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ICT integrations in TVET: Is it up to expectations?

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Abstract

In today's world where information and communication technology is playing a major role in people's daily lives, how a student learns is dependent on how the student reacts to the sophisticated system offered by these technologies. Thus, it is not surprising that online learning is accepted as an important tool in the general education sector. However its adoption in Technical and Vocational Education and Training (TVET) is yet to reach the equivalence of the general education sector. With the availability of state of the art online learning technology, there is greater opportunity for acquiring the technology that can support TVET practices. The aim of this paper is to discuss the trend of ICT integration in teaching and learning in TVET based on a systematic review of ICT integration in post-secondary TVET. The focus is mainly on the "what" and "how" aspects of ICT integration in TVET. The literature reviewed indicates that while ICT integration can be aimed at the learning goals in the three domains, the affective, cognitive and psychomotor domain; its effectiveness is more noted where learning goals are of the cognitive domains. More effective integration is also indicated where the blended mode is adopted as compared to the fully ICT mediated mode. Lessons learnt in light of these findings are discussed for future ICT integration in TVET.

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1. Introduction

Technical and Vocational Education and Training (TVET) has evolved from providing well-trained basic operators to providing professional knowledge workers as suggested by Wang (2010); "The primary goal of skills training is to provide youth with practical techniques and skills based on professional knowledge rather than manufacture well-trained basic operators" (p.47). With this aim in mind the demarcation between education and

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training or learning and training has become blurred as it should be. Thus within a training program there are now elements of learning and education and future training programs must integrate cognitive learning needs - that used to be less emphasized - in addition to the much emphasized psychomotor training needs. However, demands for hands on skills training is still a hallmark for TVET.

Reliance on instructors who have occupational skills in addition to theoretical professional knowledge is high in TVET although less so in the general education sector. Having good facilities, effective administration and willing trainees by themselves cannot achieve a good TVET program without the skilled instructors to deliver the training. Thus providing skilled instructors becomes the overriding concern where training program in TVET is concerned. However, providing adequate number of instructors who possess the appropriate occupational skills and professional knowledge for specific area of skills training is not easy as most skilled professionals prefer to work in industries rather than in the education sector. Replacing skilled instructors is definitely not an option but supporting instructors' role with technology could be a potential solution that can be looked into. With the availability of advanced online learning technology, high hopes are in place that some of the issues related to lack of skilled instructors could now be resolved.

Indeed, teaching and learning has been identified as one of the twelve potential areas for ICT applications in TVET (UNESCO Institute for Information Technologies in Education (IITE), 2005) (pg. 14). The paper has also recommended the specific subject matter content where ICT support has been adopted in general education and its mode of implementation (full or blended). However, the outcomes of the implementations of ICT in teaching and learning practices in TVET are yet to be fully explored. Furthermore, ICT integration requires high investment (installations, maintenance, and technical support and teacher trainings in specific pedagogy) (The World Bank, 2013). Therefore, before we can plan for an effective integration of ICT on a large scale in TVET, we need to have a good idea of how effective ICT integration in TVET has been to date and what can be done to improve the current situation.

ICT can be targeted for applications in at least four areas where one of it is for classroom utilization (UNESCO-UNEVOC E-forum, 2013). However, according to the World Bank (2013), there is not much empirical evidence on the effectiveness of ICT for targeted learning outcomes. In their 2013 report on the key issues related to ICT in education, they report that ICT is mostly used "...as tools for presentation rather than the often cited promotion of "21st century skills." Thus, it is of interest to actually see if the use of ICT in TVET is any different since this report. The relatively limited information on the current use of ICTs in TVET is making this review more relevant as even publications by UNESCO are focusing on ICT applications in general education rather than in TVET (Raihan & Shamim, 2013b).

In the background note of the UNESCO-UNEVOC E-forum (2013) one of the key discussion topics is on 'ICTs in the classroom: how can ICTs be used to improve learning outcomes?' Under this topic several pertinent questions were raised that continue to be relevant till today. Based on their questions, three questions were adapted and reproduced here to guide this review:-

1. How do teachers incorporate ICTs in their teaching? Specifically, what ICT applications were used? Are they specifically designed or readily available in the market? How were the ICT applications designed and were HCI and learning theories taken into considerations in the design of the ICT applications?
2. Does the use of ICTs help to improve the quality of teaching and learning outcomes? Specifically, what learning domains are being improved (cognitive, affective or psychomotor domain?) and what is less improved?
3. What can be done to improve the effectiveness of ICT integrations? (i.e., more educational resources & content, international input, more communications between teachers and learners, empowering learners & enabling independent study, information sharing etc.)

2. Scope

For the purpose of this paper, the term ICT refers to the technology that facilitate users in accessing, gathering, manipulating and presenting or communicating information while online learning refers to learning experience via networking technology. This definition is in line with that of Moore, Dickson-Deane and Galyen (2011). Based on these definitions, ICT is mandatory for online learning to be implemented but ICT integration does not necessarily

mean that online learning is actually being implemented. As to the definition of effectiveness, efforts on online learning or ICT integration in teaching and learning can be considered to be effective and successful if online learning can be provided without sacrificing students' performance (Means, Toyama, Murphy, Bakia, & Jones, 2009). At the same time, it can be considered to be cost-effective if students' course outcomes from the online mode (or ICT mediated mode) are the same as the face-to-face mode (Means et al., 2009). For this paper however, cost-effectiveness of the ICT integrations in the reviewed studies was not evaluated as many of these studies do not actually report the cost effectiveness of the ICT integrations and neither do they indicate man hours or developmental and maintenance cost of systems and application that can be used as measures of cost-effectiveness.

3. Methodology

A systematic review was undertaken where 20 research publications assessing the effectiveness of ICT applications in TVET classrooms over the recent years from 2003 to 2014 were reviewed. This period is deemed appropriate for the review purpose as publications on e-learning in TVET has only started to emerge in greater numbers from around 2003 (UNESCO Institute for Information Technologies in Education (IITE), 2005) (pg 112). The limited number of publications being reviewed is due to the selection criteria where only studies using the experimental design method was included in the review. Only publications reporting experimental design study is taken into account in accordance with the recommendations by UNESCO Institute for Information Technologies in Education (IITE)(2005) that emphasizes the importance of using experimentation and experience study in assessing the true value (or effect) of learning technologies (pg 124).

In this review, to answer the first research question, how ICT were used were classified into mode and learning target. For mode of applications, it was divided into three namely, a) fully mediated (as in distance learning), b) blended (partially) c) supplementary. Mode is of concern as a meta-analyses study by the US Department of Education on ICT in education indicate that mode of instruction does not seem to matter so much (Means et al., 2009) while intuition indicates otherwise for TVET applications. At the same time we were also interested in knowing the type of applications that were being used, (customized/ available in the market) and the design foundations of these applications (do they take into account human computer interactions (HCI) and learning theories/instructional sign theories?

For the target of learning, analysis results was divided into three domains 1) knowledge (cognitive), 2) attitude (affective) and 3) skills (psychomotor) as defined by Bloom (1956), Simpson (1972) and Krathwohl, Bloom, and Masia (1973). Further sub-classifications were made of these goals, i.e. supporting goals or main learning goals. For example, an affective learning outcome can play a supporting goal for a main learning goal in a psychomotor or cognitive domain or the affective outcome can be the ultimate goal in itself. Similarly, for the mode of ICT integration, further subdivisions were made for greater understanding.

To answer the second research question, the learning outcomes of the reported interventions are identified and discussed. Lastly to answer the third research question, suggestions on improvements were made based on lessons learnt from the success and failures of ICT integrations.

4. Result and Discussion

Results of the analysis are presented according to the sequence of the research questions.

4.1. *How do teachers incorporate ICTs in their teaching and what kind of ICT applications do they use?*

The distribution of research that target specific learning domains when ICT were incorporated is shown in Figure 1. Details of papers reviewed are shown in Table 1 (in Appendix 1). All of the 20 research publications reviewed were found to be integrating ICT in the teaching and learning for the cognitive learning goal where ICT integration was aimed at improving subject specific knowledge and understandings. Typical examples are found in the following publications by Karahoca et al. (2010), Martin-dorta, Saorin, and Contero (2011), Patterson (2011) and Ueno, Kimura, Neudorfer and Maclean (2004).

Half of these studies were also focusing on both the cognitive and psychomotor learning goals i.e., skills specific in the discipline of study (Bhavani et al., 2010; Donkor, 2010; IrumInayat, Roohul Amin, ZubariaInayat, & SitiSalwah Salim, 2013; Kelly, Taliaferro, & Krause, 2012; Moudgalya & Arora, 2010; Sahin, 2010; Toole, 2011; Wagner, 2003). Less than 50% of the research reviewed (43% to be exact) was focusing on both the cognitive and affective learning goals such as those in the following publications (Hamidah, Mulyanti, Sulaeman, & Wibisono, 2012; Patterson, 2011; Tsai, 2012; Y.-C. J. Wu & Huang, 2013). The lower focus on the affective learning goals is highly surprising as improvement in affective attributes is one of the strengths of ICT. Furthermore, studies indicate that affects should always be monitored hand in hand with cognitive or psychomotor teaching and learning practices as affects is highly effective in promoting and sustaining learning efforts (Lashari, Alias, Kesot, & Akasah, 2013). Lastly, only 24% of the studies reviewed were focusing on all three domains using e-learning (Konak, Clark, & Nasereddin, 2014; Liu, Chiang, & Huang, 2007; Shen, Lee, & Tsai, 2011; Starcic & Niskala, 2010; Wang, 2010).

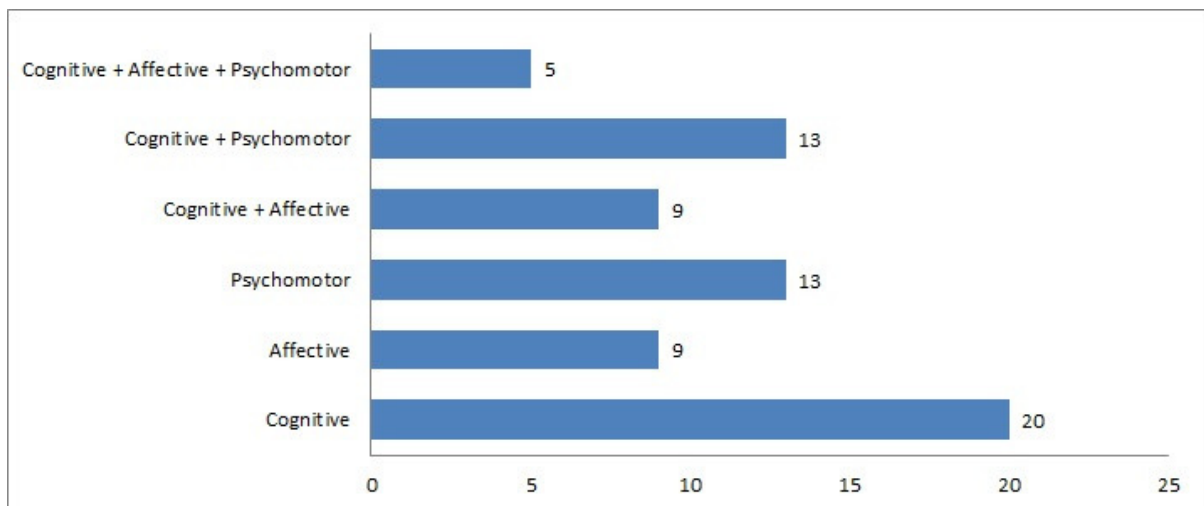


Figure 1. Distribution of studies according to target learning outcomes (cognitive, affective and psychomotor).

With regard to mode, 57% of the studies reviewed indicate that teaching and learning using ICT was in the fully mediated mode. In these studies by Bhavani et al. (2010), Karahoca et al. (2010), Konak et al. (2014), Liu et al. (2007), Martin-dorta et al. (2011), Moudgalya & Arora (2010), Toole (2011), Wagner (2003), Wang (2010) and Y.-C. J. Wu and Huang (2013); the aim was to test if full ICT integration can improve concept learning. In the rest of the studies, i.e., in Donkor (2010), Hamidah et al. (2012), IrumInayat et al. (2013), Liu et al. (2007), Patterson (2011), Sahin (2010), Starcic & Niskala (2010), Tsai (2012) and Ueno et al. (2004), the aim was to gain benefits from ICT integration in teaching and learning process through partial integration of ICT. One of the papers reviewed reported the use of ICT on special needs learners. In this case ICT was utilized to develop skills for overcoming learning difficulties (Starcic & Niskala, 2010).

Where skills training was the primary goal of ICT integration, the courses involved were diverse such as computer aided drawing (CAD) (Wang, 2010); footwear design (Sahin, 2010), web development (IrumInayat et al., 2013), networking (Konak et al., 2014), plumbing (Bhavani et al., 2010), non-destructive testing (Toole, 2011), heat transfer (Moudgalya & Arora, 2010) which are all courses in engineering program. There is also ICT integration for skills development in sports science such as the anterior/posterior stability course (Wagner, 2003) and motor skill assessment for physical education and kinesiology teachers (Kelly et al., 2012).

Regarding the type of applications, 5% were readily available applications and 95% were customized. Only IrumInayat et al. (2013) used WebCT (now brought by Blackboard) as the delivery platform. WebCT is one of the biggest subscriptions of e-learning systems in campus life. WebCT provide most all features required in e-learning

(Heirdsfield, Walker, Tambyah, & Beutel, 2011). In spite of that, user may not be able to put certain files which are not supported by the system and to display their material according to their needs because of the inflexible system.

Out of 20 papers reviewed, only Bhavani et al. (2010), Martin-dorta et al. (2011) and Moudgalya and Arora (2010) integrate e-learning with virtual experience such as virtual laboratory while in the other 14 studies (67 %), skills development and performance were always practiced in a face-to-face mode. Four papers reviewed (14%) were adopting ICT integration without e-learning due to infrastructure issues. The summary of papers reviewed according to mode and aim of study can be referred back to Table 1 (Appendix 1).

Design wise, customized design seems to be the norm but learning theories do not appear to be routinely incorporated into the e-learning or the ICT-based learning applications. Only Kelly et al.(2012) study mention what learning theories had been adopted into the design. Most of the papers (95%) do not seem to be much concern about learning theories in their design. These finding is similar to W.-H. Wu, Chiou, Kao, Alex Hu, and Huang (2012) where they found only 16% of the papers that they reviewed actually mention about applying learning theories into their ICT applications design. However, this does not mean that educators in TVET have ignored the role of learning theories in their design. They may have used their “personal learning theories” to develop their system or applications which can be largely based on their experience as learners or instructors.

4.2. Does the use of ICTs help to improve the quality of teaching and learning outcomes?

To answer the second research question on effect on ICT integration on learning outcome, the effect of the reported interventions will be discussed. Discussion will be divided into three types of decisions on the outcomes of ICT integrations; superior and effective, effective and poorly effective. Superior effective is when, the outcomes for the ICT group surpassed the comparison group that do not used ICT; effective is when the ICT group performs equally as the comparison group that do not use ICT and poorly effective is when the ICT group performs worse than the comparison group that do not use ICT.

4.2.1. Superior effective outcome

Superior effective outcomes were found in studies focusing on learning for the cognitive and psychomotor domain. In one study by Martin-dorta et al. (2011) where they compared the spatial visualization skills of first year engineering students who learned with and without using handheld touch screen devices; they found that students in the group with the handheld devices showed greater improvement in average spatial visualization score compared to students without devices. In another study, Moudgalya & Arora (2010) also found superior outcome for the ICT group that they studied although the lack of virtual laboratory using handheld touch screen devices that delays the video transfer data forces them to abandon video element in their applications.

For the learning of the psychomotor domain, a study by Donkor (2010) found that students who undergo video-based instruction in block-laying and concreting course have significantly greater practical skills competence compared to a non ICT group. Similarly, Konak et al. (2014) also found greater improvement in skill acquisition towards computer networking courses after ICT mediated training. Konak et al. (2014) suggested that collaboration between peers during the learning session contribute to the significance finding. Finding from IrumInayat et al. (2013) also support the conclusion that ICT integration enhances participant’s learning outcomes and satisfaction in collaborative activities with their instructors and peers.

ICT integrations have also found to be useful in training trainers. A study by Kelly et al. (2012) showed positive effect of ICT usage on their pre-service teachers. They found that pre-service teachers in kinesiology performed much better on assessing a motor skill after undergoing training using the Motor Skill Assessment Program (MSAP). The MSAP is a computer-based instruction (CBI) program designed according to the behaviourist learning theory that is in line with the needs of adult learners.

4.2.2. Effective outcomes

Some studies fail to provide evidence for superiority of online learning or ICT mediated learning over traditional learning. For example, in Wang (2010) the researchers found that there is no significant difference between students who learned architectural drawings and designs using the traditional teaching method and students using a

multimedia courseware with respect to professional cognition or skill operation cognition. This indicates that the ICT mediated learning is as effective in promoting cognition development – if not better than the traditional method - as suggested by Means et al. (2009). Thus either method can be used with success depending on the situations. Interestingly, the ICT group reported greater feeling of satisfaction compared to the traditional group. This indicates that while ICT mediated learning may not be superior to traditional learning for cognitive development, ICT mediated learning is superior where learning of the affective domain is concerned. Improvement in affects can be a motivating factor for self regulating and self directed learning (Hamidah et al., 2012; Starcic&Niskala, 2010; Tsai, 2012; Wang, 2010; Y.-C. J. Wu & Huang, 2013).

In another study by Karahoca et al. (2010) on high school TVE students, they found that ICT mediated learning was equally effective as the traditional method. They found that there was no difference in students' achievement in knowledge on electronics (cognitive domain) between students who learn using the interactive educational training software and students who underwent laboratory work and lessons in the traditional way. This study involved a Foundations of Information Technology course for TVE high school program. Again, this is an example of e-learning for cognitive development rather than on procedural skills or psychomotor skills training that is often the trademark of TVET. The outcome indicates that ICT mediated learning is equally effective as traditional method of learning for cognitive development purposes but the study does not however indicate that the ICT mediated mode is less or more cost-effective.

Due to its superiority in meeting the affective learning needs, ICT integration into teaching and learning has been especially indicated where special needs education is concerned. In one study on TVET students with special needs, the effect of an e-learning environment that was specifically designed (the SEVERI) to cater to students with a range of physical, communicational, emotional and cognitive disabilities, which cause learning difficulties in reading, writing and perceiving skills was evaluated by Starcic and Niskala (2010). SEVERI was specifically designed to cater to the students' needs, with interfaces that are in larger fonts and clearer format. The findings indicate that most students show higher motivation, learning skills and achieve greater performance in the specified assessment. Additional benefits were obtained where teachers' work in planning and organizing teaching and learning sessions became more efficient. The finding indicates that the special learners in TVET may benefit with the integration of ICT into their learning.

4.2.3. Poorly effective outcomes

Although, previous studies indicate positive learning outcomes when the aim of ICT incorporation is to improve cognitive learning, where skills development is the target, ICT mediated/e-learning seems to be unhelpful according to the studies reviewed. Among the thirteen studies that attempt to improve skills (Bhavani et al., 2010; Donkor, 2010; IrumInayat et al., 2013; Kelly et al., 2012; Konak et al., 2014; Liu et al., 2007; Moudgalya& Arora, 2010; Sahin, 2010; Shen et al., 2011; Starcic&Niskala, 2010; Toole, 2011; Wagner, 2003; Wang, 2010) only 31% of the study actually shows superiority of ICT mediated learning i.e., the study by Donkor, (2010), IrumInayat et al., (2013), Kelly et al. (2012) and Martin-dorta et al. (2011).

In the other studies the mode was fully mediated in some (Bhavani et al., 2010; Karahoca et al., 2010; Martin-dorta et al., 2011; Moudgalya& Arora, 2010; Toole, 2011; Wagner, 2003; Y.-C. J. Wu & Huang, 2013) and blended in others (Donkor, 2010; Hamidah et al., 2012; IrumInayat et al., 2013; Patterson, 2011; Starcic & Niskala, 2010; Tsai, 2012; Ueno et al., 2004; Wang, 2010). Other than Donkor (2010), IrumInayat et al. (2013), Kelly et al.(2012), Martin-dorta et al. (2011), ICT integration produce poorer motor skills compared to traditional method of learning. For example, in the study by Wagner (2003), ICT integration in the form of e-learning (fully mediated) seems to make learning worse rather than better, a phenomenon that requires further research to understand its root cause. Wagner (2003) attempted to teach the Lachman's test as anterior and posterior stability course in the sport science program via the computer-based interactive multimedia program. The finding indicates that the computer group has psychomotor skill that is significantly worse than students who were taught via traditional laboratory instruction. This study is an example of skills training attempt via e-learning. In another study by Tsai (2012) on English for specific purpose (ESP) in semi-conductor technology course also show the same result. Similar to the previous studies, Tsai (2012) study indicates that adult learners are more satisfied with face-to-face instruction without courseware even though in distance learning mode.

Over all, the studies seem to indicate that existing ICT mediated or e-learning initiatives is not effective for

developing occupational hands-on skills but quite effective at developing cognitive and meeting affective learning needs. It also appears that blended mode seems to be better at improving skills. These factors are highly related to the design aspect of the initiatives.

5. Challenges in Implementing ICT Mediated-Learning in TVET and Recommendations

Based on the review, design factors –designing the appropriate learning environments that meet the requirements of the target users - have been identified as key factors in promoting success of ICT integration namely consideration of target group, consideration of the learning domain and tools/materials design. The following suggestions that are classified into four categories; target group, target learning domain, mode of delivery and tool/material design are presented to promote ICT integrations at the classroom level so as to encourage more knowledge sharing and creations.

5.1. Deciding on the target group

Design of ICT should carefully consider the target group in addition to the learning objectives as introducing ICT into a classroom need special planning to ensure its successful implementation. Although, it seems so simple to simply take an available application and introduce it in the classroom, an inappropriate application may fail for the wrong target group. For example, most applications are in English and thus a significant target group could be is English language learner or English speaking learners. A group that does not speak English will not learn much from English medium applications.

This review indicates that, many learners groups may benefit such as those from the medical, engineering, science and art disciplines as the courses can be delivered from distant or in house. Special learners also seem to be a good target group for ICT integrated learning. Advanced ICT applications on the other hand can give benefit to special learners either physically or mentally. For example, voice recognition applications are helpful to a visually impaired learner while pastel color scan be used to reduce eye strain, headaches due to heavy reading. However, adult learners seem to favor face to face learning more than ICT mediated learning. Thus, choosing the target learner is important in ensuring success of ICT mediated learning. What target learners prefer counts not what administrator or educators prefer.

5.2. Deciding on the target learning domain

Although benefit on cognitive development or psychomotor development is not consistent depending on mode, course, specific type of ICT, group of learner and time spending, but benefit on affective domain is always consistent. Through all papers review show consistency in satisfaction in learning (Martin-dorta et al., 2011; Patterson, 2011; Raihan & Shamim, 2013a; Tsai, 2012; Ueno et al., 2004; Wang, 2010), enjoyment in lab session (Patterson, 2011) and management in teaching and learning become smoothly (Staric & Niskala, 2010; Y.-C. J. Wu & Huang, 2013; Yassin, Nordin, Rahim, Yunus, & Baser, 2014). Thus, the “feel good” factor can be further explored to support learning of the other domains.

Compared to the psychomotor domain, ICT integration seems to be more successful for the cognitive. However, this finding could be simply due to the quality of the technology being used in these studies that limits the capability of applications. More high-end technology such as those used for pilot and surgeon training may produce better outcomes for psychomotor skills development. Nonetheless in such cases, we have to really consider the cost-effectiveness of the integrations.

Overall, it can be said that ICT integrations is highly supportive of the affective learning needs which should be exploited further to facilitate cognitive and psychomotor skills development so that ICT integration can really be beneficial for TVET.

5.3. Deciding on integration mode

ICT integration in teaching and learning session, either blended or full mediation, is not really critical as indicated by this review although blended mode seems to dominate many implementations. All modes, be it fully blended, partially blended or supplementary seems to have its benefits and weaknesses depending on the combination of goals of integration (knowledge or skills) and design of implementations. This is supported by the finding from the US Department of Education on ICT indicate that blended or purely online are not superior from one other (Means et al., 2009). What seems to be important is that ICT is being used effectively – meets the needs of learners and objectives - in teaching and learning session with synchronous and asynchronous activities and participations from all sides, instructors and students. Thus, rather than being overly anxious to have a fully mediated mode or blended mode, use the mode that is feasible, encourage active participations of all concerns and meet the learning needs of students.

5.4. Tool/Material design

Irrespective of the type of applications, customized or market available; human-computer interaction (HCI) considerations and instructional design (ID) should guide the design of the applications to get the desired learning outcomes. HCI and ID knowledge must be carefully incorporated in addition to the knowledge gained from learning theories, principles to achieve the overriding goals of technology integrations in the classroom. Thus, designing ICT applications and integrations is dependent on innovativeness of TVET teachers while innovativeness is closely related to ICT competence and pedagogical competence (Loogma, Kruusvall, & Ümarik, 2012). Innovative teachers are commonly associated with who has a desire to innovate in teaching and learning session. Success of e-learning is dependent on how user interacts with the system. Interaction may increase with an appropriate design of the system. Thus, e-learning or ICT integration should embrace information design, interaction design and interface or presentation design (Jamalludin Harun & ZaidatunTasir, 2003).

6. Conclusion

This limited systematic review attempts to seek better knowledge on the status of ICT applications in the classroom in TVET. The limited study indicates that ICT is indeed being integrated in the TVET classrooms across disciplines as well as for diverse learners. Spectrum of applications include fully mediated, partially mediated and supplementary while the target learning outcomes were mostly cognitive in nature with very limited efforts at psychomotor skills development. In most cases, affective learning needs seems to be of concern to educators as they should be. ICT integrations in general has been shown to be relatively more effective for promoting learning of the cognitive domain and meeting the affective learning needs of learners but less so for promoting psychomotor skills development. Customized and market available applications seem to be equally favored by implementers. Highly obvious though, most applications do not seem to have clear instructional design principles influencing their designs. Thus in general, we have high expectations that are yet to be realized. Future concerns on ICT integration efforts should focus more on selecting the appropriate multimedia framework, guiding learning theories and instructional design, ICT tools for teaching and learning in TVET to ensure effective integration of ICT becomes a reality.

Appendix A.

Table 1 Summary of papers according to mode and aim of study.

Research	Mode		Aim of ICT integration			How the ICT integrate?		
	Blended	Fully mediated	Cognitive	Affective	Psychomotor	ICT integration without e-learning	e-learning	e-learning with virtual experience
Wang, (2010)		/	/	/	/		/	
Starcic & Niskala, (2010)	/		/	/	/		/	
Konak et al. (2014)		/	/	/	/		/	
Liu et al. (2007)		/	/	/	/		/	
Shen et al. (2011)	/		/	/	/		/	
Tsai, (2012)	/		/	/		/		
Y.-C. J. Wu & Huang (2013)		/	/	/			/	
Hamidah et al. (2012)	/		/	/			/	
Patterson (2011)	/		/	/		/		
Bhavani et al. (2010)		/	/		/			/
Wagner (2003)		/	/		/	/		
Toole (2011)		/	/		/		/	
Donkor (2010)	/		/		/	/		
Moudgalya & Arora (2010)		/	/		/			/
Sahin (2010)	/		/		/		/	
Irum Inayat et al. (2013)	/		/		/		/	
Kelly et al. (2012)		/	/		/		/	
Karahoca et al. (2010)		/	/				/	
Martin-dorta et al. (2011)		/	/					/
Ueno et al. (2004)	/		/				/	

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