Distance Learning Trends from a Researcher Point of View

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Abstract — This paper aims to help HR Practitioners thinking about the status of research on distance learning. We have done a review of various papers on distance learning and have identified several research areas that are fast emerging. This paper reports those areas. In this paper we also ask question where the research is heading in these particular areas.

***Key words*:** distance learning, e-learning, education, hr practices, industry.

I. Introduction

The past decade has seen huge increase in courses of distance learning (DL) in education and industry[1]. This growth in new methods of providing instruction has been possible due to many factors such as the growth of free material on the Internet, technological advancements in communication technology, and personal computers and software becoming more user friendly and affordable economically[3].

As of now, much of web-delivered content is limited by slow modem speed connected with standard telephone lines, but 'ISDN lines, wireless and USB modems and digital subscriber lines (DSL) technologies have advanced rapidly and offer high-speed, cost effective economical connectivity rates [36]. Also, as personal digital assistants (PDAs) and similar technologies decrease in cost and increase in power, they will become alternatives to personal computers, further increasing the accessibility of Internet training [36]. Essentially, as technological advances result in faster, cheaper tools, DL will become more attractive as an instructional delivery medium.

However, while educationalists and Human Resource (HR) practitioners in standard bodies such as governments and industries and other educational institutes are excited to make the use of DL [21], various researchers in the field have conducted comparatively some researches on DL and have been able to understand very little in how the technology based instruction delivery systems and various instructional programs affect learning outcomes.

Although basic research fulfills many goals, it can easily make its mark in the non-academic community when it can be used for solving problems. Also, without very solid evidence provided by basic research to help them, appliers will find themselves going through indefinite trial-and-error loop. But, the huge gap between research and practice is getting wider (see Salas et al. 1999). This gap only in some way can be attributed to the rapid growth of technology, which is allowing practice to outperform research.

In this paper we want to cover seven broad areas. HR practitioners are spending billions of dollars on successful implementation of DL programs, even when researchers have not yet surely identified who will get the most benefit, and under which kind of conditions (area 1 and 2). For DL programs to take the intended effect they must be based on solid instructions and design principles abstracted from major educational theories. But, current theories were developed in conventional classrooms, which may or may not be transferable to DL settings (Area 3 and 4). Because learning takes place at the individual level, the issues that facilitate or hinder the interaction of a learner and technology, e.g. learner control, social needs, must be addressed (Area 5). At the group level, collaboration adds technology issues, e.g. information richness, synchronicity, to those of group process losses and gains (Area 6). Finally, evaluating DL learning outcomes requires an examination of both distal and proximal outcomes at both individual and organization level (Area 7).

Our list of emerging research areas is made up of two types. The first has particular areas on which research has been done, e.g. differences in implementation of DL, the design of DL delivery systems, and computer enabled collaboration. We have extended our analysis so that we could bring issues to notice that are associated with the basic theoretical approach undertaken by researchers who study DL's different processes and outcomes. Because of that, we have selected to include these areas as a inclusion of the differences among the models of learning from which instructors make instructing principles, a bird's eye view of the matters that must be considered in evaluating both the outcomes in near future as well as distance in DL program, and the marking of important, but less researched subjects.

II. Emerging Areas in Distance Learning

A. Area 1: Defining Distance Learning

Broadly speaking Distance Learning is a term that encompasses two sub terms: 1) distance education (a term frequently referred in academia) and 2) distance training (a term frequently referred in industry). It is possible to define DL as learning method which is based on media, remote, or asynchronous and supported by some instructional system [6]

Due to its fast growth, DL is a divided into various domain having many comparatively new technologies. This disjointed condition can be seen in the lack of specific terminology to defining DL. The words distributed, distance, online, Internet, or Web-based are often used interchangeably to describe training, education, learning, or instruction. Other words that also appear are correspondence study, home study, independent study, and external study [41].

Interactive learning may be defined as either synchronous, i.e. real-time communication, or asynchronous, i.e. delayed communication. Other than that, the words e-learning and cyber-learning are appearing more frequently in literature. Both the names can be used interchangeably, but same words sometimes can be used to describe different technology contexts. For example, researchers describe simulator-based instruction as 'virtual learning' but, to HR practitioners, 'virtual learning' means learning via the Internet.

Sometimes distinctions are made between similar terms that are otherwise used interchangeably, e.g. the terms distance and distributed learning. For example, Freitas [18] point out that ‘‘the use of computers in DL is more commonly referred to as distributed learning’’, while DL can involve the ‘‘use of multimedia, teleconferencing, videotaped lectures, and/or computers’’ (p. 367). In another interpretation, DL is defined as a broad term that refers to delivering a curriculum to learners who might not physically present on location, while distributed learning allows ways of the interaction among those distant learners (Barley 1999). In industry, distributed training has been defined as ‘‘training that is generally managed from a central control site and is provided to individuals or teams who are located at one or more remote sites’’ [12].

To some extent, the ability to interchange terms reflects the variety of technologies that support DL [5]. It may be helpful to think of DL technology as points on a technology continuum. The continuum ranges from simple, low-technology/no-technology (e.g. correspondence by mail) to highly difficult or complex technology (e.g. Internet-based synchronous groups). Instruction can be delivered either synchronously (real-time mode) or asynchronously (delayed mode). The media itself can be one or a combination of the following, which are listed in no particular order of complexity: radio broadcasts, pre-recorded or live interactive television (ITV) broadcasts, compressed video, two-way audio/one-way video vs. one-way audio/one-way video vs. two-way audio/two-way video, videotapes, videodisc, CDROM, satellite transmission, open air broadcasts, cable, computer, email, on-line conferences, listservs or bulletin boards [21] [22] [35] [41].

Recently another type of DL has come into practice which has been referred to as hybrid or blended approach. This approach can be defined as “courses that require a physical on-site presence for any reason (including taking examinations) [45] [46].

Those involved in DL need to be very careful in the terminology they use, without a common base of reference, communication between and among researchers and HR practitioners will keep suffer. It is very risky since there is a possibility that research findings will be misinterpreted due to confusion or due to ambiguous language. In this case, if HR practitioners will implement system-wide changes to their instructional design program with help of inaccurate or imprecise information, the goals of the training program would be lost.

B. Area 2: Importance of Distance Learning

HR practitioners would be interested in optimizing DL for a number of socioeconomic reasons. E.g. in today’s economical era, organizations rely on a workforce that is trained to respond quickly as technology changes and new business opportunities arise [5]. In fact, the economic success of many businesses will depend on how well workers’ skills support the organization’s strategic plan and well planned employee learning programs can provide a competitive advantage to organizations [19]. Furthermore, employee career development is a key business issue because organizations need to build the competencies and skills that meet the strategic needs of the company [19]. HR departments are responsible for maintaining a well-trained, flexible workforce to meet organizational goals. DL may provide the means by which HR practitioners can provide employees with training tailored to the immediate needs of the organization [5].

Also, in context of many developing countries both in south Asia and Africa distance learning provides an important alternative of traditional class room teaching where there are inadequate school facilities in rural areas, lack of qualified teachers, lack of transport facilities, lack of hostel facilities fixed schooling hours [15].

Another reason for caring about DL is the modification in the role of workers in the economy [5]. Modern workers cannot rely on lifelong stability of their employment [33]. For the sake of security of their employment, workers must maintain current, transportable working skills. So, the workers must regularly fill their skill inventory with new skill sets through training and education programs. DL offers a convenient and flexible delivery option for workers that can accommodate their professional and personal lives [21]. For example, DL allows individual’s access to courses that might not be available local area, allows them to avoid commuting, offers them the comfort and convenience of studying at home, and gives full-time workers with family responsibilities the ability to accommodate professional and personal[48][51]. Also, DL could prove be the means of providing instruction to populations, such as the handicapped, the homebound or non-native speakers, who might otherwise not have access to learning [21] [36]. Students thinks that DL offers them experience with technology, access to outside experts, and interaction with students outside their own university (Webster and Hackley 1997). By making themselves familiar with technologies currently being used in industry, workers acquire skills valued by industry (Webster and Hackley 1997). HR practitioners need to care about any technology that facilitates the maintenance of a well-trained workforce.

To summarize, many, but not all, organizations are able to benefit from DL. A frequently occurring issue for HR practitioners is to ensure the optimization of whatever DL they employ. Because of that, HR practitioners must not remain unaware of, or uninterested in, the fact that comparatively little research is being done in proportion to the money being spent on DL.

C. Area 3: Force behind the Design of DL Systems

Theories are useful because they let you know what can be expected from the system if the principles and guidelines of the theories are followed [8]. So, research should be followed based on theories in order to follow outcomes. Currently, there is no theory or model that predicts learning in a distance environment. Indeed, some argue that, because current educational models may be inappropriate or inadequate, attempts to utilize such models will not generate competence in a knowledge society [20]. As such, researchers are calling for an appropriate learning model that takes into account the unique requirements of instruction delivered via distance technology (Webster and Hackley 1997).

Until a theory of DL is developed, its developers must rely on general theories of learning. When developers create an instructional program, they are guided consciously or unconsciously by their beliefs about how people learn, i.e. various theories of learning. Because each theory shows different outcomes, developers should intentionally choose the learning model which will best lead to the desired outcomes. The chosen model must be appropriate for the type of content which is to be taught, the previous knowledge of the people, the environment in which the knowledge will be given, and the goals to be accomplished by learning. HR practitioners should be aware of the different sets of assumptions that can underlie the instructional programs being created and delivered via DL.

Although, there are variety of factors that have contributed to the development of DL systems there are two main factors that have huge contribution. One factor has been the practical benefits – lower cost, rapid deployment, and flexibility – associated with training systems that transcend space and time and enable training anytime, and anywhere. Another factor has been the advances in technology and connectivity [24].

In general, there are two types of learning models: behavioral and cognitive [17] [26]. Broadly speaking, the behavioral model is lesson based; the cognitive model is learner based [42]. The cognitive model has two main branches: the collaborative and the cognitive information processing models [26] [28].

We agree with researchers in saying that there is no one best model of learning [26]. But, developers must determine the type of knowledge is to be inferred, i.e. factual, procedural, or higher-order thinking, that type of knowledge to be given will in turn suggest an appropriate learning model and its related guidelines. For example, novices need a basic amount of information to know what information is needed to solve a problem, and in that case, the traditional model would be more appropriate than the constructivist model [14]. The implication for HR practitioners is clear: for instructional strategies to be optimally effective, trainers and instructional designers must integrate learning models with instructional design practices.

D. Area 4: Technology vs. Instructional Design

The research concentration on design suggests that design of instructional system is far more important than the technology through which the instruction is delivered. According to Lawless and Brown [25], ‘‘Technology is not efficient learning in and of itself, but merely provides a forum for effective learning’’ (p. 127). As Ricketts [36] pointed out, no course ‘‘will automatically become better merely by being made electronic’’ (p. 135). By identifying general instructional system design models which are made for delivering classroom training must be expanded to incorporate elements unique to DL, researchers are calling for theory-based research to discover appropriate principles and guidelines[39]. Researchers have investigated various instructional system design issues, including the role of the instructor.

According to Lever-Duffy [27] there are two types of technologies that are being used to deliver instructions: synchronous and asynchronous. Synchronous technology is a mode of delivery where all participants are "present" at the same time. It resembles traditional classroom teaching methods despite the participants being located remotely. It requires a timetable to be organized. Web conferencing and videoconferencing are examples of synchronous technology, as are direct-broadcast satellite, internet radio, live streaming, telephone, and web-based VoIP. The asynchronous mode of delivery is where participants access course materials on their own schedule and so is more flexible. Students are not required to be together at the same time. Mail correspondence, which is the oldest form of distance education, is an asynchronous delivery technology and others include message board forums, e-mail, video and audio recordings, print materials, voicemail and fax.

Many researchers are interested in the role the instructor plays in DL. Ricketts [36] believe that instructional designers and instructors are still needed to determine course content as well as to drive the course. Some other thinks that technology should provide support to supplement learning, but should not replace instructors, whose role is to guide a discussion to an important and constructivist thinking (Anderson and Jackson 2000). Also, others derive that the ‘‘most important influence on involvement and participation was teaching style’’, defined as the degree to which the instructor influences people interaction (Webster and Hackley 1997, 1303).

Researchers have been investigating on how to design user-friendly interfaces for better interaction between the learner and DL technology. For example, Anderson and Jackson (2000) recommend using an integrated user interface, in which all computer support tools are seamlessly joined, to avoid confusing the learner and to minimize system instability, i.e. if many applications are combined, system crashes may occur. Also, note that the word ‘user interface’ also means the organization of information and the interface through which learners access the information, for example a hypermedia system [28]. User interfaces are hugely important for distance learners, who have no teacher present to answer questions or clarify information at their physical location [29].

Specific design principles have also been proposed for learner-centered instruction [42]. The learner-centered model says that ‘‘learners construct their own knowledge while solving real business problems and transferring their knowledge to other learners . . .’’ [42]. Stefanov and his colleagues believe that learners will be more motivated and self-directed and will search for personal efficiency if the instructional strategy is based on learner-centered principles [42].

Due to the involvement of the teams as well as individuals in DL, instructional design systems must also accommodate team training facility. Concentration should be not only on the knowledge, skill, and attitude competencies possessed by high-performing teams (Cannon-Bowers et al. 1995; Salas and Cannon-bowers 2000), but also principles for promoting teamwork, eliciting feedback in team settings, and evaluating team training [44]. It also remains to be seen whether principles and guidelines developed for training teams using traditionally derived methods will be effectively applied in distributed environments.

Based on various views we came across throughout the literature on subject we can say that technology only act as a platform for conveying instruction to people and most of the success of any instructional effort will be based on the quality of the instructional principles that underlie its design system. Appropriate design standards must be applied to technology interfaces in DL to ensure that learners’ attention is on the material they are supposed to be learning. HR practitioners must be familiar with the principles of instructional design and apply them systematically to instructional design efforts.

5) Area 5: Control by the Learners

Provided that the role of the learner is of central importance to the instructional effort, we have not been surprised to find that learner-related topics come as a major area in the DL research. According to Chris Stary & Alexandra Totter [10] learner control became a significant design issues in knowledge-transfer settings and e-learning systems. Inputs to the design and evaluation of those systems stem from different disciplines. Learners should be able to control the selection and presentation of tasks or content, as well as the transfer process, according to their needs and preferences.

Under the general theme of learner characteristics, we will discuss three sub-areas: defining learner control, specific learner characteristics that affect learning outcomes, and learners' need for social interaction.

The term "learner control" means to give learners the chance to control the speed and sequence of their learning in a DL's environment. As already discussed, many learning models are dependent on the basis of learners controlling their instructional process. But, we suggest that the term learner control is misleading within the respect of DL due to the limited control that the learners have. For example, learners can control the speed, sequence, and breadth/ depth of the information they choose to watch, but it is the instructional designers who determine the actual content. So, content includes the type, number, and quality of graphics; the presence or absence of sound, audio, animation, film, files; the structure/ outline; and the difficulty level of the text.

In case of the interaction between learners and technology, Russell [37] states that ‘‘all the students are not alike. Each one has different learning styles. It means that technology would facilitate learning for some, but will probably inhibit learning for others, while the remainder experience no significant difference’’ (p. 44). Increasing number of research shows that individual differences do predict learning outcomes in [11]. If one strategy is not suited to the needs of all learners, then we have to make use of adaptive instruction [17]. Instructional procedures for individual differences would result in increased efficiency in learning, and research needed to identify the specific cognitive characteristics important for learner control as well as the learners for whom the benefits of a dynamic teaching environment will be the greatest [17].

One more area which received much attention from researchers is importance of the degree to which a learner needs social contact during the teaching process. Researchers want to find out if the learning experience is better when learners learn in a spirit of community, in which trust, cohesion, interests, and attraction are established and grown. Do learner's needs for social interaction impacts how much learning is done and how satisfied learners get with their learning experience? If social needs are important then the researchers want to know the position under which it is better rewarding for individuals to learn on their own and when it is better for them to learn as part of a group.

In sum, in learner-centered instruction, characteristics of the learner will interact with DL technology to influence learning outcomes. Although some characteristics, e.g. metacognition, motivation, and self efficacy, are important in all DL scenarios, little research has been done yet to mark the learner characteristics that are useful in specific DL environments. Also, the social needs of learners cannot be ignored if learning objectives are to be met fully. Even if learners who are socially isolated successfully complete training programs, the long-term impacts for the organization are unknown, e.g. turnover or sub-standard long-term performance.

E. Area 6: Collaboration in DL

One more important area which has emerged by our review is the topic "online collaborative learning". It involves small groups of students working together to actively solve assignments. These assignments can include various scenarios about decision making, problem-solving, report production, or experimental projects. This subject has obvious implications on organizations, where virtual teams are assigned with the work of product research and development, software development, and other problem solving activities.

Collaboration between learners and instructors has long been an important component of the educational process, regardless of the setting [7]. However, in the potentially isolating environment of WBT, collaboration and communication between learner and instructor progresses from merely being important, to a vital link or lifeline for the learner. Many of the cues that learners rely upon in the traditional classroom are no longer present in the online environment. Unless video conferencing or voice over IP technology is utilized, nearly all of the interaction between learner and instructor is textual in nature. The tools currently used by learners and instructors to collaborate in the online environment include email, instant messaging, and discussion boards.

The collaborative model of learning has been much influenced by Vygotsky [47], who proposed that learners have an area of possible development, which differentiate between what they can learn on their own and what they can learn by working together with others who are more capable. When learners work together in collaboration, they learn themselves, and they are contributing to the development of the other group members. For example, one study found that learners who were instructed in a pilot computer-mediated tutoring session said that the most useful aspect of it was the discussion and support from other learners [49].

A big gap in the DL is due to giving less attention to training interpersonal skills, which includes the skills that support collaboration [16]. Jonassen[21] points out, ‘‘you cannot assume that learners necessarily possess the skills needed to collaborate with other students. They need to learn how to communicate, how to assume leadership, and how to deal with controversy when it arises’’. So, the researchers need to put more emphasizes interpersonal skills training, provided that industry is focusing more and more on the development of customer service skills and employee interpersonal skills[16]. According to the American Society for Training and Development [1] 9% of training spending in 1999 went to training in interpersonal skills.

More research is done on the collaboration, i.e. cooperation, than on team training, but it is not necessary that results from collaboration studies apply to teams. According to Noe [32], team training ‘‘involves coordinating the performance of individuals who work together to achieve a common goal’’ (p. 180). Whenever teams are there, additional factors are also to be considered, like degree of cohesion, interpersonal attraction, and shared mental models and situational awareness [39]. A large scale research is needed to determine important team training factors in a DL environment Also; the research must be done on intact teams, because training an individual team member does not produce the same results as training team members’ together [40].

In sum, even though many researchers have been studying collaborative DL, even more research is required to support industry as it is increasingly relying on virtual teams. In particular, team training and interpersonal skills training are neglected research areas

F. *Area 7: Return of Investment on DL*

The final area that we focus on here is the evaluation of DL. Why HR practitioners and researchers should worry about evaluating the effectiveness of DL? They should for the reason that the performance measurement allows learning to be assessed so that performance can be improved or the need for remediation identified [40]. Without that, it is impossible to decide if the training made a difference. One more justification for evaluation can give is that it can tell us the factors that contributed to training effectiveness [40], and, so, these factors can be incorporated into the next session of training. Provided that evaluation is foundational to the effective implementation of DL, here we discuss a number of questions to address this issue.

To maximize the return on investment it is important that material be developed with multiple purposes and courses in mind. That is material which is to be developed should be generic. It should be able to be re-introduced into various courses with little or no changes in its contents. Also concept of transformative income generation can be applied [43].

In 1999, Peled [34] asked how academic institutions ‘‘collect and analyze data in order to determine the effectiveness of the new computer-mediated DL approach . . .’’. Some believe that a degree of evaluation overlap exists between traditional and DL because the two methods share many common aims and methods for evaluating learning [36]. In most cases, learning effectiveness is measured by learner’s result, learner’s attitudes toward learning with DL methods, and learner’s overall satisfaction with DL [31]. Others propose that teaching effectiveness should be measured by characteristics of the learner, the technology (quality, reliability and medium richness, as well as the number of media used), the instructor, and the course (e.g. size of class which affects the amount of attention instructor can give individual learners) [48].

The organizations use Kirkpatrick’s four-level model to evaluate training. Evaluations consists of learner reactions (satisfaction, difficulties); learner achievements (problem solutions, specified goals); work behavior (learning transferred to the workplace); and benefits to organization (improved performance) [4] [42]. Our suggestion is that Kirkpatrick’s model is insufficient for evaluating the effectiveness of DL, and it should be modified to reflect the multiplicity of factors that influence satisfactory DL results.

Academicians have questioned if DL classes provide a total educational experience and have cautioned against the widespread acceptance of DL classes as a substitute for classroom learning [14]. Some have also said that the grades are not the only, or even the proper, way of measuring the effectiveness of DL [4]. For example, Eamon [14] says that traditional university education is an effective means of passing on culture through guidance, individual and group interaction, mentoring, acculturation, role modeling, and socialization. Education, according to him is more than just giving information, and technology can only work as supplement, not supplant, the teacher’s role, which is still critical to the education process.

Even when researchers can identify various pros and cons associated with DL [14] [36], only HR practitioner are allowed to organize specific information, e.g. corporate financial information, which is required to perform thorough cost–benefit analyses. Each and every organization must consider its unique circumstances when evaluating if an investment in distant learning is appropriate. To be most efficient for an organization’s needs, its training program should directly reflect the organization’s goals and strategic objectives [30] [50].

III. CONCLUSION

We find that industry is increasing spending on DL, but fact that researchers cannot yet tell HR practitioners why, when, or for whom DL works the best (Area 1 and 2). But, the data suggests that effective syllabus design of DL can increase training effectiveness (Area 3 and 4). With help of this, HR practitioners need to think what learning actually is in terms of the learner, both as a single person (Area 5), and as a member of a collaborative or cooperative team (Area 6). Finally, return-on- investment calculations should balance immediate organizational benefits with longer-term organizational costs (Area 7).

Even with the lack of specific support, it is likely that the force that promotes effective learning will also apply to DL. But, the technology-specific opportunities and constraints of DL pose additional requirements for the trainer and course designer. We again emphasize the need of more research to discover the factors involved in successful DL programs.

We also should not forget that training is done at the individual level. Training is about learning, and learning is about changes in an individual’s cognitive and behavioral aspects [23]. More research is required to learn about the internal cognitive processes through which individuals learn and how those processes interact with distance delivery of instruction.

DL is about giving the instruction; and the best technology may not always be the best solution. As Lawless and Brown [25] said ‘‘Technology is not effective learning in and of itself, but merely provides a forum for effective learning’’ (p. 128). Also, DL in education is not same as DL in work organizations. The environment, requirements, and results are different, and the difference must be taken into consideration when transporting research findings to workplace applications. More research is required in work environment so that the interaction of workplace conditions and DL can be examined at first-hand.

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