

Factors Influencing the Skill Development in the Skill based Training Program Learning Environments : A Literature Study

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Abstract—Learning is a process of receiving knowledge or skill. Skill-based training programs are more focused and are aimed for a level of expertise at the end of the course or certifications. IT certification / training programs ensure the technical competence of IT professionals. With this inspiration, there are many manufacturing industries initiating certification, training programs, crash courses, but how far these are mature enough to provide expertise and skill-level is a question mark. An operation model is necessary construct skill based training program with the factors influencing the student's acceptance and better learning. This paper discusses literature study conducted to identify the factors influencing the skill development in the skill based training program learning environment.

Keywords-e-learning, skill based training, learning model, multimedia

I. INTRODUCTION

The innovative exploitation of information technologies and communication promises to improve the quality, flexibility and effectiveness of education. The recent developments have got enormous potential to provide an effective learning environment. Information technology revolution creates extensive changes in the learning methods. Integrating IT applications to educational courses is one of the most important results of this revolution [1]. The new trends, changing economy and changing technology invites talented workforce to meet their organizational goals. Skill-based training guarantees continuous supply of skilled workforce to meet the ever-changing environment. In skill-based trainings, each training program has the specific focus to equip employee with a specific skill. Skill based training programs require clear instruction to make a learner understand the theoretical concepts and the practical aspects of the study. The environment must be designed in such a way to give chance to apply the theoretical concepts through hands-on or opportunity to apply them on a problem and test its functions. To construct such a learning environment, it is very necessity to identify the factors influencing the skill based learning with respect the user acceptance.

II. THEORETICAL BACKGROUND

a) Skill-Based Training and its importance

A good education gives both: one (knowledge) giving the other (skills) contexts to develop. Many researchers found that learners remember more effectively when they use skills to access, process and express their knowledge [2]. Findings indicate that good foundations for skill-based training and learning are teaching, assessing, planning, group work, creativity, enquiry, evaluation and self-confidence. Additionally skill-based education proved highly productive in a hands on environment and in an interactive approach [3].

b) Need for skill based training

Many IT industries are looking for trained hands as employee and they've almost made it mandatory nowadays. They also expect the skill to be directly linked to business results. Especially in the IT field, skill-based training is compulsory for all new hands to support the rapid changes in the technologies [4]. When the training is not part of the mainstream activity, it will get a secondary treatment. Failing to update the skills ends with hunting a new job or losing the position in the company. This situation has created a high demand for skill-based educators.

c) Challenges in conducting skill-based training program in e-learning environment

Compared to traditional instructor-led training, computer-delivered training classically offers learners more control over their instruction. A proper system developed in an institution or academy which is delivering the skill training will be a best practice than the individual practices [5]. Creating a learning environment with the enhanced features such as high interactivity, active feedback about learning, proper curriculum with the pre-defined objectives and goals, enhanced assessment techniques like knowledge assessment, performance assessment, and a simulated environment to give the similar feeling of real time tool/hardware/software environment is quite complicated[6]. This environment setup cost more and requires lot of expertise to develop, manage and maintain learning situation.

III. PROBLEM STATEMENT

Industries are looking for more focused and skilled people to achieve their goals, and global expansion of their business. Standardizing the procedures and practices will help a company to grow enormously. IT equipment's and software development industries are promoting and encouraging a structured learning practice to support their product and global market acceptance. Creating knowledgeable hands of their products by providing a structured education system makes them manage and maintain the products and software better. So a high need of training environment which could contribute in easy, better and acceptable learning environment by learners.

IV. METHODOLOGY

This section focuses on the Research Methodology followed in this paper. More than two hundred research articles were reviewed carefully, and analyzed to identify the influencing factors. Journals and articles based on learning theories, learning methods, multimedia based learning, e learning environments, e learning maturity modes were considered for this literature study.

V. LITERATURE REVIEW ON THE EXISTING MODELS AND THEORIES FOR LEARNING

Most of the training program follow the multimedia based learning, but it will be effective if it could be followed the following learning theories for an effective learning outcome and long-term retention.

- Cognitive load theory of multimedia learning [7]
- Cognitive theory of multimedia learning [8]
- Experiential learning [2]
- Discovery learning [9]
- Problem based learning [10]

Learners' instructional material has a great influence from Cognitive Load Theory. The instructional delivery should try to decrease extraneous load, and enhance germane load, but the learner's capacity intrinsic load which is unpredictable and cannot be altered by any instructional design. These theories make the learners attach them with the learning content by means of association, experience, reducing distraction, repetition and these factors move the learned content from active processing to long term memory and support them in retrieval of information. A computer based learning environment has all these components, characteristics and capabilities to provide this way of learning experience. This section attempts to describe the literature review, which was widely done to identify the indicators from research articles, peer-reviewed journals, conferences and other research repositories. From the literature the following components have been found very influential in a skill based learning environment and their aspects are given bellow.

a) Resource Based Learning

The most important feature of computer based e-Learning study is study material. Students' learning material is stored on

a storage device, which is accessed locally, or from a network environment. The information kept in the digital format could be accessed anytime and anywhere if it is put on the network. This facility improve learning and self-learning capabilities [11]. Students prefer different learning styles such as Visual/Verbal, Audio/Verbal, Visual/Non Verbal and Tactile/Kinesthetic [12]. The more appropriate style they choose the more association and understanding of the topic will take place [13] and convenient the whole learning process. Students learning could be easier, when material such as Practical Activity Sheets, Lab Manuals, and Step by Step technical guides to proceed without wasting time [14].

b) Learning Methods

Video and conferencing tools have been introduced in skill based learning environments to faster the learning. When skill based training need to be conducted for a mass where equipment could be simulated or provided access through remote network. Simulation-based Training provides a less expensive, repeatable practice sessions, safer, more efficient, immersive [15] approach in education. Problem-based learning (PBL) and inquiry learning (IL) are more appreciated but when they are minimally guided exercises lead to defeat the purpose and losing interest on the topic.

c) Interactive Learning

Collaborative learning benefits a learner in Increased cognitive analysis and problem solving skills, Team building, Improved results, Increased student retention, Enhancing student satisfaction and promoting positive attitudes, Improved verbal skills, Improved social skills, Promoting self-esteem, Improving cross cultural understanding etc. With the research review it is found that it is well suited for new generation learners, where they are connected with a human network [16]. Peer Interaction allows the students to interact with their class members, to discuss and clear their doubts. An eLearning instructional environment, with featuring online communication tools such as e-mail, chat rooms, and instant messaging encourage learners to discuss about the topic delivered by the instructor or interacting expert or learned by them and give them a feeling they are not alone (isolated) [17].

d) Assessment Strategies

Learning outcome would be better when proper assessment techniques are adopted during the learning process [18]. Conducting the time bound study will influence the learning attitude of a learner. Creating environment to submit the reports and assignment online will help the students to prepare their work digitally and submit to the instructor. Creating such medium could create a learning pressure and make the student understand the importance of time and deadlines. Students learning's must reflect in critical thinking, analyzing, and making interpretations with real situations. Formative assessment, Summative assessment is the end exam conducted for a learner to promote him or her for next course or level. Therefore, in skill-based trainings, if a training program specification describes a certain level of skill, and the learner does not have that required level of skill yet then the training

program should help to develop the required level and allow for lots of practice of the skill within the required context [19].

e) *Learning Indicators*

Students’ Progress Report supports the student to plan their study strategy. Further grade books help educators to know the learner progress and attitude towards learning; in other way it enables the educator to evaluate the effectiveness of teaching. Learners could see their cumulative, summative, assignment and other activities scores on a single page known as grades, which could allow them to know where to improve and make their own strategy in preparation [14].

Approximately 33 indicators are identified in this details literature study and it is listed below with their references. The mentioned indicators have been cited in various research articles and many researchers have commented on the importance of such indicators with respect to the positive acceptance of Skill-Based Training Program, and Multimedia Supported E-Learning Environments.

VI. INDICATOR TABLE WITH REFERENCES

The indicators collected from the literature which is tabulated in the table 1 as shown below

TABLE 1 SKILL DEVELOPING FACTORS

S.No.	Variable Name	References
1.	Study Material Availability	[20], [11], [21], [22],[23], [24].
2.	Varied Study Material	[12], [25], [26][13],[27], [8].
3.	Repeatable Instruction Delivery	[28], [29],[30].
4.	Compatibility of Platforms	[31], [32], [33].
5.	Multimedia Based Learning	[12], [34], [23], [35],[36].
6.	Structured Learning Content	[37][38], [39],[39].
7.	Skill Supportive Material	[37], [14], [40], [41].
8.	Reference Material	[42], [43], [44], [36], [45], [21].
9.	Face-To-Face Course Delivery	[46],[47],[48],[37], [49].
10.	Simulation Based Learning	[50],[51], [43], [52], [15],[11].
11.	Demonstration Based Learning	[43], [37],[11],[53], [49].
12.	Problem Solving	[54], [55], [40].
13.	Non-Interactive Remote Class	[37], [56],[57], [58],[51], [59].
14.	Collaborative Learning	[60], [61], [62], [63], [16],[16].
15.	Customized Learning Environment	[64], [65], [24], [14], [66], [67].
16.	Conference Learning	[21], [68] ,[37], [69].
17.	Peer Interactivity	[70],[71], [17], [44], [37].
18.	Expert Counseling	[72],[48], [73], [72],[74].
19.	Student-Faculty Communication	[75],[76],[77], [78].
20.	Online Submissions	[18],[79], [80], [81].
21.	Practice Assessments	[82], [83], [19].
22.	Skill Based Assessments	[84], [85], [86].
23.	Descriptive/Objective Type Assessments	[87], [88], [18], [34], [89].
24.	On Field Assignment	[90], [91], [92].
25.	Prior Intimation About Exam	[1], [93], [94], [81].
26.	Results With Description	[95], [86], [96], [97].
27.	Course Progress Status	[98], [99], [100], [101].
28.	Performance Report/Grade Book	[102], [86], [81], [14].

29.	Course Feed Back	[103], [104], [76].
30.	Award/Appreciation On Completion	[105], [106], [107].
31.	Intimation About Opportunities	[14], [108], [109].
32.	Provision of Internship	[110], [111], [112].
33.	Intimation Of Course Updates	[113], [14], [114].

VII. LITRATURE VALIDATION OF THE SKILL BASED TRAINING PROGRAM LEARNING ENVIRONMENT INDICATORS

The importance and reliability of the identified variables listed above can be realized by some extensive research done earlier. The following paragraphs summarize the research work and outcome of some researchers who have earlier done similar work:

(B. H. Khan, 2001)

B.H Khan developed and published the eLearning strategies during the year 1997 - 2001 to establish a successful eLearning model and its evaluation methods [115].The indicators/factors highlighted by Khan’s model were, Institutional, Pedagogical, Technological , Interface Design, Evaluation, Management, Resource Support, and Ethical. These 8 factors represents variables such as academic affairs, student services, learning environment, infrastructure, design approach, analysis, legal issues, information accessibility, navigation, assessment, content design, media analysis, audience analysis, learning material, online support, interaction. These are 17 out of 33 indicators identified in earlier section, hence adding credence to the research work done this far.

(Stephen Marshall & Mitchell, 2002)

Stephen Marshall & Geoff Mitchell from University Teaching Development Centre Victoria University of Wellington, New Zealand developed a maturity model framework which is based on the Capability Maturity Model (CMM) [116]. The eLearning model was constructed with the indicators, which are covering a wide spectrum of learning and management strategies. Teaching goal, assessment, references, pedagogy, delivery methods, tracking, technical pedagogical support, course status, course progress and structured course content. These are 11 out of 33 indicators identified in earlier section, hence adding credence to the research work done this far.

(Manford & Mcsporran, 2003)

According to Manford the effectiveness and maturity of any organization’s business processes directly affects costs and quality of the goods and services they deliver to their customers. Specifically, it proposes a Maturity Model (MM) that could be used to measure the organizational maturity with respect to the development and delivery of eLearning solutions [117]. This model developed keeping in mind the aspects such as: student support, delivery of learning material, instructional design, and project based learning, reward and appreciations, opportunities, students’ and performance indicators. These are 7 out of 33 indicators identified in earlier section, hence adding credence to the research work done this far.

(Neuhauser & Charlotte, 2004)

Neuhauser's OCDMM Online Course Design Maturity Model was formulated from the capability maturity model (CMM) [116] for software. This model was constructed to improve the key processing areas of the eLearning environment such as Components and Appearance, Individualized and Personal, Use of Technology, interactivity and finally, assessments [6]. These are 13 out of 33 indicators identified in earlier section, hence adding credence to the research work done this far.

(Bersin, 2005)

Bersin & Associates involved in a research and released a report during 2005 with a four-stage e-learning maturity model to enable and implement a successful e-learning environment. The research report, was based on the results of 526 interviews with HR managers and reviews[57]. The model highlighted by period of course, cost, catalog for marketing, Learning Management System, Web based material, Simulations, instructor lead program, audio-video support, references, content management, customization, feedback, assessments, and collaboration facilities. These are 11 out of 33 indicators identified in earlier section, hence adding credence to the research work done this far.

(Chao, Saj, & Tessier, 2006)

Tracy Chao from Centre for Teaching and Educational Technologies at Royal Roads University in Victoria, British Columbia, Canada involved in developing a framework to identify a quality review procedure for online courses evaluation. The framework consists of six independent but interconnected components. These guidelines consist covers Institutional support , Course development and instructional design , Teaching and learning , Course structure and resources , Student and faculty support , Evaluation and assessment , Use of technology and E-learning products and services. These are 9 aspects out of 33 factors identified in earlier section, hence adding credence to the research work done this far.

(Mitchell, 2007)

S Marshall, from Victoria University of Wellington, Wellington, New Zealand and G Mitchell, from Queensland University of Technology, Queensland, Australia both has developed the e learning Maturity Model during the year 2002. Which was more popularly known as a The E-Learning Maturity Model[118]provides a means by which institutions can assess and compare their capability to sustainably develop, deploy and support e-learning.

(Chang, 2008)

Vanessa Chang from Curtin University of Technology, Australia, who developed an evaluation Instrument for E-learning Ecosystem during 2008. This model focuses on Access, Interaction, Response and Results to evaluate e-learning systems. These are 4 out of 7 factors identified in earlier section, hence adding credence to the research work done this far.

(Ireland, Correia, & Griffin, 2009)

Jennifer from University of Western Sydney, Sydney, Australia has introduced and described the features of a new e-learning quality framework developed for a large multi-campus university during 2009. The framework is explicitly designed to improve the learner-centered pedagogy, Assessment activities and feedback processes, Student interaction and engagement, Quality online resources and supports and Academic management of site of a high standard that benefits student learning[119]. These are 9 out of 33 indicators identified in earlier section, hence adding credence to the research work done this far.

(Xie & Guo, 2010)

Xie from College of Humanities and Social Sciences, Nanjing Forestry University Nanjing, China developed an student satisfaction model (SSI) where satisfaction of the e learning students measure [120]. This model has been designed to improve the satisfaction level of the learner. Research results identified as teaching resources and teaching equipment, technological aspects of environment create an effects on student satisfaction namely Academic level, Good results, Practice ability, Teaching materials, Teaching equipment, Teaching atmosphere, Expectation Importance, Emotions Credibility, Recommendation, and Complaint[120]. These are 10 out of 33 indicators identified in earlier section, hence adding credence to the research work done this far.

(Gu, Chen, & Pu, 2011)

Dan GU, from School of Vocational and Further Education, Yunnan University Kunming, P. R. China has developed an e learning model and maturity evaluation framework based on the CMM [116]principles. It has been developed to give guidelines to institutions that engaged in adult education to meliorate the implementary process, so that the implementation quality of online course will be improved. This maturity model concerned about the overall instructional design, supplied resources and combination, Teaching-learning process, monitoring evaluation, and implementer management aspects. Online Course Quality Maturity Model Based on Correspondence University and Educationist not only for assessing the implementary quality of online courses in Evening University and Correspondence Education, more importantly, it can guide the institutions that engaged in adult education use of online courses to meliorate implementary process, so that to improve the implementation quality of online course. These are 5 out of 33 indicators identified in earlier section, hence adding credence to the research work done this far.

(K. U. Khan & Badii, 2012)

According Khan from National University of Sciences and Technology (NUST), Pakistan, using Internet as an e-Learning delivery system has created a new concept, and new initiative in the mind of business market stakeholders as well as the education institution of Pakistan, further e-learning has provided a platform through which university has reached out of their geographical boundaries[121]. The new model consist

of the Khan’s 2001 model for e-learning with the new components to support institutional aspects, pedagogical aspects, Ethical aspects, management aspects, technological domain development, and infrastructure planning that to especially wireless. These are 7 out of 33 indicators which are supporting learners perspective are identified in earlier section, hence adding credence to the research work done this far.

(Farajollahi et al., 2013)

Farajollahi developed an evaluation model for e-learning in higher-education in Payame Noor University, Iran. This pattern is mainly proposed for designing, performance and evaluation of the E- learning purpose[98]. Further the learning model focused at the organization level and general aspects such organizational support, management, technology usage - designing e-learning environment, ethic and legal Consideration, interaction, support services, and assessment factors. Further the model’s choices include dimensions like: student evaluation, institution evaluation, interaction between instructor - learner, interaction learner - learner, interaction learner -content, pay attention to personal differences, base and learner services. These are 15 out of 33 indicators which are supporting learners perspective are identified in earlier section, hence adding credence to the research work done this far.

This section discussed about the existing e-learning models and few maturity frameworks to evaluate the maturity of the e-learning model since 2001. The indicators identified through the literature and the teaching experience is tabulated in table 2. This summery table could help and contribute to the existing knowledge in enhancing the learning experience and better leaning.

TABLE VII : SUMMARY OF 33 INDICATORS IDENTIFIED FROM THE LITRATURE

Indicators	(B. H. Khan, 2001)	(Stephen Marshall & Mitchell, 2002)	(Manford & McSparran, 2003)	(Neuhauser & Charlotte, 2004)	(Bersin, 2005)	(Chao, Saji, & Tessier, 2006)	(Mitchell, 2007)	(Chang, 2008)	(Ireland et al., 2009)	(Xie & Guo, 2010)	(Gu et al., 2011)	(K. U. Khan & Badii, 2012)	(Farajollahi et al., 2013)
I1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
I2	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓
I3	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓
I4				✓	✓	✓	✓	✓	✓	✓		✓	✓
I5		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓
I6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
I7	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓
I8		✓		✓	✓	✓		✓	✓	✓		✓	✓
I9				✓	✓	✓	✓	✓	✓	✓		✓	✓
I10	✓			✓	✓	✓	✓	✓	✓	✓		✓	✓
I11	✓	✓					✓	✓	✓	✓		✓	✓
I12	✓		✓	✓			✓	✓	✓	✓		✓	✓
I13								✓	✓	✓		✓	✓
I14	✓	✓		✓	✓		✓	✓	✓	✓		✓	✓
I15	✓			✓	✓			✓	✓	✓		✓	✓
I16													
I17	✓	✓						✓				✓	✓
I18													
I19	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
I20													
I21	✓	✓							✓			✓	
I22				✓	✓	✓	✓						
I23				✓	✓	✓	✓	✓	✓				
I24	✓											✓	✓
I25													
I26				✓			✓	✓	✓	✓			
I27		✓									✓		
I28	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
I29	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
I30	✓		✓					✓	✓	✓	✓	✓	✓

I31				✓									
I32													
I33													

VIII. CONCLUSION AND SUGGESTION

Learning of skills through a particular course is depends on the course delivery. In general, a training process follows the following sequence to structured training process they are: needs analysis, design, development, implementation, and evaluation. In a learning process, the program must be developed in such a way to full fill the learning objectives like knowledge, skills and attitude. Instruction delivery takes a major role in building strong cognitive and behavioral changes within a learner. Delivery methods such as demonstration, discussions, computer based instructions, virtual reality technique, simulation based instructions and role-play lead to impact on the knowledge, attitude and skill development. These collectively affect the learner’s attitude. In a skill based learning environment the focus is on skill development and competency level. At the end of the skill based training it is expected a learner to attain a level of competency with in a period.

Learning through the electronic media, online is becoming more convenient these days, this learning style help a learner to do his studies regardless of time, place. A well-organized computer based and online supported learning environment is cable of giving the impact of learning in 100% in person experience. Computer based/ e-learning is conducted with many aspects some are reading purpose, some are for learning new skills and knowledge development and some cases they are mandatory to get some certification to demonstrate special skill. Electronic, computer based course delivery follows standards to maintain the delivery of content in different environment.

Conducting a skill based learning required lots of planning and structured approach in building environment with many features, which could give high interactivity. Deliverable through Internet, intranets, extranets, satellite broadcast, audio/video tape, radio, interactive television, and compact disk read only memory. When learning content delivered through electronic media, text based curriculum gives a monotonous experience to students. A multimedia based learning environment and content could fill in this gap to make the learners feel, experience, associate the learning concept. Multimedia-based learning provides a multi-sensory approach and makes the learner to associate or orient the content as per their convenience of media.

Learning through multimedia gives a better orientation in the learning process, which influence long-term memory of learner. This environment have the capability of delivering content in different formats, conducting online assessments, simulation based learning, expert interaction, enormous reference material through online community. These facilities capable of making a learner engaged with the learning activity. There are many motivational factors for joining skill based training programs it could be enjoyment, community development, payoffs, and social motivations so a learning

environment must provide and server all these purpose of learning.

E-learning environment is a platform to give knowledge beyond the classroom, so it needs to be scalable, interactive, secure, interchangeable between platforms, supplementary and comprehensive. E-learning environment needs assessment techniques to identify its strengths and weakness. These techniques help the institutions to take appropriate steps to fix the issues, improve the environment more towards learning, and conduct the course with a high level of maturity. Therefore, it is necessary to follow a process model to attain such higher lever of course delivery. There many models exist to measure the maturity of software development process such as CMM, ISO, SPICE, DPMM etc. Many researchers tried building e-learning maturity framework based on the software process model. e-MM is a popular model followed to measure the maturity of e-learning environment. The above identified indicators are theoretically very strong and these could be implanted on a framework to create a maturity model. This model could be used to measure the maturity of a skill based learning environment in learner's perspective.

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