CONCEPTUAL MODEL OF WORKPLACE TRAINING AND LEARNING STRATEGIES TO SHORTEN TIME-TO-PROFICIENCY IN COMPLEX SKILLS: PRELIMINARY FINDINGS

Raman K. Attri\(^1\) and Wing S. Wu\(^2\)

\(^1\)Southern Cross University
Australia

\(^2\)AO Consulting
Singapore

ABSTRACT

The race among global firms to launch its respective products and services into the market sooner than the competitors puts pressure to equip its employees with job related skills at the pace of business. Today’s global and dynamic business requires employees to develop highly complex cognitive skills such as decision-making, problem-solving, troubleshooting to perform their jobs proficiently. Traditional training models used by some organizations lead to a very slow speed at which employees gain an acceptable level of proficiency in the targeted job skills. Also, these models have long and regimented instructional development cycle. Thus, traditional models are inherently counter-productive to the business and do not enable employees and organizations for today’s business needs. Therefore, business organizations need to explore new training models and strategies that could reduce the time an employee takes to reach target proficiency in complex skills without compromising the effectiveness or outcome. A comprehensive review of the literature shows a very limited amount of academic or practitioner research on this topic. This doctorate research study aims to find various training strategies that have proven successful in organizations for accelerating proficiency of employees in complex job skills. The researcher collected data primarily through 74 in-depth interviews with 86 training experts with known work experience of reducing time-to-proficiency in various settings. A total of 105 project cases is collected across 42 industries to date. A grounded theory approach with constant comparison method is used to guide the theoretical saturation, analyze the data and to develop a theoretical model of training strategies. This paper presents the preliminary findings and the conceptual model of major training and learning strategies discovered in this study that leverages workplace to shorten time-to-proficiency of employees. This paper will also discuss the implications for practitioners and academicians. The preliminary findings of this study confirmed that boundaries between work and learning are getting diffused. It is further noticed that organizations are now more inclined to leverage workplace learning and training strategies as the primary mode to accelerate skill proficiency as opposed to lengthy traditional or formal training methods. Research findings suggest a pattern of three workplace training and learning
strategies that are more successful in reducing time-to-proficiency - 1) manufacturing and structuring on-the-job experiences; 2) sequencing activities in a lean learning path; 3) providing performance support systems and resources. This paper will also discuss the implications for practitioners and academicians.

INTRODUCTION

With the faster pace of today’s technology, organizations are highly pressed to meet the customer and market needs in a shorter amount of time by reducing time-to-market of the services and the products they offer. In the changing global economy, organizations now realize that sooner their employees learn necessary skills to the ‘target proficiency’, the faster they will be able to handle customer needs effectively (Attri, 2014). Leading workplace learning guru, Jay Cross (2013) stated that, “The faster a worker becomes proficient, the more profitable the firm” [http://www.internetalliance.com].

In general terms, an employee is termed ‘proficient’ when he can demonstrate superior performance which is reliable, repeatable, reproducible and consistent to a high degree regardless of the situations and nature of problems (Dreyfus & Dreyfus, 1980, 1986, 1986a, 2005, 2008). A contemporary definition of ‘target proficiency’ is provided by Rosenbaum and Williams (2004) as, “Proficiency is when a new employee achieves a predetermined level of performance on a consistent basis” (p. 14). For a given job ‘target proficiency’ is measured in terms of business outcomes or metrics expected from the job such as number of transactions, dollars sold, defect rates, customer satisfaction scores, etc. (Rosenbaum and Williams, 2004). The time an individual takes to acquire the skills to the ‘target proficiency’ is called ‘time-to-proficiency’ (Pinder and Schroeder, 1987). The time-to-proficiency usually involves onboarding, formal and informal training, on-the-job learning and other allied activities to gain expected proficiency in skill sets required to do the job. Again, measures of ‘time-to-proficiency’ vary from job to job. Figure 1 is the simple piecewise representation of the concept dealt in this paper. Two proficiency curves are shown with hypothetical on-the-job proficiency along vertical axis vs. time on horizontal axis. ‘Baseline Proficiency Curve’ represents the rate of proficiency acquisition in a given job subject to normal occurrence of events and experiences. A group of employees in a job reaches ‘target proficiency’ (shown in purple dotted line) in a time depicted as ‘Baseline Time-to-Proficiency’ measured from Time Zero (which may be day of hiring or first day of training).

Although there are no deterministic studies, there is general consensus that it could take long time to reach the ‘target proficiency’ depending upon the complexity of the job (Hayes, 1985; Klein, 1992; Klein and Hoffman, 1992; Ericson, Krampe, Tesch-romer, 1993; Hoffman & Militello, 2009). From the financial and time-to-market standpoint, it is critical for the organizations to reduce the time an employee takes to reach the ‘target proficiency’ in the skill sets required by the job. Rosenheck (2005) asserts that, “If we can reduce the time it takes to become expert or at least proficient performers, we can save our organizations a lot of money, increase retention rates, reduce errors, and improve customer satisfaction” (p. 1). Referring back to Figure 1, with deliberate planning and efforts, if rate of skill acquisition can be accelerated as indicated by

Conversely, the longer time-to-proficiency of its employees may lead to several issues for organizations like: unhappy customers from the service provided by non-proficient employees which may mean eventually losing customers to competitors; more errors and lost productivity for the company which may means financial loss too; may cause some life threatening situations (e.g. pilots).

Expectations to reduce time-to-proficiency becomes even more challenging with increased complexity of jobs that now require higher order non-routine cognitively complex skills to do the job (Karoly & Panis, 2004). On one hand it is known that acquiring any complex skill is a slow process; on the other hand businesses expect employees to gain required proficiency in the complex skills at a much faster rate. No organization can escape this paradox in today’s fast paced business. Organizations need plan interventions, implement systems and develop new training strategies proactively to reduce time-to-proficiency of its employees.

Training and learning interventions are believed to be the first line of defense used by the organizations as a solution to accelerate proficiency. As stated by Rosenbaum and
Williams (2004), “We also believe that reducing Time to Proficiency is the most significant contribution the training function can deliver to the organization” (p.14).

From a thorough literature search, it is evident that there are several training and learning strategies to enhance training outcomes and make learning more effective, enhance training transfer to the workplace and to accelerate skill acquisition. However, there is very limited amount of research efforts to develop a holistic framework to guide design and delivery of training at the workplace with a goal to reduce time-to-proficiency in business organizations. The author conducted an intensive research as part of the doctoral research to address this critical business need of organizations and gap in existing literature. The research study aims to answer the question: What and how specific training strategies (methods, techniques, mechanisms, systems, processes, instructional design, methodologies, interventions, etc.) are used by training experts in various contexts in leading organizations which have successfully reduced time-to-proficiency of employees in complex job skills? The goal of the research study is to develop a theoretical model or framework of organizational Accelerated Proficiency.

This paper will present the preliminary findings and the conceptual model of three major workplace training and learning strategies to shorten time-to-proficiency of employees. Certain new themes are still emerging which may supplement or complement findings reported in this paper. The author has kept those out of the scope for the brevity of current submission.

ACCELERATING PROFICIENCY THROUGH WORKPLACE LEARNING & TRAINING

Hoffman et al. (2010) position accelerated proficiency (efforts of reducing time-to-proficiency) as ‘phenomenon of achieving higher levels of proficiency in less time’ (p. 9) and deals with ‘How to train and train quickly to higher levels of proficiency’ (p. 8). Accelerating proficiency is not same as shortening duration of the training program; rather it goes beyond that.

For the purposes of brevity of this paper, review of issues and challenges of traditional training interventions has been kept out of the scope. In general, it can be commented here that traditional, instructor-led, classroom-based training interventions fundamentally contradicts goals of shortening time-to-proficiency due to several reasons viz. very lengthy training programs required to develop complex skills (Andrew & Fitzerald, 2010); longer training design cycle (Arnold, Ringquist & Prien, 1998); merely textbook problem solving capabilities (Mayer, 1986; Brown, Collins & Duguid, 1989; Perkins & Soloman, 1989); classroom methodologies disconnected from the workplace realities (Vaughan, 2008); need to learn same tasks in the workplace way (Bransford & Schwartz, 1999); proficiency requires on-the-job experience (Rosenbaum & Williams, 2004), etc. All these limitations lead to longer proficiency acquisition cycle with traditional training interventions such as instructor-led or classroom-based training.

According to Dreyfus & Dreyfus (1986), a proficient person uses intuition based on enough past experiences to solve new, unfamiliar and complex problems. This experience comes through one of the three ways 1) while working on on-the-job
assignments and tasks or 2) through a training curriculum which is designed to incorporate that experience (example problem-based learning, case-based training etc.) or 3) if training is embedded right into workplace in the existing workflow. It is now believed that professionals develop and accelerate most of their proficiency while working and practicing at their jobs (Billett, 1996; Eraut, 2007). Researchers have recognized that training should be extended to work setting. Hoffman, Feltovich, Fiore, Klein & Ziebell (2009) state that, “The modes and means of training should engage real work practice – the job challenges, context, and duties to the greatest extent possible” (p. 20). Grossman, Spencer & Salas (2013) also appeals that, “Beyond the formal training settings, another important area in need of future research is how training opportunities can be extended into the work environment” (p. 315). Therefore, as opposed to formal training events, organizations should investigate more on workplace learning and on-the-job learning strategies to accelerate time-to-proficiency. However, extending training into workplace settings has its challenges. According to Sheckley and Keeton (1999), individuals develop proficiency by working in challenging and supportive environments, self-monitoring, engaging in deliberate practice, and solving ill-defined problems. This learning experience is typically much unstructured and could be ad hoc at times. Rosenbaum and Williams (2004) noted that 70% to 80% of the learning happens on-the-job through several unstructured activities that hamper the effective use of employee’s potential. Therefore, the real question becomes is, in spite of random nature of workplace situations, how to accelerate experience and proficiency at the workplace.

Workplace training and learning is gaining momentum as a mechanism to accelerate proficiency though it is still in infancy stages. There are a very few research studies available to support accelerated proficiency goals particularly in the acquisition of complex skills.

Among traditional workplace training strategies, Structured OJT has reported a reduction in training durations in the low to medium complexity task environment (Jacobs, 2002; Jacobs and Bu-Rahmah, 2012, Jacobs, 2015). In their pioneer research compilation on accelerated proficiency (Hoffman et al. 2010) and accelerated expertise Hoffman et al. (2014), researchers enumerated several strategies for accelerating proficiency and expertise through training which include: computer games, simulation and immersion; case-based instructions with desirable difficulties (see Bjork & Bjork, 2011); appropriately timed meaningful corrective feedback; compressing library of tough cases in short time (see Hoffman et al., 2008); decision-making exercises (see Klien, 2003) and operational simulations (DiBello, Missildine & Struttman, 2009). On a closer look, this is a mixture of instructor-led as well as workplace-based training interventions.

Most of these methods are whole-task method, in which a particular task is taught as a whole (Van Merriënboer et al., 2002). However, Fadde (2009a) proposes that complex skills like intuitive decision-making can be broken into sub-skills or sub-tasks such as detection, categorization, and prediction and then one can develop targeted
instructional design activities in workplace settings to accelerate those sub-skills (Fadde, 2009b, 2009c, 2010, 2013).

Fadde & Klein (2012) states that one needs to practice expertise-oriented knowledge and skills through learning opportunities while doing his job. Ericsson et al. (1993) found that only practice that can accelerate expertise is highly focused and mentored ‘Deliberate Practice’ and that one needs minimum 10 years of such practice to achieve professional ‘world-class’ expertise. However, this theory is applicable in relatively closed and repetitive domains in which standards of measurements are well-defined, and outcomes are finite such as sports and music. In business domains, Fadde and Klein (2010) argue that professionals do not have that much time for deliberate practice on a narrow skill set in natural settings besides their roles. To address this, Fadde and Klein (2010; 2012) proposed a framework called ‘deliberate performance’, also called Action Learning Activities (ALA), which leverages characteristics of day-to-day job like repetition of everyday routine work, timely feedback by superiors, task variety of the workplace, progressive difficulty of situations to accelerate expertise in domain-specific tacit knowledge and intuitive expertise.

Similar to above, immersive strategies also showed promise in accelerating proficiency at the workplace. Such strategies include simulation, game-based learning, tabletop exercises, interactive stories, board games and alternate reality games. As an example of immersive learning, Klein (2003) proposed ‘decision-making exercises’ (DMXs) to accelerate complex decision-making at the workplace without taking the professionals out of their job. In the business context, Backus et al. (2010) put forth support for immersive learning as a way to accelerate leadership skills by stating that, “Immersive learning allows individuals to actively engage in real-world scenarios and make decisions that result in real-time consequences” (p. 145). Extending it further, Grossman et al. (2013) specified that decision-making expertise at work could be accelerated using some workplace training strategies such as simulation-based training, situational awareness, metacognition training, mental rehearsal, coaching and mentoring, motivation enhancement. They also indicate that “…many questions remain regarding the types and combinations of interventions required to develop expertise at both the individual and the team level” (p. 314).

Alongside training interventions, it is believed that knowledge capture and sharing in the organizations helps new professionals to make quick decisions and accelerate their expertise. Baxter (2013) found that proficiency or expertise complex workplace skills like strategic thinking, situational awareness, decision-making, etc. could be accelerated by capturing and using the tacit knowledge. Hoffman et al. (2008) support knowledge capture and sharing as a method to accelerate proficiency. However, they also state that “knowledge management by knowledge capture and knowledge repositories is only a part of the solution to workforce problems” (p. 3-6).

More recently, Rosenbaum and Williams (2004) proposed a methodology called Learning Paths, to put the structure around haphazard on-the-job activities from day 1, eliminate irrelevant activities and sequence on-the-job tasks in a proper order to shorten
time-to-proficiency. A reduction up to 30% in time-to-proficiency has been reported (Learning Paths, 2013). However, this approach has not been validated by any research studies yet.

From preceding discussion, it looks like that there are quite a few workplace training strategies that may hold the potential to reduce time-to-proficiency. However, it seems that training field needs an integrated framework that could be scaled to different contexts, content and job roles. Hoffman et al. (2010) believe that “there is relatively little research on training at the high end of the proficiency” (p. 59). Hoffman, Andrews, & Feltovich (2012) make a strong argument that existing studies do not specify any comprehensive mechanism for accelerating the proficiency either through training or otherwise, as evident from their appeal to research community:

“empirical fact about expertise (i.e., that it takes a long time) sets the stage for an effort at demonstrating the acceleration of the achievement of proficiency […..] Our vision is that methods for accelerating the achievement of proficiency, and even extraordinary expertise, might be taken to new levels such that one can accelerate the achievement of proficiency across the journeyman-to-expert span post-hiring.” (p. 9)

This research study aims to close this literature gap. This paper will report preliminary findings of the research and the framework developed so far which primarily leverages workplace learning and training interventions to shorten time-to-proficiency.

METHODOLOGY

The study has been conducted using qualitative exploratory research approach to reveal relatively lesser known the phenomenon of accelerated proficiency (Zikmund, 2000). Grounded Theory methodology is used with constant comparison of new data with the old data to develop a theory based on the emergent data (Strauss & Corbin, 1990).

There are only handfuls of training experts who possess experience in this area. The LinkedIn database with over 225 million professionals in over 200 countries was used as the primary source to locate these experts who possess required expertise for this study (Robinson, 2014). Purposive sampling is used to select the initial set of potential participants based on analysis of various evidences such as their social media profiles, past interviews, webinars, blogs, publications, industry recognitions or awards or any other writing highlighting their specific experience in the area of accelerated proficiency (Glaser & Strauss, 1967; Fink & Kosecoff, 1985; Morse, 1991). A total of 374 potential training experts were identified progressively and were invited via direct emails to participate in the research.

In-depth semi-structured interviews were used as a primary mode of data collection from 74 consenting participants. Remaining 12 participated consented to participate via questionnaire interviews or “Questerviews” (Adamson, Gooberman-Hill, Woolhead &
Donovan, 2004) and e-mail interviews (Meho, 2006). These 86 participants hailed from across 42 industries representing a wide industrial landscape. Each participant was asked to give an in-depth account of one of the project cases in which he or she successfully reduced the time-to-proficiency of employees using various training strategies. Questions in semi-structured interview were designed to get in-depth understanding of four major areas: (a) project challenge or business need and how it was related to accelerating learning and proficiency (b) challenges or issues with existing training model (c) new strategies selected to accelerate proficiency and how those were implemented and (d) quantitative, qualitative or anecdotal results indicating effectiveness of the new strategies. At the time of writing of this paper, a total of 105 project cases were collected, driven by the theoretical saturation. Having data in project cases allowed applying the interpretive approach to gathering real-life experience of experts and allowed comparison of strategies within the project and across the projects (Yin, 1989; Stake, 2006).

The interview data was transcribed. Based on techniques demonstrated by Wheeldon & Faubert (2009) and Brightman (2003), for each interview, a mind map was developed to understand key points and strategies specified by the participants. The visual maps, thus developed, led the author to understand emerging directions and pursue the area requiring further investigation.

An inductive data-driven coding was used to mark emerging concepts from interview transcripts (Mayring, 2000). Coding approach specified by Strauss and Corbin (1990) was used. Inductive open coding is the first step where codes were progressively refined and applied to subsequent data. New open categories were also drafted based on emerging new information and as older categories were consolidated or reorganized. Axial coding was also used to analyse how different categories are related and how they interacted with each other, and to check if the categories reflect any causal relationship. By linking the data with the categories, several themes emerged. Back and forth a comparison of categories was employed. Next, selective coding was used to identify a core or central category by systematically relating it to the other categories, validating those relationships and filling in categories that needed further refinement and development. This iterative process generated a conceptual model for training and learning strategies for accelerated proficiency.

PRELIMINARY FINDINGS

Moving from Traditional Instructor-Centric Training to Workplace Training

Participants were asked a question ‘How the traditional training model looked like before making any changes?’ From data analysis of responses, it emerges that most of the organizations and institutions depended heavily on contiguous blocks of time to conduct face-to-face, classroom-based or instructor-led training sessions as a primary training mechanism. The goal of such instructor-centric models was to cover mass of content rather than workplace skills, as indicated by the comment:
“In the old version of the program, we had so much content in there that the real critical things got lost in the content. And it became very difficult for the learner to really focus on what is it that's really important.”

Due to mass of content covered in traditional training, they also mentioned poor retention of skills stating that, “So you can imagine when they actually got into the lab and they started working, it was like, they had forgotten everything.”

In response to the question on challenges of traditional training model towards accelerating proficiency, most of the participants quoted very slow rate of proficiency acquisition, as evident from one of the comments, “…at the time it was commonly believed among the management team that it was taking people too long to get to speed.” From the data analysis, it can be said that organizations typically copied models from educational institutions that were more of instructor-centric, content-heavy, classroom training based but very light in experience. This research establishes that traditional industrial-era training model fundamentally contradicts the goals of shortening time-to-proficiency.

Participants were asked to describe in detail how they selected and implemented new training strategies to address long time-to-proficiency. Constant comparison of participants’ responses reveals that most organizations are getting away from traditional classroom-based training models and moving towards workplace training and learning strategies as a mean to shorten time-to-proficiency. Most of the participants appear to favor on-the-job learning at the workplace as the biggest contributor to shortening time-to-proficiency. One of the participants contrasted traditional training with the workplace training as:

“By and large, most things that happen in a training room are fairly ordinary. People are sitting there absorbing stuff, talking about stuff, and it’s not an emotional rollercoaster, let’s put it that way. Now if they’re learning stuff in the workplace, chances are there’s a lot more emotions involved. It’s more real. It’s more immediate. There are other people directly involved. There are consequences of failure or success. All of those things put an emotional loading on whatever is learned and that means that learning will stick more. So in that sense, there’s a pretty good chance that it will stick better if it’s learned at the point of work rather than in a classroom. But it’s not because it’s formal or informal, it’s because of the way those memories are encoded and the richness of the sensory experience that’s going on when that encoding happens.”

As evident from the comment above, it seems that involvement with the task and emotional loading of tasks amidst of the realities of the workplace are the key drivers as to why proficiency gets accelerated in actual workplace settings. From data analysis, it is seen that training experts increasingly believe that boundaries between learning and workplace need to be diffused as evident from one participant’s statement:

“Learning on the workplace became a more conscious choice that resulted in people being more self-sufficient in a shorter period, compared to the
previous approach where each skill (general and specific) was packed in formal (and there for a long period of) training.”

Several participants mentioned that on-the-job experience and social interactions at workplace accounted for up to 90% of the total learning. It is suggested that this 90% part is mostly instrumental in increasing the pace of proficiency acquisition. By systematically leveraging on-the-job and workplace learning is fundamental to accelerate the time-to-proficiency.

**Three Workplace Training and Learning Strategies to Shorten Time-to-Proficiency**

The research study found three key training and learning strategies which systematically leverages various aspects of a workplace to accelerate time-to-proficiency of the employees.

**Manufactured and structured on-the-job experiences**

Most of the research participants appear to have consensus that professionals learn from real and hard problems they experience in their jobs. Exposure to various situations is subject to the occurrence of relevant events. If organizations are to wait for events to occur on its own to impart that experience needed to become proficient, it may take very long time. Participants mentioned that:

“...the people learn a lot of what they learn on-the-job. Now, the reason they learn something on a job is because they get delegated the task or something happens around them which means they have to respond to that happening [of events] around them. So in effect, if a particular task or a particular event never happens for 12 months, they end up not learning about it. [...] they learn based on what the universe decides to provide them in terms of experiences in a very happenstance fashion.”

Research findings suggest that if those experiences are systemically manufactured at the workplace and packed in a compressed time, one could accelerate the time-to-proficiency by exposing professionals to these experiences at an accelerated rate. Some representative comments support this conclusion is:

“.... people develop expertise primarily through experience. [...] That time can be shortened by using the taxonomy of cases to establish a learning path that is designed to systematically expose new hires to each of the experiences for which they need to develop proficiency. The experiences can be on-the-job, simulations, or even observations.”

For example, one may not encounter a difficult customer very often in sales. However, without having skills to handle such a customer, one may not be deemed proficient. In such situation, a sales agent could be made to listen to a recorded call of a difficult customer or he could be sent along with a senior sales person in a tough sales call.
Data suggest that ‘packing experiences in compressed timeframe’ is the essence of the strategy as stated by one participant as, “Trainees are systematically exposed to situations in a compressed timeframe that it would otherwise take years to experience.”

**Sequence of activities and experiences in a lean learning path**

The research findings noted that the strategy of ‘manufacturing the experiences’ works better when these experiences are organized, structured, sequenced and packed optimally in a compressed timeframe. One of the participants mentioned that:

“...let’s focus on learning by doing but let’s do it in such a way that we facilitate experiences in a structured sequence and let’s not just wait for the universe to provide those experiences in a haphazard fashion.”

An important part of the equation to shorten the time-to-proficiency appears to be efficient and optimal ‘sequencing’ of the activities and experiences, which is stated by one participant as:

“If I get my [proficiency] definition [and] I get my current [learning] path, I can start to see all sorts of opportunities to speed up that path to get to my [proficiency] definition and getting the path in the right order with the right amount of stuff is really the secret to it [accelerating time-to-proficiency] all.”

The activities could be already available in the daily course of business or could be manufactured as indicated by the first finding. Findings revealed that sequencing is made optimal by using some criteria like frequency of occurrence of the task (very frequent to rare), usage of the knowledge or skill (very often to hardly), complexity of the task (simple to complex) and difficulty level of the problem (very simple to very hard). One example of sequencing based on frequency is:

“So, we took all of the SOPs [standard operating procedures] and we organized them and we said- Which one of these SOPs would you expect somebody to do within the first three months of employment? And then Which one of these do you expect them to do from three to six months? And then from six to nine months? And then from nine months on?”

Another aspect of sequencing mentioned by the participants is to assign time targets to each activity. By doing so, the total time-to-proficiency can be estimated and tracked and then focused efforts can be made to shorten the time. This is evident from comment below:

“So the milestones are really saying, okay let’s put a time-to-proficiency on each of these statements […]. So if I sit down with you after three weeks, I know where you should be. You’re going to have master three things and you [are] working on these others and so it becomes part of an
ongoing assessment. […] For each [proficiency] statement you have a milestone and then we also have an overall time-to-proficiency for the whole thing, but you don’t get that all that on the last day, it happens as you go.”

The preliminary findings suggest that learning being a process, could be optimized using process improvement tools like Six Sigma to take the ‘time’ out just like any other workplace process, as can be inferred from the evidences below:

“One of those important things is that learning is a process, it’s not a single event it’s a process. […] I think that if you have a process one of the things you can do through these [process improvement] methodologies is to take time out of the process, you also take out waste [irrelevant activities] out of the process, [and] you take out variability [in time-to-proficiency].”

Overall, the research findings establish that time-to-proficiency could be accelerated by sequencing of available or manufactured activities in a learning path according to certain criteria, assigning time targets to activities and then packing the sequence in a compressed time frame.

Performance support systems and resources

Another important finding is increasing use of ‘Performance Support Systems’ (PSS). PSS are mostly the electronics resources like online learning content, reference material, knowledge-base, procedures, mobile applications, decision-making software, etc. which can provide just-in-time training or just-in-time support, “…and performance support simply means at the moment of need you have it available.” This research shows that organizations are deploying more performance support systems in place of or in augmentation of training, as inferred from comment:

“Organizational learning moves from being a training event to which employees need to be invited, to something that happens automatically as employees seek assistance on-the-job from the EPSS [electronics performance support system].”

Findings above also suggest that a PSS deployed to deliver learning or information at the moment of need actually accelerates time-to-proficiency because employees can access the resources at their own pace, rather than at the pace of the instructor or at the pace of information flow from their colleagues. Data also suggested that by using PSS to deliver informational content, the formal training intervention can focus more on critical human skills required for proficiency. It is also noticed that PSS can be used as part of the formal class or training itself can be delivered via PSS itself. This is supported by some comments such as:
“By integrating the learning material (such as scenario-based questions) into the business procedures, the EPSS becomes a powerful online learning platform. By tracking employee progress through the procedure-based exercises they need to complete in order to achieve and prove competence, the EPSS can integrate with an LMS to provide a comprehensive map of organization learning and competence achievement.”

One reason PSS could accelerate the proficiency is its ability to provide reinforcement of learning and knowledge at certain intervals as mentioned in one of the comments:

“That's why I think performance support, if it's linked to spaced practice, can be very useful. Just get people regular doses [of reinforcement]. It's not just what knowledge I need at that point in performance support, it's pushing other stuff to them as well that they don't need at that point, but they need to consolidate into long-term memory.”

Above evidence emphasize that if orchestrated strategically, the performance support systems may eliminate the need for lengthy and ineffective, content-driven, formal training and may leverage available workplace resources better to accelerate time-to-proficiency.

To conclude, referring to Figure 2 it is depicted that while there are numerous workplace training and learning strategies generally deployed at a typical workspace, this study reports that three strategies described above hold better possibility to reduce time-to-proficiency in the organizations. It is further noted that these strategies may complement, supplement or strengthen each other at workplace (as shown by bi-directional interactions with arrows) depending upon the job and context and can be implemented in different mix in different settings.

Figure 2: Three workplace Strategies to Shorten Time-to-Proficiency
DISCUSSION

The research findings in this study suggest a framework for systematically accelerating time-to-proficiency of employees through workplace learning and training strategies. Research revealed three strategies that will be discussed here in the light of support from the previous literature, confirming the finding of previous studies, adding new contribution made by this study to the knowledge.

A classic example of manufacturing and structuring experiences systematically is by Lesgold et al. (1992) who reported success of time compression strategy with SHERLOCK tutor in which electronics troubleshooting reduced four years of on-the-job training to approximately 25 hours of training. Klein (2003) and DiBello et al. (2009) also support approach to design experiences in compressed time. Their method involves recreating an experiential tough-case decision situation at workplace in form of 'strategic rehearsals' in which trainees are presented information in piecemeal fashion about a critical incident as it would unfold in actual situation, but the entire situation is presented in time-compressed format. This method is considered to accelerate expertise in decision-making in a shorter timeframe. Extending it further, Hoffman et al. (2008) presented a strategy called ‘tough case time compression’ in which a large corpus of rare tough cases is developed and used as training material either in classroom settings or workplace settings (p. 7-3). His premise is that if we can pre-burn the experience in trainees in a compressed timeframe, we may be able to accelerate the time-to-proficiency. Consistent with above research studies, present research study postulates that rather than waiting for workplace to provide experiences, if designers can leverage day-to-day routine at workplace, systematically design experiences and pack those in a compressed timeframe, the time-to-proficiency could be accelerated.

There is some evidence that best results of manufactured experiences are achieved when sequenced optimally to pack in a compressed timeframe that is our second finding. Such an approach of sequencing the activities, tasks and experiences is called learning path or pathway. In the context of the complex jobs, Darrah (1996) showed the use of a sequence of organized activities in a computer manufacturing company while Hutchins and Palen (1997) explains it for aviation for flight engineer’s role. The structured on-the-job training (S-OJT) methodology also incorporates a certain level of sequencing and logical flow of work activities for optimal results. There are some evidence that such structuring reduces training time (Jacobs, 2002; Jacobs and Bu-Rahmah, 2012; Jacobs, 2015). In their book Learning Paths, Rosenbaum and Williams (2004) shares that “Major shift in the way training needs to be structured involves integrating formal training, practice, and experience along a Learning Path, and not in a topic-by-topic curriculum” (p. 16). They advocated an approach which consists of 1) identifying all existing activities, assignments, tasks, job aids, on-the-job mentoring opportunities, job shadowing and available content, 2) sequencing those in form of learning path based on targeted proficiency definitions and 3) assigning time targets or milestones to each activity on the learning path. They claim that with such an approach organizations can achieve up to 30% reduction in time-to-proficiency. The present study
confirms that a correctly sequenced learning path has strong potential to reduce time-to-proficiency. The findings of this research support several of above observations.

Our study supports the technique to assign time target to each activity on the learning path, as mentioned above by Rosenbaum & William (2004). While still taking the ‘time’ out of the sequence, this technique allows designers to be conscious about the spacing and interval required for practice, reflection and feedback to ensure the sustained transfer of learning. Such spaced practice and intervals are considered very important by other researchers for sustained transfer to workplace (Birnbaum, Kornell, Bjork & Bjork, 2013; Thalheimer, 2006; Davachi, Kiefer, Rock & Rock, 2010; Karpicke & Bauernschmidt, 2011).

In regards to criteria for sequencing, Arnold et al. (2013) demonstrated that complex decision-making skills of novice-level professional knowledge workers were accelerated when they are presented with the ‘authentic cases’ which “gradually increases in complexity systematically extending procedural knowledge from case to case” (p. 7). This evidence support our finding that sequencing a learning path with correct criteria like frequency, complexity difficult plays a central role to accelerated proficiency.

A key contribution of the research study is the finding that process improvement methodologies, when applied to take the time, waste and irrelevant activities out and developing a lean learning path, directly leads to reduction in time-to-proficiency of learners. The literature lacks much support on this approach (Islam, 2006) while our research points out a potential area for further investigation how process improvement tools such as Six Sigma could be used to improve the training.

Based on preceding points, we hypothesize that time-to-proficiency of employees can be shortened if organizations leverage the workplace activities to achieve proficiency goals and then logically sequence those based on time-targets to remove irrelevant activities, waste, and time out of the learning path.

Literature supports our findings on performance support systems very well. Gery (1991) advocates using electronics performance support systems to provide individualized online access instead of the information content-heavy training upfront. Raybould (1995) view all computer based training, knowledge assets, information sources as a subset of EPSS, rather than as an alternative approach. Findings confirm that if strategically deployed, performance systems could either augment or completely replace the training interventions. It is also imperative to say here that with the availability of new technologies, shape and extent of performance support systems are also changing beyond its original role of just-in-time resource for training or support or information. Andrews (2004), based on framework by Rosenberg (2001), proposes that “the related constructs of “training”, “knowledge management” and “performance support” can interact to form a strong HPT [Human Performance Technology] toolset. All three constructs are crucial in building a learning organization” (p. 7). Such a performance support system provides crucial support during a rare event that either lacks systematic training or learners have forgotten how to do a low-frequency task.
Nguyen (2006) points out that as one progresses from novice to expert, as training interventions go down, there should be an increase in the use of EPSS. However, literature does not directly specify if and how EPSS accelerate proficiency. That’s where this study provides reasonable evidence that when proficiency goals are viewed holistically, then training, non-training and performance support solutions may be able to complement each other to accelerate the time-to-proficiency.

Overall it can be concluded that present study provides some useful insights into the phenomenon of time-to-proficiency. While it affirms certain observations from previous studies, it also provides some new strategies. The major contribution of study can be considered to be the integrated framework of four strategies working in tandem to shorten time-to-proficiency.

**IMPLICATIONS**

The framework suggested in this research can be useful to line managers, practitioners, academicians and workplace designers to put systems in place to shorten time-to-proficiency.

Based on the findings, it is recommended that designers should first define the proficiency indicators or measures for the job role. Then they should analyze the existing formal classroom-based training or other training interventions currently being used in the organization. Based on the end point proficiency goals, they should then map all the available activities, tasks and assignments done day-to-day routine and assess how each stated proficiency goal can be achieved through those activities. It is also recommended to assess already available performance support systems, job aids, online knowledge-base repositories, and other electronic resources to assess if any of the training requirements can be eliminated and if resources can be used instead to achieve same proficiency goal. Part of this assessment should be to rethink redeployment of existing PSS or design new PSS to deliver some content, information or training instead of lengthy formal training programs. The analysis may involve the availability of any e-learning or other training courses if certain outcomes are achieved best through those opportunities. Any other experience or activity necessary to reach the target proficiency but not occurring frequently enough at the workplace in the usual course of work should be ‘manufactured’ or designed.

Findings suggest to then sequencing the activities in a logical order to achieve targeted time-to-proficiency goals in shortest time. Different criteria like frequency, complexity, difficulty and usage of the skill can be used to create an optimal and logical sequence of activities. During sequencing, any irrelevant activities not leading to stated proficiency goals is eliminated. Above exercise should result in a lean and optimal sequence of activities. Based on findings, it is recommended that each activity should be assigned a milestone or time target based on overall time-to-proficiency goals for a given job.

Academicians and educational researchers may be able to extend these findings further. There is scope for future research to conduct pilot studies to test the conceptual
framework proposed in this paper and to test the effectiveness of strategies in different settings. It is also suggested that future research could be conducted to explore various factors that may impact the effectiveness of stated strategies. There is also the potential for longitudinal research by implementing the suggested workplace training strategies in a specific job setting and to do before and after comparison of gains in time-to-proficiency. Another potential research suggested here is to explore how the effectiveness of reported strategies can be enhanced with the use of latest technologies, mobile applications, content delivery platforms, knowledge management tools and team collaboration systems.

The data analysis is still in progress, and subsequent findings may change, enhance or augment the preliminary findings reported in this paper. Limitation of this research must be noted that participants reported effectiveness or success of various training strategies in reducing time-to-proficiency in terms of their own qualitative, quantitative or anecdotal measurements. Any evaluation of their measurement methods or metrics is kept out of the scope of the research.

**CONCLUSION**

Workplace training and learning strategies has never been that crucial as it has become in today’s business world. Organizations do not have time and options to put their professionals in lengthy formal training programs to develop and accelerate their proficiency. The study presented in this paper could be considered as first of its kind which provides a framework on how organizations can leverage workplace opportunities to shorten time-to-proficiency of their employees without taking them out of the job. From the preliminary data analysis, it can be concluded that time-to-proficiency of employees to acquire complex skills can be reduced through four workplace training and learning strategies: 1) manufacturing and structuring on-the-job experiences; 2) sequencing activities in a lean learning path; 3) providing performance support systems and resources. Though each strategy in itself could be successful in isolation, it is noted from participants’ accounts that improvement in time-to-proficiency will be more effective if these strategies are orchestrated together in appropriate mix based on context, job roles, and business challenges.
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