

Identifying opportunities for artificial intelligence in the evolution of training and development practices

Evolution of
training and
development
practices

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Abstract

Purpose – The fast pace of innovation and disruption in business processes and technology today requires employees of organizations to be continuously up-skilled and be able to adapt to changing practices. Training needs are becoming more personalized. Micro-learning and bite-sized training modules, easily accessible to employees, as and when required, are some of the major organizational needs. Training and development programs should be designed keeping in mind factors of employee engagement, involvement and extent of training transfer. The purpose of this paper is to explore whether artificial intelligence (AI) can lead training and development processes in organizations in the years to come.

Design/methodology/approach – The author has interviewed 27 HR and training professionals, in person, from across eight organizations in the FMCG, oil and natural gas and clothing and apparel industries. All these organizations have an annual turnover of greater than US\$14.5m. A formal questionnaire was not followed since this research explores a new field in academia. Open-ended questions were used in the interviews, of which eight were common across all interviews. The mean interview duration was 25 min 33 s. The objective being to capture ideas and identify future trends, the analysis was done on a percentage basis and served as the foundation for a new training and development needs model for organizations.

Findings – Among the 27 HR/training professionals interviewed, 92.6 percent respondents believed that their organization/department requires knowledge management practices while 40.7 percent require the training content delivered to a fixed category of employees, to be updated continuously. Personalized learning was mentioned as a requirement by 63 percent of the respondents. In total, 92.6 percent HR/training professionals believed training programs should involve high employee engagement. In total, 51.9 percent would prefer on-the-go learning tools for their employees, while 33.33 percent respondents believed an intuitive e-learning interface would be useful for their organization/department. The findings also led to the foundation of an SIP model, which shall be useful in providing direction to AI systems in training and development practices.

Research limitations/implications – The paper opens up avenues for further research to be conducted in identifying the areas of impact of AI in training and development. It paves the way for researchers to quantify training effectiveness and measure it with the help of AI.

Practical implications – The objective of the paper is to explore the opportunities for AI in training and development practices. Having identified the opportunities, it shall drive the practice of using AI across industries.

Originality/value – The thoughts in the paper have been ideated by the authors organically. Relevant data points from referred sources have been cited to back up those thoughts.

Keywords Artificial intelligence, Training design, Training needs

Paper type Conceptual paper

The evolution of business processes and practices across organizations over the last two centuries has developed the need for dynamic changes in “skills required to be possessed” by employees. The change in nature of work has redefined training objectives from improving efficiency in simple manual tasks to providing employees with relevant knowledge and skills, and enhancing their abilities to perform complex and dynamic jobs (Ford *et al.*, 2017). Skill development in employees was once conducted entirely by supervisors on the job (Kraiger and Ford, 2007) and is now required more frequently, with learning to occur on demand. Technological advances have made it possible for training and development to happen on mobile platforms like smartphones and laptops.



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Training and development requirements for employees have shifted from “mass upskilling” in batches in the early twentieth century to personalized and individual training needs, now. With the introduction of training models (ADDIE, Dick and Carey, Six Disciplines of Breakthrough Learning, etc.), Training and development in organizations now start with needs assessment for training programs and follow a scientific and structured approach toward designing and scheduling the programs for their employees. At times, these steps to be followed in designing training programs are lengthy and time-consuming (Kruse, 2009 on the ADDIE Model). The advent of artificial intelligence (AI), which has the potential to simulate human intelligence and put it to practice, is now witnessing a widespread utilization of the tool in combating lengthy and tedious processes.

This paper studies the evolution of training and development needs of organizations to identify how research on training methods and how training practices have evolved, why and how computer-based training (CBT) and AI concepts were introduced in training and development practices and what the current trends are in terms of training requirements and areas of focus. The author has then attempted at identifying possible applications of AI in training and development practices, across stages, and identified the potential benefits which can be drawn by organizations. Finally, the author presents his views on the future impact of AI on roles in training and development and the challenges of implementing AI across training and development practices.

1. Evolution of training and development practices

1.1 *Pre-Second World War*

The roots of training and development can be traced back to the middle ages where the concept of apprenticeship was first introduced. The late eighteenth century and the nineteenth century witnessed the industrial revolution, the result of which was a need for highly skilled workmen to efficiently run units of mass production in several countries. The early 1800s witnessed the origin of Vocational Schools (Desimone *et al.*, 2002) for the development of industry-specific skills. Later, in the twentieth century, the First World War witnessed a shortening of the existing apprenticeship programs. The need for developing industrial operations skills in a wider section of the society in a shorter span of time led to job instructional training becoming the leading practice in training the workforce (Desimone *et al.*, 2002).

Incidentally, the *Journal of Applied Psychology* published its first article on training and development in 1918, toward the end of the First World War (Ford *et al.*, 2017; Geissler, 1918). This article presented a plan for the uniform training of Applied Psychologists. There was an increase in the demand of highly skilled Applied Psychologists during the First World War. This article lined out the course curriculum and design to develop and train Applied Psychologists and also defined job roles in this profession for graduates from varied backgrounds of law, commerce, science, education and others. Between the First World War and the Second World War, there were several training efforts carried out across roles and industries and much of the then published literature focused on the description and evaluation of the methods. Few articles were published on training and development in the domain of sales training, piloting, gliding, training clinical psychologists (Sibley and Stogdill, 1936). The 1940s witnessed training initiatives in military settings as the focus shifted to identifying methods to measure the effectiveness of a training program (Lawshe and Thornton, 1943).

1.2 *Post-Second World War – 1980s*

Training and development practices took off world-wide post the Second World War. These practices were inspired and derived from the training within industry (TWI) service, which was initiated during the Second World War by the USA. TWI helped set up Technical

Training Programs in 16,511 manufacturing plants in the USA and by the time it was scrapped off, the USA had developed 23,000 trainers and 17,59,650 certified production supervisors (Dooley, 1945).

Eventually, as peacetime economy started taking shape, a new profession – Training Director – started making its way into several industries. This was inspired from the wartime training movement and these Training Directors were later to lead human resource development initiatives across organizations (Torraco, 2016). In 1984, the Instructional Systems Development (ISD) Model (Campbell, 1984) was developed, which mentioned for the first time the requirement for a needs assessment before designing the training course outline and its contents. The ISD Model has five phases – analyze, design, develop, implement and evaluate – commonly known as the ADDIE Model today. This provided a structured and systematic rigor to the training, which earlier was amorphous and quite frequently, unreliable. The 1980s and the 1990s witnessed the widespread of on-the-job learning practices, which were cost-effective and also aided in learning and developing several skills at a time, in organizations. The need then shifted toward processes which required lesser time in the pre-training analysis process (Rossett, 2009) and one which could integrate learning with working for employees (Torraco, 1999).

The human capital theory laid the foundation for the logic of training and development being an integral part of human resource strategy as the investment made by organizations in training and development has resulted in enhanced productivity and positive business results and is not just another expense for organizations (Torraco, 2016). Thus, the return on investment on training and development became an important parameter in selecting and implementing programs. Eventually, training and development practices became more robust with the introduction of just-in-time training (Iannarelli, 2009), third party independent vendors for training (Robinson and Robinson, 1995), CBT and advanced methods to measure behavioral and financial results (Cascio, 2006).

1.3 The 1990s – today

In the 1990s, the focus of both, research and organizations shifted to enhancing employees' participation in development activities, learning and transfer. Employees' perception of the work environment, aspects of the work environment like transfer climate and programs focused on cognitive, skill-based and affective learning outcomes (Tracey *et al.*, 1995) were some of the major topics which witnessed research and implementation (Ford *et al.*, 2017). Researchers and organizations started keeping learners at the center of the training programs and models. Many of them examined how different training programs like error training and mastery training influence self-regulatory processes during learning and how these programs affect individual differences to impact training outcomes (Ford *et al.*, 2017). Organizations started implementing online training programs and promoted research on means to make these programs more engaging and effective for their employees. The methods of measuring the impact of training programs on business results broadened their focus from individuals to teams and organizations (Aguinis and Kraiger, 2009). Recent studies have focused on the learning that occurs beyond the boundaries of formal training (Courtright *et al.*, 2014), wherein it has been demonstrated that the developmental value of a training program is not just defined by the experience of the program but is also shaped by organizational contexts, interventions and the characteristics of the learner.

2. Introduction of e-learning and artificial intelligence in training

Thacker and Blanchard (2006) define e-learning as “The delivery of training or education through electronic media.” During and after the Second World War, e-learning through CBT opened up avenues of simulation, wherein analog and digital units became capable of

predicting the outcomes of several government projects, including the Manhattan Project. Simulations are now used by several organizations to help employees understand the possible real-life outcomes of decisions taken and the way they are implemented. For instance, simulation is used in pilot training, along with virtual reality (VR), wherein the trainee interacts with a virtual environment to obtain results which would be real in nature if the actions simulated were to be implemented in practice.

Programmed instruction (PI) was introduced by B.F. Skinner in the 1950s. In this method, which could be delivered initially using his patented technology, learners had to submit answers to questions asked. If the answers were correct, the next question would be asked and if not, the answer to the question attempted incorrectly, would be explained to the learner (Magliaro *et al.*, 2005). PI evolved over time and is currently used by several online course providers. The first instance of Intelligent Computer Assisted Instruction (ICAI) was IBM's Coursewriter I, which was launched in the 1960s. It offered a personalized training option, wherein based on the individual responses of the trainees, the training needs were met by CBT which had characteristics similar to that of a human tutor. ICAI led to the development of Intelligent Tutoring Systems, which proved to be more advanced in the sense that the system was able to learn the best methods to deliver training programs based on the trainee's responses.

Over the last three decades, the transfer of knowledge has been facilitated through sharing of software and courses on CD-ROMs, Intranet (sharing of information within the organization's portal), webinars (Web Conferences using slideshows, videos, etc.), Wikipedia, online learning platforms like Coursera, edX and Khan Academy, social networking sites and also through YouTube videos. YouTube training is currently on the rise as it offers trainers a free platform with potential access to millions of followers. Channels like CorpU TV, which produces video-interviews of CEOs, mostly of the Fortune 500 Companies, and includes concepts of coaching, succession planning, sales training and others. The tutorials and training videos on YouTube range from simple "How to do [...]" training to detailed, conceptual and theoretical knowledge on business strategy, medicine, finance and auditing, sales, human resources, engineering, arts and entertainment, technology and culinary sciences amongst others.

The internet, today, has offered organizations with low-cost platforms to share their practices, thoughts and knowledge resources with the world and also with their own employees privately. Standardized means of presentations using templates also provide for branding of such shared content. However, content management is becoming a major problem for organizations who have taken to video-training extensively. Possible leaks of confidential information through videos is a threat, as many organizations are now combating this through their IT departments.

3. Trending training and development needs

3.1 Methodology

In identifying the current needs and future trends of AI in the field of training and development, the author interviewed 27 HR and training professionals across eight organizations in the FMCG, oil and natural gas, and clothing and accessories industries. All the organizations covered have an annual turnover of greater than INR 100 crores or US \$14.5m. Some of these organizations like Unilever (Hindustan Unilever Limited) have a global footprint, which gave the author a multinational perspective of the current needs and future trends. A formal questionnaire was not used in this research. The scope of AI in training and development being unclear in existing literature, it would not have been appropriate to limit the possibility of identifying future trends. Using a formal questionnaire would restrict the thoughts and ideas which were generated and captured from the answers of the HR professionals interviewed in the research.

The 27 HR/training professionals were interviewed in person, with a mean interview duration of 25 min 33 s. The following eight open and close ended questions were common across all interviews:

- (1) Does your organization have training and development practices in place?
- (2) Why does your organization require training and development programs?
- (3) How do you currently extend your training and development facilities to your employees, across work levels?
- (4) What has been the shift in the behavior of employees toward your training and development programs?
- (5) How do your employees consume professional/course content currently?
- (6) How do you envision training and development practices in your organization to evolve in the next five years?
- (7) What is the major drawback in your existing training and development model?
- (8) What has been the observable benefit (if possible, share the mean Training RoI) from the training and development programs delivered so far?

3.2 Results

Among the 27 HR/training professionals interviewed, 92.6 percent respondents believed that their organization/department requires knowledge management practices while 40.7 percent require the training content delivered to a fixed category of employees, to be updated continuously. Personalized learning was mentioned as a requirement by 63 percent of the respondents. In total, 92.6 percent HR/training professionals believed training programs should involve high employee engagement. In total, 51.9 percent would prefer on-the-go learning tools for their employees, while 33.33 percent respondents believed an intuitive e-learning interface would be useful for their organization/department. Figure 1 illustrates the focus areas of organizations for current training and development needs.

These results capture the change in organizational needs in training and development systems, which is prominent if compared to those from the early 2000s. The shift in needs, observed toward intuitive e-learning interfaces, on-the-go learning and personalized learning, enables in identifying the future trends of AI in training

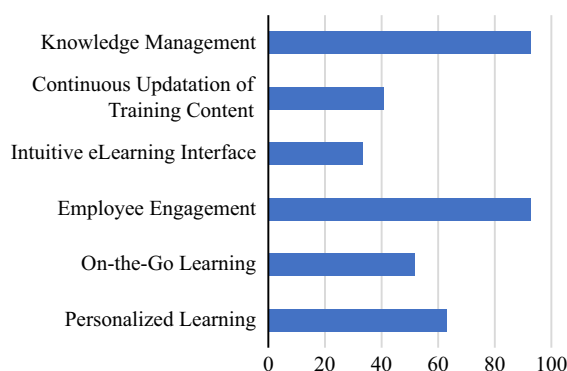


Figure 1.
Focus areas of
training and
development needs in
organizations
interviewed

and development practices. The future needs can therefore be accommodated in an “SIP Model,” described as:

- (1) Seamless – with organizations growing in sizes and entering newer markets, robust knowledge management practices need to be in place, across the length and breadth of the organizations. Knowledge, either tacit or codified, needs to be brought out on a platform which can be accessed with ease by any employee in the organization.
- (2) Intuitive – training and development practices are moving out of classrooms and are shifting to mobile screens. In the physical absence of an instructor, the modes need to be intuitive and adaptive to the user. AI can play a crucial role in filling this gap.
- (3) Personalized – in the late 1800s and early 1900s, training and development programs were delivered to batches of professionals. Current needs have shifted to them being designed for every employee individually, taking into account learner characteristics, as defined earlier in this paper. AI has the potential to identify the learner characteristics of employees and design training and development modules and programs based on these characteristics.

Future needs, thus, can be met if these three characteristics are simultaneously present in the training and development systems of organizations.

While the delivery of programs is now more seamless than before and also one with lesser boundaries, many of the 27 HR/training professionals interviewed (across FMCG industry, oil and natural gas industry, and clothing and accessories industry) report that their training and development programs require a scientific, unbiased and highly learner centric approach, with lesser human intervention and human bias in identifying and defining training needs and interpreting learning styles of individual employees; making training programs, both online and offline, as personalized and intuitive as possible, keeping in mind the cost-effectiveness and training transfer objectives of the initiatives. Given the high amount of accumulated training material and data available with organizations, across departments, knowledge management practices have been initiated in several organizations, to help sustain confidentiality of critical information, documentation of training material and offer a library of training modules in an intuitive manner to their employees. The need is also to make such data and learning modules easily accessible to employees when and where they need it. The aim is to promote knowledge transfer and reduce the reluctance to attend training programs in employees (Zahra *et al.*, 2014).

The evolution of training methods over the years has helped organizations reduce costs, motivate their workforce and increase profits (Findley and Davis, 2013). As companies today rely more on computer-generated training such as simulation or virtual training methods, the younger generation too, embraces technology aided learning and particularly those which involve social interaction (Jayson, 2012).

4. Opportunities for artificial intelligence in training and development

In the field of human resources, AI has been making rapid advances. Today, cognitive-supporting decision making systems, example being IBM's Watson, are assisting employees in taking HR decisions. From identifying an employee's mood to aiding in recruitment processes, AI is able to weed out a major part of human biases involved in these processes. Algorithms enable HR professionals to identify correct profiles for vacant roles, eliminating biases of race, gender or sexual orientation. AI recruiters automatically schedule appointments and interviews, provide real time feedback and answer relevant questions to applicants.

In training and development, AI has applied itself in and has the potential to:

- (1) analyze an employee's performance based on pre-defined performance parameters;

- (2) define training needs by mapping performance ratings and trainee characteristics to relevant KSAs and identify gaps;
- (3) identify the learner's preferred method and style of learning, including interpretation of trainee characteristics;
- (4) identify trainer characteristics (training style, personality type, knowledge on subject matter, professional experience, etc.) (Burke and Hutchins, 2008);
- (5) map trainers to trainees based on needs and preferences of trainees;
- (6) determine the duration, frequency, pace (personalized) and mode of delivery for the training program;
- (7) lead knowledge management practices in organizations including creation of knowledge and documentation of knowledge;
- (8) remove human biases in the process of employee nomination and selection for training programs;
- (9) measure transfer of training periodically, using performance parameters;
- (10) measure personal development of the trainee (relevant to the KSAs) using relevant parameters; and
- (11) schedule training programs in a calendar year to ensure maximum participation from target audience, being tied up to other training programs.

Resulting from these potential applications, the use of AI in these processes has the potential to benefit organizations by:

- (1) reducing the effort made in analyzing surveys floated out to employees and trainers to identify needs and understand individual characteristics;
- (2) selecting the right set of learners for training programs, removing favoritism, thus training the right set of employees;
- (3) making training programs interactive and engaging in nature, thus enhancing employee motivation for participating in such programs;
- (4) choosing the right training provider/trainer based on learner preferences, enhancing learning and required training transfer;
- (5) management of knowledge resources in the organization;
- (6) making the training program highly learner centric and personalized, so that employees benefit the most out of the programs; and
- (7) training and development professionals shall be able to devote more time in strategizing training practices, promoting and monitoring training transfer and innovating training methods.

Arend Hintze categorizes AI systems into four types:

- (1) Reactive machines – without memory and past experience, they analyze possible situations and choose the most strategic/suitable move.
- (2) Limited memory – using past experience and information, these systems make future decisions. Autonomous vehicles use this system for some of their features.
- (3) Theory of mind – these systems are expected to run under the assumption that decisions taken by others are impacted by their own beliefs, desires and intentions. Such AI is not in existence yet.

- (4) Self-awareness – systems which understand their current state and can use the information to infer what others are feeling. Such AI is also not in existence yet.

Reactive machines and limited memory systems have their potential application in training and development under two major heads.

4.1 Designing training programs

The first step in designing training programs, according to several models (ADDIE, Dick and Carey, etc.) is to identify the training needs for a selected category of employees. Relevant data are collected in the form of tasks to be carried out as part of the job, criticality of the tasks, knowledge, skills and abilities required to carry out the tasks, current performance and optimum performance, for identifying training needs. AI is also used by a few training providers for the training needs analysis. One such system uses performance data of employees to calculate gaps and identifies training needs based on criticality.

This is followed by the AI system understanding trainee characteristics, given that the need for most organizations today is “Personalized Learning.” AI enables the concept of “Mass Personalization” in training and development. Based on individual performances, AI shall enable organizations to identify personal needs and offer training solutions personalized to the needs of an employee or a group of employees with similar training needs. AI, thus, has the potential to offer employees a “Virtual Personal Mentor,” who shall be responsible for the needs assessment, program design and performance monitoring of the employee.

AI has the potential to be used in assessment centers to identify training needs. Assessment centers, a concept developed in the 1930s by the German Army, include activities where conversations are simulated between employees and customers. Parameters like facial expressions, tonality and trainee emotions can be evaluated with trainee characteristics and on-the-job performance to identify training needs (Whitepaper, Knolskape, 2017). Individual trainee characteristics include capabilities, personality traits, motivational constructs, values and interests, attitudes and emotions, and perceptions (Ford *et al.*, 2017). Noe (1986) developed multivariate models of how trainee characteristics influence learning. Research has identified (Ford *et al.*, 2017) that characteristics such as managerial motivation (Butler *et al.*, 1983), seniority (Gordon *et al.*, 1986) and self-efficacy (Gist *et al.*, 1989) influence training success and learning. Other trainee characteristics like conscientiousness and goal orientation, and non-trainee characteristics like climate and culture impact the motivation to learn, development of learning goals, metacognitive activity, learning and transfer of training (Ford *et al.*, 2017). It was observed by Brett and VandeWalle (1999) that trainees with a high goal orientation are able to adopt skill improvement goals which results in better training performance. Recent studies have proven that during one-on-one face to face training programs, trainees with high mastery orientation had the poorest problem-solving performance if they were trained by an inexpressive and organized instructor (Towler and Dipboye, 2001). AI (limited memory systems) has the potential to take as input, training needs, trainer characteristics (training style, personality type, knowledge on subject matter, professional experience, etc.) (Burke and Hutchins, 2008), trainee characteristics, transfer climate and research results to predict the efficiency of training transfer, thereby prescribing trainer profiles, based on their characteristics, for a given set of trainees.

Research (Schwartz and Haskell, 1966; Schwartz and Long, 1967) has also proven that trainee attitude and achievement are more comparable to conventional methods of training than technology aided training. More recent research has identified a number of factors (Ford *et al.*, 2017) including individual differences, training design features and provisions of support which shape the decisions made by learners during learner-controlled training and dictate the value addition from training programs. AI (limited memory systems), using these factors with training objectives as inputs, can prescribe critical design components of a

training program (mode of training delivery, location, etc.) for a trainer and a given set of trainees. AI, therefore, can identify training needs, map trainers and prescribe the design of training programs, using relevant data and inferences drawn from past research, as input parameters. Training program designers are required to be aware of all components like training objectives, available resources, trainee characteristics, nature of trainer – trainee relationship, training transfer parameters, schedules of trainees, their subordinates and immediate superiors, and other strategic components, and the linkages between them, from the beginning till the end, to craft out an effective training program (Lynton and Pareek, 1990). Relevant research results and data from organizations fed into a limited memory AI system enable it to design a training program including the mode of delivery and scheduling of the training program, as a whole. This end-to-end designing of a training program using AI systems is rarely offered by training providers today. Major roadblocks faced by training providers in developing such a system are:

- (1) limited research results being available on the relationship between critical training design components; and
- (2) limited data being available from organizations on employees across trainee characteristics required in designing the program, as a result of which human intervention and personal opinion on employees become a necessity.

Making training programs intuitive and more engaging in nature is a challenge being faced by many organizations. AI (limited memory systems), using individual learner habits and preferences, can design smarter platforms for transfer of training content. These can be in the form of human-like conversations and smarter user interface for on-screen communication. The combination of VR and AI can enable employees to undergo live visual simulations of their job-tasks in classrooms and undergo virtual training experiences (Taylor, 2017).

It is often noticed that the pace of training programs does not suit all relevant learners (Ford *et al.*, 2017). AI has the potential to measure an employee's progress in the training program, based on regular tests or performance metrics. This enables the system to change the pace of the training program to match the learning abilities of the employee. This mechanism is currently used by few training providers, majorly in designing training solutions for front-end salespeople.

Updating and revamping of training programs for larger batches of employees is usually a time-consuming task, and therefore, is not done very frequently by organizations. AI, using recursive feedback mechanism, has the potential to make incremental changes in the training programs, based on the engagement levels or by identifying recurring failure points in the program. Thus, instead of a mass overhaul of a training program, gradual changes ensure that training issues are taken care of, continuously.

4.2 Knowledge management

Knowledge includes the set of facts and rules of thumb that experts may have acquired over many years of experience (Liebowitz, 2001). Knowledge management (Liebowitz, 1999, 2000, Liebowitz and Beckman, 1998) is also the process of creating value from an organization's intangible assets. It combines various concepts from numerous disciplines, including organizational behavior, human resources management, AI, information technology and the like. (Liebowitz, 2001). Knowledge management forms an integral part of training and development (or L&D) departments of several organizations.

According to Liebowitz (2001), knowledge management practices are required in organizations which:

- (1) have a higher average employee age;
- (2) have made little investment in training and development programs;

- (3) do not have a mentoring program for knowledge transfer within the organization;
- (4) have not put efforts into documentation of knowledge;
- (5) are witnessing poaching, buy-outs of the more knowledgeable employees in the organization; and
- (6) have a lack of coordination or interaction between departments.

Today's focus on knowledge transfer in organizations, wherein experienced employees from the organization train their subordinates or subject matter greenhorns or new-recruits, demands a proper knowledge management system in place. This shall help in proper documentation of knowledge, easily accessible to the target audience and be available for reference or modification, if and when the need arises, making use of limited memory systems. AI can help convert individual knowledge into collective organizational knowledge. One important part of knowledge Management is knowledge capture and representation. Knowledge engineering methods (Hendriks and Vriens, 1999) have applied knowledge acquisition techniques to retrieve knowledge from domain experts, through interviews, simulation, protocol analysis, card sorting and personal construct theory, to name a few. These knowledge acquisition methods, using AI, can also be used to create knowledge repositories, which can be put online, for access to the organization's employees. In addition to this, knowledge discovery and AI driven data mining can be used to identify trends in the knowledge repositories and help build newer and well-structured knowledge systems. AI is also used to represent acquired knowledge in the form of cases, charts, scripts, etc., to make it learner-friendly and easy to understand. "Intelligent Agents" (Bradshaw *et al.*, 1998) is an AI technique where agents collect knowledge from different cohorts, find linkages between them and thereby create new knowledge for the organization; exhibiting characteristics of reactive machine systems. Intelligent agents can be applied to web-pages, e-mails, online communities and existing knowledge repositories, along with data mining to collect individual pieces of information and look for trends and relationships between them.

5. Impact and challenges

Having identified the potential of AI, the advent of AI in training and development shall take away repetitive and tedious tasks, like interpreting needs assessment surveys, scheduling training programs, human intervention in mapping trainers to trainees, measuring organizational learning climate and work environment, and scheduling training programs, from training designers. AI intervention would make the decisions to be taken on training needs, delivery and trainer selection, prescriptive or suggestive in nature. The role of training designers shall, therefore, turn out to be more strategic and about decision making in the near future.

A major challenge for AI systems in training and development shall be to interpret training feedback and link it to performance, training transfer, trainee characteristics and trainer profile, in order to make the process of needs identification and subsequent designing of training programs more personalized, engaging and transfer-effective.

Most organizations do not routinely measure the impact of training (Srimannarayana, 2011). According to Bersin, 81 percent of organizations regularly measure training reaction, 35 percent measure learning of trainees, 14 percent measure job impact, 10 percent measure business impact and 5 percent measure return on investment. Srimannarayana (2011) mentions that there is a gap between the measures that are valued and the measures that are actually used in calculating the benefits of training and development, by organizations. The study also mentions that training professionals lack the control over data required to measure training and development. Two of the four major reasons mentioned by

Srimannarayana (2011) for organizations and training professionals not using measures to assess training impact are:

- (1) the belief that measuring of training is expensive and time-consuming; and
- (2) limitations and difficulties in the available measurement models.

This poses another challenge for limited memory AI systems in training and development, which would be to identify and define relevant parameters, use existing measurement models or develop new measurement models, to measure the return on investment of training programs conducted and their impact on business. This can then be used as a recursive feedback to improve upon the training and development initiatives of the organization.

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