Educational Technologies as Mediating Artefacts in Training and Instruction: A Disruptive Innovation for Expansive Learning?

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ABSTRACT

The premise of this study lies in the concept of mediating artefacts that are "integral and inseparable components of human functioning" and that "the focus of the study of mediation should be on its relationship with the other components of an activity system" Engeström (2001). Thus, this study is designed to explore the uses of educational technologies and their impacts as mediating artefacts in training and instruction on the elements of Engeström Activity Theory (AT) Model. It further inquires if the respondents' choice of educational technology is disruptive innovation for expansive learning. The study chose, by purposive sampling, 34 respondents: 28 are faculty members and trainers and 6 are Higher Education Institutions (HEI's) Administrators. It covered 3 countries such as United Arab Emirates, Oman, and Philippines. The study adapted the mixed method approach using Engeström (1987) Model of Activity Theory (AT) as its framework for research. The data gathering was done in 3 phases: Initial survey using the self-made questionnaire, Respondents' interview using semi-structured questions, and Final interview among 6 HEI's administrators. The interview transcripts were coded appropriately in relation to the key themes. Rank analysis, percentage of responses, and the themes derived during the interview were used to analyze the result of the study. Some of the key findings are: Mobile Learning is the first choice among the top 6 technologies used in training and instruction; the use of top technologies as mediating artefacts in training and instruction has direct impact on the elements of AT Model, particularly on Goals, Rules, Subject, Division of Labor, and Community; the impact towards expansive learning is not only limited to students but also to the faculty members and trainers; lastly, there is no concrete evidence to date that the use of educational technologies is a disruptive innovation for expansive learning.

Keywords: Activity theory, educational technology, expansive learning, disruptive innovation

Introduction

This study argues that the use of educational technologies as mediating artefacts in training and instruction has direct impact on the elements identified in Engeström's second model of Activity Theory. It further argues that these impacts necessitate understanding so as to identify the best role mediating artefacts play in training and instruction. It also theorizes that the use of educational technologies as disruptive innovation in training and instruction will lead to expansive learning. The result of this study will be used for the succeeding study on expansive learning.

The concept of mediating artefacts is grounded in a socio cultural perspective from authors like Vygotsky (1978) and Engeström (2001). Vygotsky argued that tools, signs,

symbols, among others are "instruments of psychological activity in a manner analogous to the role of a tool in labor" (Conole, 2013). Hence, Vygotsky's first model of the theory is on the concept of mediation. However, for Engeström's second model, mediating artefacts are "integral and inseparable components of human functioning." He also argues that "the focus of the study of mediation should be on its relationship with the other components of an activity system." (Engeström, 1999). Thus, the framework of this research, being a continuous and progressive study, is anchored on the concepts advanced both by Vygotsky and Engeström's second model.

The use of educational technologies in training and instruction is an innovation that is taking shape in higher education institutions today. Is this innovation purposely done to merely enhance teaching or disrupt students' access to learning? Apparently, most higher education institutions use technology for teaching enhancement purposes, unaware that they are disrupting students' access to learning. Powel, Olivier, & Yuan (2015) wrote clearly, "disruptive innovations present a challenge to higher education institution's existing systems, processes, and working practices." These challenges affect the institution's ability to serve its clients, sustain quality, and meet goals. In 2004 for example, Dublin City University's delivery of teaching was disrupted when "Moodle was successfully introduced so that by the end of the academic year, 70% of academic staff were using the VLE (Virtual Learning Experience)" in training and instruction (Blin and Munro, 2010). Soon, other Universities in the West followed. As these technological innovations continue to invade the education system, the theory of "Expansive Learning" found excellent tools for its use.

Expansive learning is initiated when some individuals involved in a collective activity take the action of transforming an activity system through reconceptualization of the object and the motive of activity, embracing a radically wider horizon of possibilities than in the previous mode of activity. People and organizations are all the time learning something that is not stable, not even defined or understood ahead of time (Engeström, 2001).

Most higher education institutions today, as predicted, are now gradually shifting from instructional paradigm to learning paradigm (Barr and Tag, 1995). This is evident by the presence of high impact practices in many higher education institutions like the use of collaborative projects, community-based learning, capstone courses, learning communities, etc. The shift in learning paradigm put the context of expansive learning more suitable to the present climate in higher education.

Purpose of the Study

The main purpose of this study is to explore the uses of educational technologies as mediating artefacts in training and instruction and to look into the impact of the use of mediating artefacts on the elements of Activity Theory towards expansive learning. Specifically, it aims to:

1. identify the top educational technologies used as mediating artefacts in training and instruction and whether these **have impact on the elements of Activity Theory (AT) identified in** Engeström (1987) model.
2. determine if the respondents' choice of educational technologies used as mediating artefacts in training and instruction is a disruptive innovation for expansive learning.
3. gather relevant information to be used for another study that is focused centrally on expansive learning.

Research Questions

This study will attempt to answer the following Research Questions:

1. What are the top educational technologies used as mediating artefacts for training and instruction by educators and training practitioners?
2. How are these educational technologies used as mediating artefacts impact the delivery of training and instructions in relations to the following elements of Engeström (1987) model: Objects (Goals), Rules (Assessments), Subject (Teacher), Division of Labor (Teacher, Trainer, & Support Staff), and Community (Student)?
3. Is the use of educational technologies as mediating artefacts of training and instruction a disruptive innovation in expansive learning?

Theory Used in Research

This study used Engeström (1987) model of Activity Theory (AT) of Expansive Learning as its framework. The model illustrates the theory that human beings do not interact directly with their environment. Instead, they use tools such as signs and codes and physical apparatus as mediators. Activity Theory argues that human actions are not a direct transmission between subject and object but are mediated through the use of (broadly defined) tools. "Activity Theory (AT) is a useful analytical lens because, it moves the focus of analysis from the technological tool to the way that tool is used by people to achieve a purpose" (Benett, 2010).

Engeström (1987) Model of Activity Theory as illustrated in Figure 1 (page 4) describes that the top most part of the triangle is called Mediating Artefacts (Tools). The "Subject" (Teacher or Trainer) and the "Object" (Quality Learning), the purpose of the activity is its main elements. The bottom row of the model features the Rules, the Community, and the Division of Labor as its nodes. "The Rules node represents the conventions and regulations shaping an activity (such as assessment). Community refers to those affected by the activity (like the students), and the Division of Labor node represents who does what in an activity, thereby illustrating both the distribution of tasks and the hierarchy of power" (Flavin, 2016). However, Flavin argues (2016) that there are some contradictions in the interaction of the nodes, and Engeström (1987, 2001) identifies these contradictions as significant for expansive learning. "For example, a lecturer (subject) works with students in order to achieve high-quality learning (object). Digital technologies (tools) can be used to facilitate the learning. However, if a new tool is available, over which the students (rather than the lecturer) have mastery, this may require new practices within the activity system for the object of high-quality learning to be accomplished, as observed by Scanlon and Issroff (2005), when they reported students helping a lecturer to display images via a laptop in the classroom.
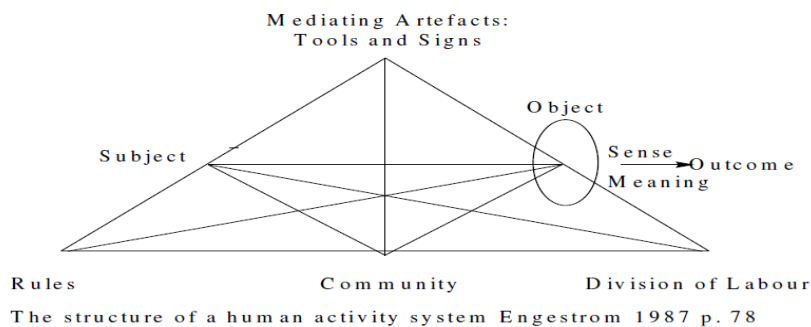
Mediating Artefacts:
Tools and Signs

Object

Subject   Sense →Outcome
               Meaning

Rules   Community   Division of Labour
The structure of a human activity system Engestrom 1987 p. 78

Figure 1: Engeström (1987) Model of Activity Theory

Literature Review

Disruptive Innovation in Education

"Disruptive innovation is a process by which a product or service takes root initially in simple applications at the bottom of a market and then relentlessly moves up market, eventually displacing established competitors" (Christensen, C. 2003). Christensen gave examples of mobile phone disrupting the traditional use of communication. Initially, Christensen and Boyner called it Disruptive Technology in their 1995 article, "Disruptive Technologies: Catching the Wave." In 2003, both Christensen and Raynor changed the term "disruptive technology" to "disruptive innovation," reinforcing the idea that the disruption is not an intrinsic design feature of the technology, but, instead emerges through practice (Grint & Woolgar, 1997). Christensen (1997) separates new technology into two categories: Sustaining, a technology that relies on incremental improvements to an already established technology, and Disrupting, one that lacks refinement, often has performance problems because it is new, appeals to a limited audience, and may not yet have a proven practical application.

"The educational world is particularly susceptible to disruptive innovation because it relies heavily on communication and technology" (Miller, 2004). Miller further asserts that "disruptive technological innovation has the power to change civilization's culture and its institutions, including higher education." The Babson Survey Research Group 2013 Report stated that 6.7 million students are taking at least one on-line course in the United States, and the growth is expected to be at 9% annually. In Asia, Singapore takes a lead in innovation as it hosts to many top performing education institutions in the world. "Investments in education technology have been a key part of Singapore's national plan for two decades and have been cited by some experts as a reason that the country has so much academic success (Kelly, 2015).

Are these innovations in education sustaining or disrupting the delivery of training and instruction? Seiring (2012) indicated that "improving lectures through better use of media and presentation techniques is the sustaining innovation". He further stressed, disruptive innovation of flipping the class and completely restructuring the use of class time to improve instructional goals is disruptive innovation. "The former improves upon existing approaches while the latter introduces completely new approaches while disrupting their underlying assumptions and behaviors" (Siering, 20120).

Expansive Learning

"Expansive learning is initiated when some individuals involved in a collective activity take the action of transforming an activity system through reconceptualization of the object and the motive of activity embracing a radically wider horizon of possibilities than in the previous mode of activity" (Engeström 2003). Gregory Bateson's (1972) distinguished the 3 levels of learning that support expansive learning. "Learning I refers to conditioning, acquisition of the responses deemed correct in the given context. Whenever Learning I takes place, Learning II is also going on as people acquire the deep-seated rules and patterns of behavior characteristic to the context itself. Thus, in classrooms, students learn the 'hidden curriculum' of what it means to be a student. Sometimes the context bombards participants with contradictory demands. Such pressures can lead to Learning III where a person or a group begins to radically question the sense and meaning of the context and to construct a wider alternative context." The theory of expansive learning develops Bateson's idea into a systematic framework.

Educational Technologies, Tools, and Strategies

The New Media Consortium (NMC) Horizon Report: 2015 Higher Education Edition identified 7 categories of technologies, tools, and strategies, in which it monitors continuously. These are: *Consumer Technologies* such as 3D Video, Electronic Publishing, Mobile Apps, Tablet Computing, Wearable Technology, etc*;   Digital Strategies* like Bring Your Own Device (BYOD), Flipped Classroom, Games and Gamification etc.; *Internet Technologies* including Cloud Computing, Internet of Things, Real-Time Translation, etc.; *Learning Technologies,* both tools and resources developed expressly for the education sector, such as Massive Open Online Courses (MOOC), Mobile Learning, Open Content, etc.; *Social Media Technologies* including Collaborative Environments, Crowdsourcing (Wikis), Social Networks like Facebook, Twitter, Instagram, etc.); *Visualization Technologies,* a growing cluster of tools and processes for mining large data sets and generally making the complex simple like 3D Printing, Information Visualization, Visual Data Analysis, etc.); an *Enabling Technologies* that have the potential to transform what we expect of our devices and tools like Mobile Broadband, Open Hardware, Virtual Assistants, Statistical machine translation, etc.

Research Methodology

Conceptual Model of Research

This mixed method study that is partly quantitative and mainly qualitative used Engeström (1987) model of Activity Theory (AT) of Expansive Learning as its framework for research. AT is particularly useful as a lens in qualitative research methodologies. "AT provides a method of understanding and analyzing a phenomenon, finding patterns, and making inferences across interactions, describing phenomena, and presenting phenomena through a built-in language and rhetoric" (Jeld et al, 2012).

Instruments and Data Gathering Procedure

A self-made questionnaire was prepared and distributed on line and some were hand-delivered personally. The objective of the questionnaire is to determine: the extent of participants' awareness of various educational technologies; if the use of educational technology as mediating artefacts aided or hindered its accomplishment; and how technology consequently affect the elements of the activity using Activity Theory model. The 7 categories of technologies identified in NMC Horizon 2015 report were used as choices for

the respondents. The questionnaire has a tick box option, and some statements are followed by open ended questions.

The data gathering procedure has 3 phases: Preliminary Survey, Follow- up Interview using semi-structured interview guide, and the Final Probing among selected HEI's (Higher Education Institutions) Administrators. The follow-up interviews were done either personally or through internet media. The interview transcripts are coded appropriately in relations to the key themes. The analysis centers in the use of the themes derived during the interview, and supported by rank analysis and percentages of responses.

Triangulation of Data and Sampling Technique

This study used triangulation technique. It used multiple data sources in the investigation to facilitate deeper understanding of the phenomenon. "The triangulation of sources examines the consistency of different data sources from within the same method" (Denzin, 1978 and Patton, 1999). Thus, the data were taken from 3 sources: United Arab Emirates (2 HEIs, 13 respondents), Sultanate of Oman (2 HEIs, 11 respondents), and Philippines (1 HEI and members of the Philippine Association for Teachers and Educators with 10 respondents).   Overall, 28 Faculty members & Trainers participated in the preliminary survey and interview, and 6 (HEIs) Administrators were further interviewed. Furthermore, Methodological triangulation was also used. This "involves using more than one option to gather data, such as interviews, observations, and documents" (Kennedy, 2009). The study collected the data from the following methods: Questionnaire in the initial phase of the research; Interviews in the second and third phase, and examinations of available documents in one HEI.

Purposive sampling was used in this study so as to focus on particular characteristics of a population that are of interest. This, in turn, provides the best information the study inquires.   The researchers purposely choose HEIs faculty members, trainers, and administrators in a survey as well as in interview. The respondents summarized in Table 1 include 8 nationalities: Philippines (18), India (4), Pakistan (3), Jordan (2), Canada (2), United States (2), United Kingdom (2), and Australia (1). Table 1 presents the respondents' profile.

Respondent's Profile

Table 1
Distribution of Respondents by Country and Their Position & Specialization

Faculty/Trainer by Specialization/Country	United Arab Emirates	Oman	Philippines	Total
Business	3	0	0	3
Education	1	0	6	7
Engineering	2	2	0	4
Information Technology	2	5	1	8
Language	2	2	1	5
Agriculture	0	0	1	1
H E I Administrators / Country				
Head of IT Department	0	1	0	1
Head of Computer Information System	1	0	1	2
Head of Section - IT	0	1	0	1
Head of Educational Technology	2	0	0	2

Total		13	11	10	34

Results, Findings, and Discussion

The Top 6 Educational Technologies Used as Mediating Artefacts for Training and Instruction

The survey conducted among 28 faculty members and Trainers showed that Mobile Learning is the top most educational technology used for training and instruction. All (100%) respondents used this technology. This is followed by Electronic Publishing, 89% (25/28); Bring Your Own Device (BYOD), 86% (24/28); Mobile Broadband and Flipped Classroom, both at 75% (21/28); Social media technology particularly Crowd sourcing with 64% (18/28), and ; Massive Open On Line Courses or MOOCS with 61% (17/28) respondents.

It is however, noted that while Electronic Publishing is used by all respondents in UAE and Oman, only 67% (6 out of 9) used this in the Philippines. Also, while Flipped Classroom, is used by all (100%) of the respondents in UAE and 89% (8/9) in Oman, only 33% (3/9) of this is practiced in the Philippines. The absence of Digital Course wares and Learning Management System in the HEI in the Philippines is the primary reason for this.

IT and Engineering faculty members leads the highest frequency in the use of educational technology. They are followed by Business, Language, Agriculture, and Education, respectively.

Table 2
Distribution of Respondents' Usage of Various Educational Technologies as Mediating Artefacts for Training and Instruction

Overall Rank	Educational Technologies	% of Users	United Arab Emirates		Oman		Philippines	
			Rank	% of Users	Rank	% of Users	Rank	% of Users
1	Mobile Learning (Learning Technology)	100	1	100	1	100	1	100
2	Electronic Publishing (Consumer Technology)	89%	1	100	1	100	3	67%
3	Bring Your Own Device – BYOD (Digital Strategy)	86%	1	100	4	67%	2	88%
4	Flipped Classroom (Digital Strategy)	75%	1	100	2	89%	5	33%
	Mobile Broadband (Enabling Technology)	75%	2	80%	3	78%	3	67%
5	Crowd Sourcing –Wikis (Social Media Technology)	64%	2	80%	4	55%	4	55%
6	Massive Open On Line Courses –MOOC (Learning Technology)	61%	3	70%	3	78%	5	33%

The use of educational technologies has an impact on the following elements of Engeström AT (1987) model: 2.1 Objects (Goals); 2.2 Rules (Assessments); 2.3 Subject and Division of Labor (Teacher, Trainer, & Support Staff), and 2.4 Community (Student)

Impact on Objects (Goals)

The main object (goal) of every activity in teaching and instruction is to ensure accomplishment of the course outcome that is properly defined by HE institution. It is, therefore, very crucial to determine if the use of educational technology as mediating artefacts aided or hindered its accomplishment.

Findings: The use of educational technology has direct impact on the course goals (objects) as it aids their accomplishment.

86% of the respondents supported this finding. 5 faculty members and the Educational Technology Head in one HEI in UAE articulated their observations.

Survey Result	
86% (24/28) agreed that the ***"use of educational technologies makes the goal of training and instruction easily achievable."***	
Support Narratives	
Business Faculty, UAE	Technology drives effectiveness in teaching. Teaching delivery has been enhanced. So the ***goal in teaching (training and instruction) is well attained***.
Business Faculty, UAE	It does improve quality of teaching and the teacher becomes effective as it ***facilitates the knowledge at efficient rate.***
Education Faculty, Philippines	***To achieve our goal***, it is imperative that teachers of today's generation ***should use technology*** in training and instruction
IT Faculty, Oman	It is useless to adopt a technology that will not help attain the goal of the course. So, ***we choose a technology*** that has truly ***helped attain the course's goals.***
IT Faculty, UAE	It is given that the quality of teaching has improved using various technologies. Therefore the ***objective of the course is easily achieved.***
Educational Technology Head, UAE	Our role is to make sure that the educational technologies we provide to our faculty members are not only up to date but are specifically ***designed to help attain the main objectives of the course.***

Figure 2: Summary of Findings and Support Narratives on Impact on Objects

Impact on Rules (Assessments)

The general purpose of course Assessments is to gather fair evidence to make a judgment about student's level of performance against the specified learning objectives. Thus, it is vital to ensure that assessments are done securely and fairly.

Findings: The use of educational technology has direct impact on Rules (Assessments) in at least 2 points as follows: the need to have extra security features in the assessments and to involve more people in the preparation and delivery of assessments

96% of the respondents supported the first finding and 83% for the second finding. 3 faculty members articulated their concerns and HEI's administrators from Oman and UAE explained the assessment security features.

Survey Result
• 96% (27/28) agreed that "*extra security features are needed" for on line assessments.*   • 83% (23/28) claimed "*it completely changed the way assessment is prepared."*

Support Narratives	
Extra Security Features:	
Head of IT, Oman	HoD and all HoSs see to it that the **college policy on plagiarism and academic integrity are discussed in the class**. At the same time, **staff are encouraged to use open-source anti-plagiarism utilities.**
Educational Technology Head, UAE	The use of **Lockdown browser during assessment is mandatory** for the students. This will prevent examinees from opening other websites during assessment; **Safe Assign is used as anti plagiarism tool** for projects and assignments submitted on line.
Language Faculty, UAE	This (technology) **changes not only the delivery of the assessments but even its preparation.** In today's "hacking age" one has to secure the assessment that are stored in our computer's drive, and I don't know if our IT people are doing it right.
More people are involved in the assessment processes	
Education Faculty, UAE	The preps for assessments are huge as you have to **constantly coordinate with a lot of people** – faculty teaching the same course, as well as EdTech people.
Language Faculty, Oman	This is a lot of legwork . . . you **need to be in constant communication with support staff and fellow faculty as well**.

Figure 3: Summary of Findings and Support Narratives on Impact to Rules (Assessments)

Other findings:

Despite of high percentages of uses of educational technology in training and instruction, yet 52% (15/28) of the respondents are still using mostly paper based assessment. The percentage of papers-based assessments for each country are as follows: Philippines (78% - 7/9), Oman (55% - 5/9), and UAE (30% - 3/10). The high percentage of paper-based assessments are in Education, Language, and Business departments. IT and Engineering faculty members have less paper-based assessments.

Impact on the Subject and Division of Labor (Teacher, Trainer, & Support Staff)

The Division of Labor works around the object of the activity, yet the object is much affected by the mediating artefacts. So how is mediating artefacts affecting division of labor?

Findings: The use of educational technology has direct impact on the Division of Labor as follows: there is a strong coordination and high frequency of consultation among people involved in the activity; and the social dimension, particularly on interactive communication among technology users, are common among respondents.

Definitely, 96% of the respondents support this observation. Also, 78% said that the frequency of consultation with colleagues and support of IT staff is needed. All (100%) faculty members of Business, Language, and Education need IT support while only 16% of IT and Engineering faculty members said they need such support. This finding collaborates with the second finding on Impact to Rules (See Figure 3).

The use of technology in training and instruction has its social dimension too. Technology mobilizes people for a purpose. Contrary to the notion that it isolates human being, technology has apparently connected more people at work. Evidence showed that the use of educational technology as mediating artefacts in teaching and instruction has provided better avenue among teachers, trainers, and support staff to talk, discuss, and resolve issues together.

Survey Result	
96% (27/28) agreed that "excellent coordination with all concerned people is a must."	
Support Narratives	
Education Faculty, Philippines	It promotes and enhances engagement and communication because the learning process has become interactive.
IT Faculty, Oman	Mutual consultation has become a byword
HoS of IT, Oman	It does not limit the social interaction but rather reinforce team work, better communication and collaboration. It allows the department to be more efficient in its various operations.

Figure 4: Summary of Findings and Support Narratives on Impact on Division of Labor

Impact on Community (Students)

This study focuses on the single element of the community, the students. Of all the elements of Activity Theory identified in Engeström (1987) model, the community is considered to be the forefront of the analysis as it concerns with many issues like the efficiency and the effectiveness of the whole activity, and not on the mediating artefacts only. For this study however, the analysis is only on the impact of educational technologies to students.

Findings: The use of educational technology has direct impact to the students as it aided the theory of expansive learning.

One of the areas in the theory of expansive learning is about "reflecting on new practice – teaching others what we have learned". This is also called Reflective teaching. 3 faculty members share their experience as shown in Figure 5 below.

Support Narratives	
Business Faculty, UAE	"I use the apps that show an interactive pictures of ice cream melting once its demand has reduced . . . Students input figures in their laptop and it showed how it affected demand and supply. This event triggers 2 things: one, so many questions were asked that I was so overwhelmed. We know that we are effective when students keep asking good questions; two, I posted a topic in LMS so that students can enter their inquiry. In the next hour, I am amazed of the thread of

	comments, arguing among themselves."
Business Faculty, UAE	"I asked my students to do "self-assessment" using an on line tool to find out the level of needs they have, using Maslow's Theory of Needs. Some students were at first reluctant. Minutes later students got a feedback on line. The website explained the level of needs a person looks for. So, I asked the students to try to compare their needs with others. It was very noisy class, but I just let the class to stay that way. The discussion among students were intense. There was a debate among themselves. I facilitated the arguments. At the end of the session, group of students came to my desk, telling me that they have understood Maslow's Theory better now than before. One student even said, I know now why some people in our organization behave that way"
Language Faculty, Oman	"Some students are really good in the use of technologies and they are helpful to their classmates. Seeing my students teaching others was a bit shocking to me at first. Unintentionally, peer teaching is happening in the class!"

Figure 5: Summary of Findings and Support Narratives on Impact on Community (Students) towards expansive learning

The narratives shown in Figure 5 are evidence of the usefulness of mediating artefacts towards expansive learning. However, this may not be true to all. The technological aspect of training "should not fall on the teacher to educate them", a Business faculty from HEI in UAE said. "The problem sometimes is that there are students who are not really prepared and so our tasks had been added and it slows us down to get to the core", she added.

The use of the top 6 educational technologies is inclined towards sustaining rather than disrupting innovation for expansive learning.

An overwhelming 93% of the respondents observed that the use of educational technologies is sustaining innovation in training and instruction. Educational technologies are merely "tools" and have not replaced the traditional delivery of teaching.

Survey Result	
93% (26/28) agreed that the use of educational technology, "has not replaced the traditional method of delivering training and instruction."	
96% (27/28) agreed that the use of "educational technologies has primarily improved existing teaching approaches through various presentation techniques in the class"	
Support Narratives	
Language Faculty, Oman	Technologies are there to support teaching. Maybe it is more efficient than old methods but we also do the same principles in teaching delivery such as motivating the students, assessing them, identifying who are progressing well and those that are at risks. So nothing has changed since I taught many years ago.
Engineering Faculty, UAE	Educational technologies are just tools for learning, and it is still up to the instructor to choose whatever tools he or she deems best for the situation. Even way back, we used old crude tools in learning, but it did not limit our knowledge of the course.

Figure 6: Summary of Findings and Support Narratives on Use of 6 Educational Technologies as Sustaining Innovation.

However, for the use of Flipped classroom and MOOCs, respondents have different views from the other 4 technologies. 86% of the respondents agreed that these 2 technologies are disruptive innovations but further inquiry provides limited support statements for this finding.

Survey Result	
86% (24/28) agreed that Flipped classroom and MOOC's have introduced new approaches by restructuring class time to improve training and instruction	
Support Narratives	
Language Faculty, Oman	"Flipped classroom is good because teaching modalities is at the pacing of the students and teachers. So the students look at the course calendar and work around it."
Business Faculty, UAE	I taught a Project Management class at a College which was joined in from the outside by a male student through Zoom videoconferencing . . . using Zoom meant extra class preparation and having a change in course delivery, but it helped the students a lot."
Business Faculty, UAE	"The flipped classroom as a strategy is about making use of your time productively. This benefits both the faculty and the students."
Other Observations	
Business Faculty, UAE	"The flipped class will be better only if students also do their part of reading and studying on their own and in advance. The flipped classroom would probably work better for course with many practical components.
Head of IT, Oman	"There is no institution-wide rule or policy regarding flipped classroom in the college. Teachers have the "authority" to determine the mechanics on how they will utilize this method in their class."
Head of EdTech, UAE	"Flipped class has to be regulated as it also tends to be abused by the faculty members and students."

Figure 7: Summary of Findings and Support Narratives on Use of Flipped Classroom as well as some Major Observations

Other Findings

The use of educational technology provides an avenue for Expansive Learning among faculty members and trainers.

"Educational technology leads to sharing of best practices and ensuring common practices within the same course. For example, I have run several peer-training sessions in my college, to share my knowledge of the SoftChalk Content Authoring Tool with other teachers." (Business Faculty from UAE HEI). The EdTech Head in UAE also supported the idea that "as trainer, we learn from each other. We learn from each other's mistakes too."

Teacher's expertise in the use of educational technologies in training and instruction does not make one a proficient teacher.

Proficiency in the use of technology is different from being proficient in teaching, the Head of IT in HEI in Oman said, "the use of technologies depends on the course or subject

matter. It means that there are courses that are better taught in more traditional "rote learning" method, such as programs in medical areas (one really needs to memorize heavily in these fields). However, there are also courses that I believe are best taught using technologies in order for students to have a more experiential learning." Another IT faculty member from Higher Education (HE) in Oman cautioned, "If a faculty member is behind in the use of these technologies, his teaching may not be effective anymore to some technology-conscious students." Another IT Faculty member from the Philippines has this to say, "Using e-learning technologies helps students explore more knowledge at their own pace". "The need to adopt and adapt the existing trend in educational technology is imperative", an Education faculty from the Philippines concluded.

Conclusion

This study has found overwhelming evidence that the use of Educational Technologies as mediating artefacts in training and instruction has direct impact on all elements identified in Engeström second model of Activity Theory. HEIs with readily available IT infrastructures and Technology training support have higher frequency of technology use among faculty members and trainers. The following conclusions are further derived:

1. On Educational Technologies
    While the uses of these technologies have provided quality deliveries of training and instruction as they aided the accomplishment of the course goals, these, however, are not maximized by the institution towards expansive learning. There is limited evidence (only 11% - 3 out of 28) to show that these aided expansive learning, nor did these disrupt the way learning is accessed. Faculty members and trainers used these technologies merely as a "tool", implying that nothing has changed in the way the course deliveries are done as compared in the past. The use of technology in assessments is staggering low, 52% are still paper-based. It is apparent that the training among faculty members and trainers is focused on the delivery of technology in training and instruction, instead of making use of technology as a means to expansive learning. On the lighter side, the uses have provided a vibrant social dimension, instead of isolation among the members of Division of Labor.

2. Flipped Class
    The flipping of the class is not well defined, lacking institution protocol thus tends to be abused by both the students and faculty members. There is no institutional definition as to how many percent of the class should be on-line or on a face-to-face meeting. Furthermore, some evidence suggest that some students are not prepared for flipping as they do not make advance reading, nor are acquainted well in the use of educational technologies. This affected the "Rules" identified in AT Model.

3. Disruptive Innovation in Expansive Learning
    There is no evidence to prove that the use of educational technology as mediating artefacts in training and instruction is a disruptive innovation for expansive learning.

4. The use of Engeström (1987) Activity Model in this research has provided an excellent framework for the succeeding study on expansive learning.

Recommendations

Engeström (2001) uses the notion of expansive learning as a "developmental, interventionist tool in workplace learning (to change practice). In expansive learning, learners construct a new object and concept for their collective activity, and implement this new object and concept in practice." So this study recommends the following:

1. For HEIs to successfully shift from Instruction to Learning institutions, the use of educational technologies as mediating artefacts in training and instruction should not be limited to a sustaining innovation in the system. While mediating artefacts are not alone affecting expansive learning, their use, however, plays significant transformation in the learning process, both by the students and faculty members. Educational technologies should be used, as an interventionist tools, to explore new ideas and new objects. The focus of training should be on this aspect.

2. For the use of Flipped Class in training and instruction, HEIs should have institutional policies identifying among others: percent of online class, nature of the course, types of students, support systems, etc.

3. For the Researchers, there is a need to further probe the expansive learning theory, focusing on the students (learners) as respondents of the study is vital.

"A college is an institution that exists to produce learning. It is both needed and wanted. We now see that our mission is not instruction but rather that of producing learning with every student by whatever means work best" (Barr, Tag, 1995).

List of References

Barr, R., Tag, J., (1995) From teaching to learning. A new paradigm for undergraduate education. http://www.maine.edu/pdf/BarrandTagg.pdf. Retrieved 12 June 2016

Bennett, L. (2010), Activity theory: What does it offer elearning research? University of Huddersfield repository, http://eprints.hud.ac.uk/10631/. Retrieved May 15, 2016

Christensen, C., Aaron, S., & Clark W.(2001), http://er.educause.edu/~/media/files/article-downloads/erm0313.pdf . Retrieved 15 May 2016.

Christensen, C. M., & Raynor, M. E. (2003), The innovator's solution: Creating and sustaining successful growth. Cambridge, MA: Harvard University Press.

Conole G (2013), Designing for learning in an open world.

Denzin, (1978) and Patton, (1999). http://www.qualres.org/HomeTria-3692.html. Retrieved 29 May 2016.

Flavin, M. (2016), Disruptive Conduct. Innovations in Education and Teaching International (Vol. 53, Issue 1, 2016)

Flynn J. (2013), Christian Educational Journal: Spring 2013; 10, 1; ProQuest Central

Grint, K., & Woolgar, S. (1997), The machine at work: Technology, work and organization. Cambridge, MA: Polity Press.

Kennedy, P. (2009), How to combine multiple research options: Practical Triangulation http://betterevaluation.org/evaluation-options/triangulation. Retrieved 31 May 2016.

Miller, M.R (2004), The Millennium Matrix: Reclaiming the Past.

Model Used Figure 1 Credit: https://pquesada90.wordpress.com/2014/12/09/what-is-a-disscourse-community/)

NMC Horizon Report: 2015 Higher Education Edition.

Powel S., Olivier B, Yan L, (2015), Handling Disruptive Innovations in HE: Lessons from two contrasting case studies. Research in Learning Technology.

Siering, G. (2012), Disruptive Innovation in Teaching and Learning. Center for Innovative Teaching and Learning. Indiana University Bloomington.

Vygotsky, L. S. (1978), Internalization of higher psychological functions. In M. Cole, V. John-Steiner, S. Scribner, & E. Souberman (Eds.), Mind in society – The development of higher psychological processes (pp. 52–57). Oxford: Harvard University Press.

Walsh Kelly (2015), Emerging educational uses of technology that are the most exciting right now.

Weibell, C.J. (2011), Principles of learning: 7 principles to guide personalized, student-centered learning in the technology-enhanced, blended learning environment [https://principlesoflearning.wordpress.com]. Retrieved 29 May 2016.