedagogical approach. There are number of ways by which use of ICT can be meaningful in schools. The e-learning can be useful for pedagogical support, teaching practice, student assessments, teacher evaluation, teacher efficacy, lesson planning and material development, teacher job satisfaction survey and attendance, teachers' access to resources and use of equipment and materials, student motivation, access to large ICT resources (Strigel & Ariunaa, 2007).

Another major use of e-learning in education is associated with the purpose of communication. E-mail based formal communications have grown tremendously and they have been formalized in educational settings over the last decade. Presenting this facts O'Neill and Colley (2006) states that web-based communication has replaced face-to-face meeting and written or printed letters and it is the primary means of communication between students and teachers in virtual era as different form of computer-mediated synchronous and asynchronous communication. This has potential for institutional reform and relevance at the ate of technology.

Moreover, ICTs have capabilities to bring reasonable change and paradigm shift in TVET pedagogy. Anderson has shown that the roles of teachers and students have been shifted after the implementation of ICT and e-learning. Traditional role of teachers as a knowledge transmitter has been changed to facilitator, collaborator, and knowledge navigator. Table 3 is a figure that compares the roles of teachers and students before and after using ICT in instructions.

This is about inviting reform shifting the paradigm with innovative pedagogy at the level of roles that instructors and trainees play at schools under CTEVT.

Workplace Learning Opportunity

We have noticed that workplace learning is one of the major concerns of higher education institutions in the context of

Table 3
Paradigm shift in teacher and student roles in e-learning context

	A shift from		To
Teacher	Knowledge transmitter; primary source of information teacher controlling and directing all aspects of learning	$\Rightarrow$	Learning facilitator, collaborator, coach, knowledge navigator and co-learner; teacher giving students more options and responsibilities for their own learning
Student	Passive recipient of information reproducing knowledge learning as a society activity.	$\Rightarrow$	Active participant in the learning process producing knowledge; Learning collaboratively with others
			(Adapted from Anderson, 2010)

the 21st century learning. CTEVT should reach out to trainees' workstation such as workshop, farmhouse, kitchen, clinics, and fields wherever they work. It can never happen with traditional approach of classroom focused teaching and learning activities. However, ICT has potential to bring U-turn through e-learning that ensures anytime from anywhere learning. Mainly CTEVT graduates are skilled workforce for the market. In most cases they are already employed and would like to earn and learn together. It is essential for CTEVT to facilitate them for earning while learning (Geel & Backes-Gellner, 2012) in practical ways to mitigate the gap of theoretical and practice of skills and knowledge. In doing so, attending schools every day leaving their workstations/ workshops is not comfortable. Students may encounter various problems with frequent travel to the schools for theoretical knowledge. It may be waste of time for them. Instead, they want learning at their workplace practically aligning theoretical knowledge through e-learning.

One of the opportunities provided by the e-learning/online learning technology is virtualization of learning that reduces gap of physical distance so that students can learn without travelling to their school's classroom or learning takes places at their workstation or workshop. We also can say learning takes place beyond the classroom. In this regard, Allen (2007) also focuses on creating an online/e-learning learning environment that uses classroom simulations and expert performance coaching to provide real work experience in a safe environment and support the integration of new behaviours into the workplace.

E-learning also helps students with skills of using technology to access education from home: independently browsing, communicating, finding resources, and learning. But, in the conventional face-to-face mode of learning, students may not learn those skills without mandatory provision. These skills are also preferred because the new generation of Web-based tools – Web 2.0 allows users to organize information, create, edit content, share, and collaborate with others. Such skills practised using Web 2.0 and mobile learning are valued at workplaces by employers of the 21st century (Russell, 2009). Thus, there is no way to ignore the prospects of online/e-learning for TVET as greater part of education sector in Nepal.

Theoretically, workplace learning is associated to *Situated Pedagogy* which is a strategy to offer the curriculum of practical significance and contextualization of learning experiences. For example, on the job learning/training opportunities for students with support to address issues in society through project/problem-based learning approaches. In addition, this strategy also offers the contextualized experience of learning and assessment to meet the personal and professional goals of the students (Witthaus et al., 2016). Thus, pedagogy that offers situated learning aims at fostering students' engagement in the learning process

that connects them to the context and real-world relevance. In addition, situated pedagogy offers flexibility in learning and strong student support system for self-paced interactive learning with technology.

Therefore, it is important for CTEVT to consider e-learning initiatives to scale up across its system – pedagogy including assessment, administration including policy, plan, and curriculum reform. In short institutionalization of e-learning program is important for pedagogical innovation and institutional reform to produce technologically sound and skilful workforce required for local and global marketplace in 21st century.

Conclusions

E-learning is considered by instructors and students as promising catalyst to introduce innovation for alternative pedagogy across CTEVT programs. A little effort on piloting has profound impact and was supportive even during COVID-19 Pandemic. E-learning was used actively by teachers and students who had access to connectivity from CoEs. It is possible to implement e-learning across the CTEVT systems. However, data cost for connectivity, training for users and a responsive e-learning site to smart mobile phones are essential to consider in further plan as maximum users use mobile phone to access the site. E-learning can go parallel with face-to-face classes after providing basic infrastructure support, training, and e-content. Overall status of e-learning is encouraging in compare to the efforts

placed on piloting interventions. Therefore, it is important to consider scaling up the e-learning initiatives based on the lessons learnt from CoEs by minimizing challenges and maximizing the opportunities and support indicated in findings.

Moreover, ICT provides an efficient management tool for improving the efficiency of education planing and delivery and facilitating policy making and management (UNESCO, 2009). UNESCO-UNEVOC has emphasized ICT as one of the essential components in 21st century TEVT system for transforming TVET programs with full potential to enrich classroom and workplace learning. It is important to realizing the transformational potential of ICT integration and e-learning pedagogy for innovation in TVET system. The changing patterns of processes, products, and services in the world of work are what drive the relevance of improving TVET delivery using ICTs and innovative e-learning models to prepare learners for vocational and generic skills they need for lifelong learning and gainful employment.

Therefore, institutionalization of e-learning at CTEVT is most important implication drawn from this study for pedagogical innovation, access, quality, and relevance of TVET education with integration of modern technologies and creation of workplace learning opportunity through e-learning. This can be done by establishing an **E-learning/ICT Development Directorate at CTEVT**. The directorate can prepare policy and plan for curriculum reform, IT

infrastructure, human resource development, training and development, innovation in TVET pedagogy through e-learning and reform in instructional design, e-content development, and support students and teeachers for e-learning implementation. In doing so, the directorate can prepare policy guidelines to integrate the e-learning system into all the programs offered by CTEVT and work for its implementation. Likewise, the directorate can coordinate curriculum reform initiatives for ICT integrated instructional design to recognize the value of e-learning as an integrated part of instructions that covers both synchronous and synchronous online learning.

For IT infrastructure and human resource, the directorate can plan to establish at least one e-learning lab with a development cabinet in each school and provision at least a full time IT staff in each school for smooth operation of the e-learning lab and other IT equipment. In addition, the directorate can also focus on training and development programs to enhance the knowledge and skills of all instructors and other administrative staff to integrate e-learning required for their job tasks. Likewise, promote e-learning as an integrated part of instruction as alternative pedagogy that can go parallel to the face-to-face mode. Nonetheless, the directorate can coordinate for development of interactive electronic teaching learning material (eTLM) for all subjects and establish continuous e-learning and IT support system for teachers and students. It will help them to use various tools and techniques to continue their engagement in e-learning system.

Thus, by establishing an e-learning/ICT development directorate, CTEVT can enhance effectiveness and efficiency of technical education delivery system and skills development services using ICT based teaching-learning and support. In addition to the key areas stated above, the structural and functional scope of the directorate can be making technical and vocational education more accessible to a broader audience/wide range of users/all learners using ICTs and focusing on providing all essential technical backstopping to the ICT development units of each CTEVT offices and technical schools.

References

Allen, M. W. (2007). *Designing successful e-learning: Forget what you know about instructional design and do something interesting. San Francisco, CA: John Wiley & Sons, Inc.*

Ally, M. (2008). *Foundations of educational theory for online learning. In T. Anderson (Ed.), Theory and practice of online learning (2nd ed., pp. 15-44). Edmonton: AU Press, Athabasca University.*

Anderson, J. (2010). *ICT transforming education a regional guide*. Bangkok: UNESCO.

Conrad, D. (2008). Situating prior learning assessment and recognition (PLAR). In T. Anderson (Ed.), *The theory and practice of online learning in an online learning environment (2nd ed., pp. 75-*

90). Edmonton: AU Press, Athabasca University.

Geel, R., & BackesGellner, U. (2012). Earning while learning: When and how student employment is beneficial. Labour, 26(3), 313–340. doi:10.1111/j.1467-9914.2012.00548.x

Kafai, Y., & Resnick, M. (2011). Introduction. In Y. Kafai, & M. Resnick (Eds.), Constructionism in Practice: Designing, thinking, and learning in a digital world (pp. 1-8). London: Routledge.

Ministry of Education[MOE]. (2013). Information & communication technology (ICT) in education master plan 2013-2017. Kathmandu, Nepal: Author.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. Teachers College Record, 108(6), 1017-1054.

O'Neill, R., & Colley, A. (2006). Gender and status effects in student e-mails to staff. Journal of Computer Assisted Learning 22, 360–367.

Pangeni, S. K. (2016). Open and distance learning: Cultural practices in Nepal. European Journal of Open, Distance and E-Learning (EURODL), 9(2), 32-45. doi:10.1515/eurodl-2016-0006

Pangeni, S. K. (2020). Uses of Communication tools for online learning: Lessons learned from Nepal. In Innovative technologies and pedagogical shifts in Nepalese Higher Education (pp. 26-41). Brill Sense.

Russell, S. (2009). Taking care of business: Authentic use of Web 2.0 in schools. In M. Orey, V. J. McClendon, & R. M. Branc (Eds.), Education media and technology year book (Vol. 34, pp. 199-209). New York, NY: Springer Science & Business Media.

Strigel, C., & Ariunaa, L. (2007). ICT in education initiatives in rural schools in Mongolia. In E. Meleisea (Ed.), ICT in teacher education: Case studies from the Asia-Pacific region (pp. 95-109). Bangkok: UNESCO.

UNESCO. (2009). E-learning series on information and communication technology in education. Bangkok: Author

Vassiliou, A., & McAleese, M. (2014). New modes of learning and teaching in higher education. Luxembourg: Publications Office of the European Union.

Witthaus, G., Rodríguez, B. C., Guàrdia, L., & Campillo, C. G. (2016). Next generation pedagogy: IDEAS for online and blended higher education. Barcelona, Spain: Universitat Oberta de Catalunya(UOC). Retrieved from http://openaccess.uoc. edu/webapps/o2/ bitstream/ 10609/ 51441/1/Next_Generation_Pedagogy.pdf

Woolgar, S. (2002). Introduction: Five rules of virtuality. In S. Woolgar (Eds.), Virtual society? Technology, cyberbole, reality (pp. 1-22). New York, NY: Oxford University Press.