An integrative model of e-learning use: Leveraging theory to understand and increase usage

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ABSTRACT

Employees are increasingly using technology to access content for learning, and theory development has been outpaced by practice. Drawing on a well validated theory of behavior change (the Transtheoretical Model of Change), as well as theories on technology acceptance and employee development, this paper offers an integrative model of factors that influence employee use of e-learning as well as practical recommendations for how use might be increased. Recommendations for future research on e-learning are also offered.

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Keywords: e-Learning e-HR Transtheoretical Model of Change Technology Acceptance Model Employee development Training

1. Introduction

Arguably the most dramatic trend in employee training and development over the last 20 years has been the increased use of technology to deliver training (Brown & Sitzmann, 2011; Heathfield, 2010; Patel, 2010; Rossett & Sheldon, 2001). Part of what explains this trend is the convergence of technologies used to deliver content. Increasingly, movies, games played via dedicated consoles, books, audio recordings, and even live presentations are all being digitized and delivered via computer and network technologies. In the case of workplace learning, convergence allows learning materials of all kinds to be used by employees, on demand, through a variety of platforms — desktop computers, laptops, cellular “smart” phones, and increasingly agile digital book readers and media players. Digitally transmitted content accessed by employees for purposes of learning work-related knowledge and skill, which we label e-learning, is becoming an increasingly common aspect of work.

Concerns have emerged that e-learning often does not live up to its full potential, in part because of low usage rates and high attrition (Bell, Martin, & Clarke, 2004; Brown, 2001; Brown, 2005; Tyler-Smith, 2006; Wang, 2010). In short, the availability of an e-learning resource does not ensure its use, let alone its effectiveness as a tool to change employee behavior. Three related streams of research are useful for understanding these concerns, including research on: (1) general information technology usage (e.g., Davis, Bagozzi, & Warshaw, 1989; Venkatesh & Bala, 2008), (2) employee development broadly defined (e.g., Maurer, Lipstreu, & Judge, 2008), and (3) the limited research focusing directly on e-learning use (e.g., Brown, 2005; Luor, Hu, & Lu, 2009; Wang, 2010). Even though each of these areas offers some insight into e-learning use, no consensus has emerged about the dominant factors that determine employees’ usage decisions. This paper seeks to develop a theory, drawing from all three of these research streams, to explain the various factors that influence an individual’s use of e-learning. In addition, drawing on the logic of research regarding pre-training interventions and behavior change, the theory incorporates an intervention designed to boost the probability that a given individual will make use of a particular e-learning opportunity. More specifically, we adopt a well-validated model of behavior change, the Transtheoretical Model of Change (TTM; Prochaska, DiClemente, & Norcross, 1992), as a framework for designing a pre-training intervention to boost e-learning use. In this vein, our model is not intended to be an exhaustive portrayal of e-learning effectiveness, but a theory-driven perspective on the most proximal influences of e-learning

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1053-4822/$ – see front matter © 2012 Elsevier Inc. All rights reserved.
doi:10.1016/j.hrmr.2012.06.004
usage within a particular context. That is, the primary outcome in our model is use of e-learning, not learning (or transfer) as a result of it.

The paper is organized as follows. First, we will offer brief reviews of the literatures on e-learning effectiveness and use, information technology use (specifically through the lens of the Technology Acceptance Model: Davis et al., 1989), participation in employee development, and pre-training interventions. We then describe the TTM and adopt it to this context, offering both a conceptual model and specific research propositions. We conclude with limitations and suggestions for future research.

2. Literature review

The annual State of the Industry Report by the American Society of Training and Development (ASTD) offers a snapshot of changes that have occurred in training practices over time. The latest available report indicates that since 2001, the percent of training time organizations offer via technology has more than doubled (Patel, 2010). Even though classroom-based training still accounts for over 60% of training hours, the growth of technology-based training has been substantial — 36.5% of learning hours offered in 2009 were available via technology, the highest level since ASTD began collecting this data. Importantly, this estimate only accounts for formal training delivered via technology. The increase in on-line resources for learning, resources used informally to gather or share information, is harder to track. As one example, estimates suggest that approximately two-thirds of large organizations in the United States offer SharePoint to their employees (Infotrends, Inc, report cited in Greenfield, 2009). SharePoint is a Microsoft software platform that allows for file sharing and collaboration. SharePoint may be used simply to archive documents; or, more relevant to our model, it may be used as a platform to distribute materials intended to help others learn. Our definition of e-learning would subsume this use of the software. So estimates of e-learning derived from studies of formal training likely underestimate its prevalence, at least in organizations and industries where employees frequently work with computers.

2.1. e-Learning effectiveness

There are both advantages and disadvantages of the trend toward e-learning, which are discussed in more detail elsewhere (e.g., Welsh, Wanberg, Brown, & Simmering, 2003). The Welsh et al. (2003) review found that organizations can achieve numerous benefits from implementing e-learning programs, including consistency in training, reduced cycle time, increased convenience for learners, improved tracking capabilities, and reduced cost. Potential drawbacks, according to the authors, can include higher up-front cost, lack of trainee interaction, and the possible confusion within organizations of providing information (i.e., content to be learned) without actually providing training (i.e., content embedded within an instructional framework including objectives, practice, and feedback; Welsh et al., 2003).

Another potential advantage of e-learning is the flexibility and control that it typically affords learners. This increase in learner control has been noted as a defining feature of the shift to e-learning (e.g., Brown & Ford, 2002; Orvis, Fisher, & Wasserman, 2009). But learner control does not always result in better outcomes. As Kraiger and Jerden (2007) note in their meta-analysis, allowing learners control means that learners are free to not use the materials, or use them superficially. Learners may, for example, open an e-learning resource on their computer, but ignore it while they do other tasks. Or they may skim e-learning information quickly without paying attention to the materials.

Given the relatively equal number of advantages and disadvantages, research has been undertaken on the relative effectiveness of e-learning and traditional classroom instruction. One early meta-analysis of computer-based versus classroom classes found small advantages for computer-delivery (Kulik & Kulik, 1991). Similarly, a meta-analysis of video-delivered versus face-to-face delivery found a small advantage for video delivery (Machtmes & Asher, 2000). However, a more recent meta-analysis on the relative effectiveness of instructor-led versus web-based training reveals that many of the observed differences are attributable to differences in instructional design. The Sitzmann, Kraiger, Stewart, and Wisher (2006) meta-analysis found an effect favoring web-based training, but it was reduced dramatically when studies were restricted to those with similar instructional design across the classroom and web training. The finding that learning does not differ across different forms of delivery methods, so long as the content and instructional design are held constant, is a position well established in the instructional design and technology community (e.g., Clark, 1994, Russell, 1999; but see Kozma, 1994 for an alternative view). In general, meta-analytic work continues to indicate that learning outcome differences across technology delivery and more traditional face-to-face delivery, when potential confounds are controlled, are inconsistent or minimal (Allen, Bourhis, Mabry, Burrell, & Timmerman, 2006; Cook et al., 2008).

These results suggest that future research on the broad question of “which is more effective, e-learning or classroom instruction” is likely to offer little theoretical or practical value. E-learning offers the potential to increase access to learning resources, access that might not occur in the absence of the technology. Viewed from this perspective, more interesting research questions include, “how can we increase use of e-learning resources?” and “how can we design e-learning to maximize learning?” To this end, researchers have offered design principles relevant to e-learning. For example, Salas, DeRouin, and Littrell (2005) present a series of recommendations for the design and delivery of distance learning programs, of which e-learning is increasingly becoming the most common form (see Table 1). These empirically-based guidelines cover various topics including organizational contextual factors, design features, recognition of technology efficacy differences in learners, and learner control issues. An e-learning training program can be, for example, more cost effective than traditional classroom training if travel costs are eliminated. No travel may also mean employees spend less time away from the job. E-learning can also be useful for standardizing training and delivering it to large, geographically dispersed learners simultaneously. Learners might include
Another design-focused research synthesis is offered by Mayer and Moreno (2002); see also Clark & Mayer, 2008. Summarizing a series of laboratory studies of computer-based learning, the authors suggest that computer-based, multi-media training should be designed with five aids in place. Table 2 summarizes the names, descriptions, and average effect sizes for these aids. These guidelines derive from research on students working in a controlled laboratory setting. As a result, they speak to the question of how to maximize learning within computer-delivered lessons, not to the question of how to increase participation in such lessons.

It is worth noting that, even with no dramatic learning differences across technologies, technology choices do matter. There are other factors that come into play when organizational decision makers must decide which technology to adopt in a particular situation, such as meeting minimal requirements for the type of information to display as well as design, development, and delivery costs (see Reiser & Gagné, 1983). It is our contention that research comparing classroom versus technology-mediated training is less useful than research demonstrating how to ensure effectiveness of a particular medium once it is selected. Consequently, our model is not a media selection model, nor is it a broad model of e-learning effectiveness; it does not answer the question of “which technology would be best to use” or “how do we maximize learning.” Instead, our model addresses the overall set of proximal factors.

<p>| Table 1 |
| Distance learning guidelines. |</p>
<table>
<thead>
<tr>
<th>Guideline</th>
<th>Description</th>
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<tbody>
<tr>
<td>Only provide distance learning when you are sure it meets the organization’s needs.</td>
<td>Before distance learning is chosen as the strategy for delivering training, it is necessary to consider the organization development problems that it will address and the manner in which it can help solve these problems.</td>
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<td>Take into consideration human cognitive processes when designing distance learning programs.</td>
<td>Distance learning should be designed so that learning modules are consistent with the tenets of cognitive learning theory, a theory that explains how the mind processes environmental stimuli.</td>
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<tr>
<td>Enhance the learning experience by including both graphics and text in the presentation of learning topics.</td>
<td>Using multiple forms of media in distance learning is advantageous, because past research has demonstrated that individuals learn the most when they are actively engaged in the learning process; active learning is facilitated when both graphics and text are used in distance learning, because individuals are forced to make relevant connections between the words and the pictures.</td>
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<td>Include learning games.</td>
<td>Learning games are typically computer games that have been adapted to train specific workplace skills; these games can be beneficial to learning in that they: (1) increase the appeal of online training; (2) make the idea of “tests” less frightening; (3) facilitate discovery learning; and (4) offer trainees substantial amounts of practice in workplace skills.</td>
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<tr>
<td>Keep learners engaged.</td>
<td>One of the primary reasons why learners drop out of distance learning programs is the failure of many online courses to keep learners engaged; this problem, however, can often be remedied by a simple change in the focus of the distance learning program.</td>
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<tr>
<td>Offer a blended approach.</td>
<td>Offering a combination of training techniques will likely satisfy both employees who prefer to work online and employees who prefer classroom instruction.</td>
</tr>
<tr>
<td>Allow for interaction between trainees and for communication between trainees and facilitators.</td>
<td>Distance learning programs can allow for interaction between trainees and for communication between trainees and facilitators through asynchronous and synchronous communication tools and by building factors into the program such as virtual communities and interactions with expert sources and facilitators.</td>
</tr>
<tr>
<td>Offer computer-based, distance learning methods to computer-savvy trainees or train learners on computer basics before offering computer-based training.</td>
<td>Distance learning that employs computer-based instruction will likely be most suitable for trainees with high levels of prior experience with computers; however, one way to bring trainees with lower levels of computer experience up to the level of trainees with more extensive experience is to provide instruction on basic computer skills before trainees begin computer-based, distance learning.</td>
</tr>
<tr>
<td>Provide distance learning for hard-skill training but supplement it with other forms of instruction for soft-skill training and for training on such abstract topics as workplace ethics.</td>
<td>Distance learning appears to be particularly appropriate for the training of explicit, factual-based knowledge, for soft-skill training, and for training on such abstract topics as workplace ethics; however, distance learning might best be administered by supplementing it with other training approaches (lecture, role play).</td>
</tr>
<tr>
<td>Offer trainees control over certain aspects of instruction.</td>
<td>Trainees in distance learning programs might benefit from control over both the context of training examples/practice problems and the amount of instruction; however, it might be better to withhold some types of control from trainees, such as control over pacing, sequencing, and provision of optional content, because research has not shown these types of control to be consistently positive.</td>
</tr>
<tr>
<td>When offering trainees control over instruction, make sure that trainee preparation, system design, and workplace conditions facilitate successful use of that control.</td>
<td>In order to ensure that increased learner control will lead to better training outcomes, certain conditions should be met before trainees are granted this control, such as providing instructions on how to use learner control and why, allowing trainees to “skip” rather than “add” extra instruction, and promoting use of learner control through supervisor support of this instructional feature.</td>
</tr>
<tr>
<td>Guide trainees through the distance learning program.</td>
<td>Tools, such as advanced organizers and cognitive maps, may help trainees to have a better understanding of the core elements of training and, simultaneously, to traverse a distance learning program more easily.</td>
</tr>
<tr>
<td>Make the program user-friendly.</td>
<td>The course content of distance learning must be divided into small, manageable sections and each web page within the program should be limited to no more than two hundred words.</td>
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Source. Salas et al. (2005).
that influence whether an employee is likely to use a particular technology-delivered resource once it has been made available by the organization. We view question of use as fundamental precursor to overall effectiveness. After all, employees will not learn anything if they do not access the materials. We turn next to research that has directly addressed e-learning use.

2.2. e-Learning use

There have been a handful of studies that examine employee use of e-learning directly. Brown (2005), for example, examined the on-line learning activities of university employees who had access to an e-learning library of computer skills development courses. He found that individuals’ motivation to learn and workload both had direct effects on time spent in e-learning courses, which in turn had an effect on computer-related job performance as rated by supervisors. Consistent with prior research by Mathieu, Tannenbaum, and Salas (1992) in a more traditional training setting, Brown (2005) also found that participants who volunteered for the e-learning (versus being asked to complete e-learning modules by their supervisors) spent more time within the learning modules themselves.

Long, Dubois, and Faley (2009) utilized a case study approach to examine factors that influenced the use of online training within a US-based landscaping company. These researchers found that the well-established system, in place for over a decade, had a completion rate among employees who enrolled of only 21%. Subsequent analysis of employee surveys showed that the attrition from the time of enrollment to completion was not primarily due to course-related factors (e.g., design issues, technology concerns, or course content). Instead, job- and organizational-level issues appeared to be the main causes of trainee attrition, such as work overload.

Luor et al. (2009) collected data on individual differences, attitudes toward e-learning and intentions to use before the implementation of a new e-learning system (N = 170). One-hundred and twenty on-line courses were made available over a 10-month period, and the amount of time employees spent using those courses was recorded. The researchers found a relatively small relationship between intent to use and actual time spent with the system (r = 13). Surveys sent to employees after implementation revealed that high intent, low usage employees were effect by not having enough time to do the courses and experiencing technical difficulties.

Wang (2010) examined e-learning usage by surveying U.S.-based human resource and human resource development professionals (N = 398) about how many traditional and e-learning courses they had started and finished in the last three years. This method allowed the researcher to estimate relative completion rates. e-Learning completion rates ranged from 0 to 100%, with an average of 74%. In contrast, the average traditional program completion rate was 98%. Wang (2010) also examined predictors of completion rates, and found that both individual and work environment variables predicted completion of e-learning. Some of the strongest effects were for work environment characteristics. The amount of workload (negative), the presence of an organizational policy for completion, and the perception that more people complete on-line courses at their organization all predicted completion rates. Interestingly, technology self-efficacy did not predict, as expected from prior theory and research.

2.3. Use of information technology

The most widely cited model of technology adoption and usage in the literature is the Technology Acceptance Model (TAM; Davis et al., 1989). The basis of the model is quite simple — users’ perceived ease of use and perceived usefulness for a given technology will impact their intent to use and, via intent, their actual use of the target technology. According to Venkatesh and Bala (2008), the initial TAM model consistently explains about 40% of the total variance in individual intention to use a given information technology (IT). The TAM has undergone several adaptations and expansions since its initial conception, including the TAM3 (Venkatesh & Bala, 2008), which incorporates several new variables regarding the technology itself and the individual user that serve as antecedents to the foundational variables of perceived ease of use and usefulness. Venkatesh and Bala (2008) also discuss implications of the TAM3 model on pre-implementation interventions, which include four broad categories (design characteristics, user participation, management support, and incentive alignment). In short, the authors emphasize the need for organizations to ensure that accurate representations of the technology are provided to employees, and that the benefits of a new technology are communicated effectively.

While the “TAM has in fact come to occupy a central position in research focused on individual adoption of IT innovations” (Lucas, Swanson, & Zmud, 2007, p. 206), the original model and subsequent versions have limitations. A recent special issue of the Journal of the Association of Information Systems was focused on the appraisal and critique of TAM research since the inaugural
Davis et al. (1989) article. Goodhue (2007) points to two key issues with the TAM itself — namely, that increase use of technology may not always be a positive thing, and that the model ignores the issue of actual technology fit to the task itself, relying solely on individual perceptions to drive intent and use of a technology. In another commentary, Bagozzi (2007) states that while much of the subsequent research and theorizing related to TAM has focused on broadening TAM to include antecedents and consequences, little has been done to look more deeply into the “black boxes” of perceived ease of use and perceived usefulness. Finally, Straub and Burton-Jones (2007) raise an important methodological issue with much of the accumulated TAM research — common source bias. Because study protocols often ask study participants to rate their perceptions of ease of use and usefulness of a given technology, and then subsequently rate their actual use of the same technology, the potential for cognitive dissonance among study participants is high. Despite all of these reservations, it is clear that the TAM offers a useful set of constructs to assess when predicting technology use.

2.4. Participation in employee development

Maurer et al. (2008) summarize and extend prior research by Maurer (e.g., Maurer, 2002; Maurer & Tarulli, 1994) that focused on overall employee development activity. The researchers found that the effects of personality, development domain individual factors (learning orientation, goal orientation, and perceived need), and situational factors (work support) were mediated through motivational factors (particularly attitudes toward development), which in turn influenced involvement intention to participate (see also Carbery & Garavan, 2007). It is interesting to note that general mental ability had no effect on participants’ development motivations or intentions, and that the only variable outside of the motivational factors that independently influenced development activity was a history of prior participation.

The research results from Maurer (2002) and Maurer et al. (2008) suggests that learner motivation is an essential determinant of participation, particularly their prior participation in development and their attitudes toward development. However, there are limitations of this work as it applies to the study of e-learning. The model is focused broadly on any type of development, so it does not model differences across different types of content and different types of delivery technology. Perhaps more accurately, the model has a different fundamental purpose, seeking to examine participation in any and all development activities. While reasonable for studying development in general, this work may not be sufficiently focused to predict usage in a particular context (i.e., a particular e-learning resource).

2.5. Pre-training interventions

Research has also focused on how to intervene with trainees to ensure that they are ready for training. The logic behind such interventions is clear — training can be more effective and efficient if learners begin the training activity motivated to learn from the experience (Baldwin & Magjuka, 1997; Magjuka, Baldwin, & Loher, 1994). In the context of this review, we examine this literature to find theory-driven interventions that might increase e-learning use.

Cannon-Bowers, Rhodenizer, Salas, and Bowers (1998) developed a theoretical framework for conceptualizing conditions of practice for training events, with a particular focus on pre-training interventions (labeled “pre-practice conditions” in their article). The authors list six pre-training interventions within their framework, shown with their descriptions in Table 1. While the sixth item (team pre-practice briefs) pertains specifically to team training, the other five provide a means of categorizing pre-training activities that are focused on the individual trainee. Attentional advice interventions focus on trainee development of schema or mental models, which allow the individual to better assimilate new information with existing knowledge. Metacognitive strategies during the pre-training phase are self-regulatory in nature, and focus on priming trainees to assess progress and learning strategies prior to initiating a learning activity. Advance organizers provide a means for trainees to organize relevant information prior to a learning event, which in turn helps to orient the learner as new information is acquired during the learning activity itself. Goal orientation interventions refer to the establishment of training-related goals (either performance or mastery) from an outside source, rather than the general disposition of trainees towards the learning activity. Finally, preparatory information is focused specifically on the learning environment itself, and is information provided to the trainee prior to engaging in the learning activity that prepares the trainee for conditions that will likely be encountered through the course of training. This area of intervention is largely focused on potentially demanding training situations, such as therapy sessions and high-stress task conditions.

A recent study by Mesmer-Magnus and Viswesvaran (2010) provided a meta-analytic review at the five individual-level pre-training interventions, setting aside team pre-practice briefs. Their results showed that all of the intervention categories had positive effects on learning gains, with attentional advice and goal orientation showing the largest effects on learning outcomes. Moderation effects were found for the method of training used (traditional, self-directed, and simulation), as well as the content focus of the learning event (cognitive, skill-based, and affective); however, generally speaking, all of the interventions had positive impacts on trainee learning across all moderators.

In total, research does suggest the value of intervening prior to the start of a training activity, at least for learning outcomes. No research to our knowledge has examined the effect of intervening to increase usage rates, although such work is a natural extension of the Cannon-Bowers et al. (1998) framework. Moreover, research to date has focused on general pre-training interventions designed to be consistent across all learners. Future theory and research may benefit from adopting a tailoring or individualizing approach to pre-training interventions — intervening in the way most appropriate for a particular learner. In adopting TTM, this is the direction that our efforts take.
2.6. Summary

From the brief review of multiple streams of research, several themes are evident. First, perceptions regarding a technology, particularly perceived usefulness and ease of use, influence subsequent use of that technology. Second, attributes of an employee’s work role influence utilization, particularly workload. Third, contextual factors, including employer mandates for training utilization, the climate surrounding the use of learning initiatives, and the level of value placed on the learning itself by the organization, also exert influences on utilization. And, finally, individual motivation is perhaps the most proximal predictor of utilization. Prior research has examined motivation in different ways, including from the perspective of generalized motivations toward development. In an effort to build a theory to study utilization of particular learning resources, with particular content, we next examine a theory of motivation and behavior change.

3. A theory of behavior change

The TTM was first proposed by Prochaska and DiClemente almost 30 years ago (Prochaska & DiClemente, 1982), with their seminal article published ten years later (Prochaska et al., 1992). The TTM, also known as the “Stages of Change” model, is predicated on the idea that individuals enter into opportunities for change with different mindsets in regards to the change itself, which in turn can cause large variations in individuals’ willingness and/or ability to learn how to change, take action, and maintain changed behavior. The model delineates several stages, which represent different motivational states related to the targeted behavioral change. In the first stage (pre-contemplation), individuals do not see a need for change and have no intention to change their behavior in the near future. Contemplation is the second stage, in which individuals recognize a need for change, contemplate the change itself, but are not committed to taking action. In the third stage, preparation, individuals have both the recognition of need and intent to change in the near future, typically within the next month. During the fourth stage, action, individuals modify their actions and/or environment to achieve the desired behavioral state. Individuals who have changed their behavior remain in this phase for the period of time from initial change through six months. Finally, maintenance occurs once the individual has maintained the new behavioral pattern for greater than six months without relapse — within the perspective of the TTM, this stage can continue indefinitely.

It is important to note that the model is dynamic in nature — stage shifts occur over time, and individuals can conceivably jump forward or backward several stages (Prochaska et al., 1992). For example, a recovering drug addict can move from the maintenance stage to the pre-contemplation stage through a relapse in drug use. Likewise, an individual could conceivably move from pre-contemplation to action quite quickly, given a strong enough stimulus. A second important feature of the TTM is that it implies that different cognitions are necessary at each individual stage; thus, the model promotes the use of stage-based interventions to produce higher rates of behavioral change among participants (Prochaska et al., 1992).

Along these lines, researchers in the health sciences have progressed through two streams of research as potential tests of the model — one stream focused on differences among individuals who self-report at different stages of readiness for change prior to treatment, and another stream directed toward measuring the effectiveness of stage-specific interventions during the treatment itself. Support for the TTM through these two streams is mixed. While space prohibits a lengthy discussion of prior research, it is generally accepted that individuals at different stages exhibit a number of differences on key variables, perceptions of pros and cons related to the proposed change and change-related self-efficacy (see Di Noia & Prochaska, 2010; Hall & Rossi, 2008; Marshall & Biddle, 2001 for meta-analyses in this regard). In terms of stage-specific interventions, the empirical findings are equivocal. Several reviews, meta-analyses, and commentaries have been put forth in the past ten years on both sides of the argument (Spencer, Pagell, & Adams, 2001 for meta-analyses in this regard). In terms of stage-specific interventions, the empirical findings are equivocal. Several reviews, meta-analyses, and commentaries have been put forth in the past ten years on both sides of the argument (Spencer, Pagell, & Adams, 2001 for meta-analyses in this regard).

While the vast majority of the research related to the TTM has focused on psychotherapy and other health-related behavior change, a few empirical studies have looked at application of the TTM principles to business or general education-related contexts. First, Harris and Cole (2007) utilized the TTM to interpret results of a 9-month leadership development effort, and found significant relationships between participant initial stage of change and several outcomes, including job attitude, perceptions of areas for improvement, and evaluation of training content. Cole, Harris, and Feild (2004) developed a multidimensional item battery based on the TTM to measure differences in learning motivation levels in undergraduate students, and found strong relationships between TTM stages and multiple outcomes, including class attendance, course satisfaction, and exam scores. Grant (2010) explored the relationship between manager perceptions of costs/benefits of adopting workplace coaching behaviors and their individual stage of change. He found that managers at earlier stages had similar perceptions of benefit relative to later stage managers, but significantly higher perceptions of cost related to the adoption of these behaviors. In a similar vein, Grant and Franklin (2007) conducted a study of undergraduate students targeting improvement in study skills, and found that the perceived costs of change in study habits for students in early stages (e.g. pre-contemplation) were higher than the perceived benefits, whereas the opposite held true for students at later stages (e.g. maintenance). Narayan, Steele-Johnson, Delgado, and Cole (2007) examined participants in an intervention program for driving under the influence (DUI) offenders, and found significant relationships between stage designation with perceived choice to attend training, perceived social support, and motivation to learn. Finally, Tyler and Tyler (2006) provide a perspective on the application of the TTM to the teaching of business ethics in the undergraduate classroom. It is in this direction that we feel that the TTM holds potential value for guiding interventions intended to improve the effectiveness of training in general, and e-learning in particular.
The TTM also outlines processes of change that reflect the specific actions necessary for shifts in behavior to occur. Change processes are defined by Prochaska et al. (1992: 1107) as “covert and overt activities and experiences that individuals engage in when they attempt to modify problem behaviors”. The TTM defines ten process groups that have received the most empirical support across various psychological problem areas, including smoking cessation and obesity (Prochaska & DiClemente, 1985) — these process groups are listed and defined in Table 4. It is important to note that various processes are believed to be more effective in certain phases than others, reflective of the different attitudes and mindsets of individuals that are embodied in a particular stage of change at a given point in time. For example, according to the TTM, early-stage (e.g. pre-contemplation and contemplation) individuals will gain more benefit from actions that impact problem recognition at the onset, and emotional and environmental analyses once the targeted behavior for change has been identified. As individual progress towards later stages (e.g. preparation, action, and maintenance), execution of strategies focused on specific behavioral changes and cognitive appraisals of environmental stimuli and interpersonal relationships are most appropriate (Prochaska et al., 1992). Table 5 provides a graphic representation of the interaction of stages and processes of change.

To summarize, while there is ongoing debate with regard to some elements of the TTM, we feel that there is enough positive evidence in support of the general theory to warrant our theoretical application of the theory to the e-learning context. We do not wish to enter the fray in regard to the validity of the TTM in relation to health-related behavioral change; rather, we propose that the tenets of the model provide a unique lens with which to both understand motivation and to design interventions that increase the probability of usage.

### Propositions

A model integrating prior research and incorporating the TTM is offered in Fig. 1. The model incorporates general learner characteristics (drawn from the work of Maurer and colleagues), technology characteristics (as perceived by the user in accordance with the TAM), and context. At the core of our model is the notion that employee motivation to change as delineated by the TTM is a fundamental driver of utilization of e-learning opportunities. Based on the logic of the TTM, employees that are at earlier stages (i.e. pre-contemplation, and contemplation) of the model either do not recognize a need for a behavioral change (vis-à-vis the learning opportunity), or recognize a need but are not committed to making a change. In either case, individual motivation to change is low; hence, within the context of our theoretical model, the willingness to utilize e-learning resources to produce a behavioral change will also be low relative to individuals at later stages of the TTM. We summarize this point in Proposition 1:

### Table 3: Pre-training interventions.

<table>
<thead>
<tr>
<th>Pre-training intervention</th>
<th>Definition</th>
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<tr>
<td>Attentional advice</td>
<td>“Information, independent of performance content, about the process or strategy that can be used to achieve an optimal learning outcome during training”</td>
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<tr>
<td>Metacognitive strategies</td>
<td>Self-regulatory mechanisms that aid in guiding individual performance through “planning, monitoring, and revising goal appropriate behavior”</td>
</tr>
<tr>
<td>Advance organizers</td>
<td>“A category of activities such as outlines, text, aural descriptions, diagrams and graphic organizers that provide the learner with a structure for information that will be provided in the practice environment”</td>
</tr>
<tr>
<td>Goal orientation</td>
<td>“Type of goal (mastery or performance) which is set within the learning environment”</td>
</tr>
<tr>
<td>Preparatory information</td>
<td>Information that “aids by setting the trainees’ expectations about the events and consequences of actions that are likely to occur in the training environment”</td>
</tr>
<tr>
<td>Team pre-practice briefs</td>
<td>“Sessions where team performance expectations can be clarified, and roles and responsibilities established before team practice”</td>
</tr>
</tbody>
</table>

Note. Adapted from Prochaska et al. (1992).

### Table 4: Processes of change.

<table>
<thead>
<tr>
<th>Process of change</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciousness raising</td>
<td>Increasing information about self and problem</td>
</tr>
<tr>
<td>Self-reevaluation</td>
<td>Assessing how one feels and thinks about oneself with respect to a problem</td>
</tr>
<tr>
<td>Self-liberation</td>
<td>Choosing and commitment to act or belief in ability to change</td>
</tr>
<tr>
<td>Counter-conditioning</td>
<td>Substituting alternatives for problem behaviors</td>
</tr>
<tr>
<td>Stimulus control</td>
<td>Avoiding or countering stimuli that elicit problem behaviors</td>
</tr>
<tr>
<td>Reinforcement management</td>
<td>Rewarding one’s self or being rewarded by others for making changes</td>
</tr>
<tr>
<td>Helping relationships</td>
<td>Being open and trusting about problems with someone who cares</td>
</tr>
<tr>
<td>Dramatic relief</td>
<td>Experiencing and expressing feelings about one’s problems and solutions</td>
</tr>
<tr>
<td>Environmental reevaluation</td>
<td>Assessing how one’s problem affects physical environment</td>
</tr>
<tr>
<td>Social liberation</td>
<td>Increasing alternatives for non-problem behaviors available in society</td>
</tr>
</tbody>
</table>

Note. Adapted from Prochaska et al. (1992).
Proposition 1. Employees in pre-contemplation and contemplation stages will be less likely to utilize e-learning than employees in later stages.

While the pre-training stage of change is an important determinant of an individual’s propensity to use a particular e-learning resource, we believe that an individual’s stage can be altered through intervention — ideally, to move individuals from early to later stages within the TTM framework. Working within a technological context, we suggest that this intervention would consist of an email or other digital message sent to employees after their stage of change had been identified (see the method used by Smeets, Brug, & deVries, 2006). An individual’s particular stage of change can be identified via short surveys, which could be distributed to all employees as part of a needs assessment or climate survey. Alternatively, this entire process could be embedded within a single point of contact, with learners completing the survey and then automatically receiving a customized message based on their stage of change. Such an intervention is consistent with Cannon-Bowers et al. (1998) and might be considered a targeted form of preparatory information.

Previous research has shown that there are distinct differences among individuals at different stages within the TTM regarding their perception of pros and cons relative to a particular proposed behavior change (Di Noia & Prochaska, 2010; Hall & Rossi, 2008; Marshall & Biddle, 2001). Interventions that attempt to maximize perceptions of pros and minimize cons for a given behavior change have been successful in other disciplines, not only in improving the balance of pros/cons (Grant & Franklin, 2007), but also in moving individuals from early to later stages within the model (Prochaska et al., 1992). Thus, we also expect that interventions targeted at early stage individuals relative to an e-learning initiative can have a positive impact on their eventual utilization of e-learning, as illustrated in Proposition 2:

Proposition 2. Employees in the pre-contemplation and contemplation stages who receive pre-training material discounting cons and highlighting the pros of the training-related behavior change will be more likely to use related e-learning resources than those employees who do not receive this material. This effect will be mediated by a shift toward a later stage of change.

Table 5

<table>
<thead>
<tr>
<th>Interventions to shift stage of change.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-contemplation</td>
</tr>
<tr>
<td>Consciousness raising</td>
</tr>
<tr>
<td>Note. Adapted from Prochaska et al. (1992).</td>
</tr>
</tbody>
</table>

Fig. 1. An integrative model of e-learning use.
Next, prior studies related to the TAM suggest that perceived ease of use and perceived usefulness of the technology influence eventual usage. These perceptions should be used to capture the influence of technology, a particularly important issue if a study is examining multiple programs delivered with different forms of technology. Assessing these constructs will ensure that observed relationships between a pre-training intervention and usage is not confounded by the type of technology used in a particular e-learning setting.¹

**Proposition 3.** The higher the perception by learners that the delivery technology is easy to use, the greater the use of an e-learning offering by learners.

**Proposition 4.** The higher the perception by learners that the delivery technology is useful, the greater the use of an e-learning offering by learners.

Maurer's work suggests that past development history predicts participation in development activities (e.g., Maurer et al., 2008). His recent theorizing also extends prior findings about attitudes toward development to propose a motivational state that he labels “learning and development orientation”. Maurer (2002) proposes that learning and development orientation includes cognitive, affective, and behavioral facets and ultimately captures the extent to which the learner believes that learning and development, in the context under study, is relevant to the self. This model subsumes various dimensions of learner motivation under one umbrella. Consistent with Maurer (2002), we propose that both past development experiences and the combined set of motivational factors (subsumed under the label of learning and development orientation) will predict e-learning use.

**Proposition 5.** The greater the past participation by learners in learning and development, the greater the use of e-learning.

**Proposition 6.** The higher the learning and development orientation of learners, the greater the use of e-learning.

Our last set of propositions involves several contextual factors that we expect will have an impact, either directly or indirectly, on e-learning usage. The first context-related variable that we will discuss is e-learning climate within the workplace. While several definitions of a general training climate have been offered in the literature (Holton, Bates, & Ruona, 2000; Kozlowski & Hults, 1987; Tracey & Tews, 2005), our use of the term “climate for e-learning” is focused on the overall level of support provided by the organization to employees in regard to the use and availability of e-learning resources. Actions taken by the organization that would fall under this umbrella include the level of legitimacy managers convey e-learning has as a learning tool, policies and resources that encourage e-learning use, and the extent of managerial support of employees’ time investment in e-learning activities. If the organizational climate is unsustainable for e-learning initiatives, we would expect that any effects of positive learner-specific perceptions of the ease of use or usefulness of the e-learning technology would be reduced in such an environment. Hence, climate for e-learning moderates the relationship between learner perceptions of e-learning technology and e-learning usage, as proposed in the following:

**Proposition 7.** Individual perceptions of the ease of use and usefulness of e-learning technology will have a stronger effect on e-learning usage when the learner works in a climate that is supportive of e-learning than when the learner works in a less supportive environment.

The second contextual variable in our model is at the individual level — employee workload. As shown in the Brown (2005), Luor et al. (2009), and Long et al. (2009) studies, heavy workload has a significant dampening effect on utilization. Recent work has demonstrated that individuals who deliberately self-regulate to alter their behavior must exert energy (Vohs, Baumeister, & Ciarocco, 2005). Compared to individuals with low workload, individuals with higher workloads may find it difficult to exert the mental energy necessary to alter their behavior. Thus, we would expect that individuals with high workloads will find difficulty in diverting time and energy towards an e-learning offering, regardless of their stage of change, development characteristics, or perceptions of the e-learning technology itself.

**Proposition 8.** The lower the individual workload of a potential e-learning user, the greater the use of e-learning by that user.

The final contextual variable in our model is labeled “climate for desired change.” Climate for desired change includes formal HR systems and organizational mandates (clear statements by company leaders that emphasize the value and requirement by the organization of a given behavioral change). This differs from climate for e-learning in that climate for desired change is focused on specific actions or requirements made by the organization in regard to the behavior change itself, rather than the delivery technology employed to help bring about the behavioral change. The generalities of the climate for e-learning could be considered as a “pull” for employees to use e-learning resources, while climate for desired change involves a “push” by the organization towards employee utilization of specific resources aimed toward the intended behavioral change. In an environment where a tracking system has been implemented, HR policies and systems support the use of the behavioral change through explicit linkages, and management has voiced clear support of the need for change, we would expect that interventions would have a better chance for success than in situations where compliance is optional, unchecked, and lacks explicit managerial support. As a simple illustration, managers who advocate for improved service by employees, and simultaneously alter the recruiting, selection,

¹ Our model does not include “intent to use” simply for parsimony; the influence of intention is an unmeasured mediator between perceptions of technology and usage. Such micro-mediators are always present in causal models and, although of interest to some researchers (based on their research question), seldom represent a threat to internal validity (Cook and Campbell, cited in Hollenbeck, 2008).
and compensation systems, as well as mandate that all employees take service training, create a context conducive to improving customer service behaviors of employees. In such a context, an intervention designed to alter employees’ stage of change for customer service activities will have a much stronger effect. More formally:

**Proposition 9.** Individualized interventions tailored to the learner’s stage of change will have a stronger effect on the learner’s stage of change when the climate for the desired behavior change is high, as compared to when the climate for the desired behavior change is low or absent.

It is worth noting that Proposition 9, unlike its predecessors, is purposefully written as a general proposition that is applicable beyond only e-learning contexts. Referring back to Fig. 1, Proposition 9 relates to how the “climate for desired change” contextual variable influences the effectiveness of a pre-learning event intervention for altering an individual’s stage of change. As such, the mode of learning (e.g., e-learning, classroom-based instruction) is not a factor in this relationship. While this is an important consideration in our model for understanding a potential mitigating factor of environmental influence on stage of change interventions, it is not unique to e-learning. Nevertheless, we believe that this is a potential avenue for future empirical research, as the magnitude of effect for this variable may be different between e-learning contexts and other workplace learning situations.

Our final proposition focuses on the direct effect of climate for desired change on e-learning use. To the extent that management actively supports a particular change, learning opportunities relevant to that change will be viewed by employees as relevant to their work. As noted earlier, we intend the model to be tested for e-learning use in a particular context, so e-learning here would refer to a particular set of learning resources that would be aligned with the change sought. Returning to the example of customer service training, such training should be viewed as meaningful, and sought after, in organizations where the climate for customer service is strong.

**Proposition 10.** The higher the climate for desired change, the more likely learners will make use of e-learning that is consistent with that change.

5. **Discussion**

As organizations increase the availability of digital resources intended to help employees learn, questions of use will become even more important. There is sufficient anecdotal and empirical evidence to suggest that the usage of e-learning resources is often much lower than organizations would hope. The model presented in Fig. 1 offers a parsimonious portrayal of the most proximal influences of e-learning use. As a result, this model can be used to guide research on usage, as well as a wide variety of interventions that might increase usage. The model also suggests a principal point of leverage, based on the TTM, of a learner’s stage of change. With knowledge of a learner’s stage of change, managers can use technology to launch individualized interventions that alter motivation and thus increase usage.

As an illustration of the model, consider an organization that is implementing sexual harassment training via an online module. Organizations implement sexual harassment training for a variety of reasons, including compliance with federal and state laws. Some organizations train as a way to alter employee behavior. Given the complex motivations (not to mention unethical propensities) of most sexual harassers, it is unlikely that their behavior can be altered with a simple training intervention. However, the behavior of the vast majority of employees could be targeted, specifically with regard to how they react to offensive jokes and what they do after witnessing offenses. Organizations can survey employees (and perhaps suppliers or other relevant groups) as part of a climate survey to determine their stage of change relative to confronting and reporting offensive behavior. Following this survey, individualized email reminders regarding the training could be sent that are tailored to each individuals’ stage of change. According to the model presented here, this intervention should boost use relative to the baseline as a result of shifting employees’ stage of change. To fully test the model, it would be necessary to measure other learner characteristics (i.e., learning and development orientation and past learning and develop use), perceptions of the delivery technology (i.e., perceived ease of use and usefulness), and aspects of the workplace context (i.e., climate for e-learning, climate for confronting and reporting harassment, and learner workload).

The model presented here also could help managers who seek guidance on how to push a desired change through the organization via e-learning. The model suggests that the motivational intervention will be most successful when the training climate is supportive, the administrative context is aligned, and employee workload is reasonable. Guided by this framework, managers could enact policy changes related not only to support of training, but also in support of the desired behavior change. In this example, this would require efforts to alter the climate regarding how employees react to offensive behavior. In addition, management could offer paid release time to complete the training.

There is a major challenge to this approach, particularly in the example offered. This challenge, which one of the authors has encountered in his consulting work, is a concern regarding employee privacy. Some organizations may not be comfortable with survey results being tracked to the level of individual respondent; the lack of anonymity might encourage response distortion. In the case of sexual harassment, there is also a related concern about increased liability. Organizations that have concrete data indicating which employees are least likely to alter their behavior may be concerned that this knowledge could be used to support claims of culpability (such as, in the case of motivation regarding harassment, for harassment). If the courts determined that ‘low’ scores on a stage of change survey (i.e., pre-contemplation) could reasonably be interpreted as a ‘high’ risk score for offending, then failing to confront these individuals might be construed as failure to remediate. The degree to which privacy and liability concerns arise will
vary across organizations and across training content, as this example illustrates. Training for technical skills, such as how to use a new online form, would be less likely to raise privacy and liability concerns. Nevertheless, these issues must be considered before implementing a system such as the one we recommend.

5.1. Limitations and conclusion

The model we offer examines e-learning use only, and thus does not examine other outcomes, including learning, application, and transfer. While we feel this is appropriate given the need to understand usage as a prerequisite for these other outcomes, we recognize this as a limitation of our theory. Another limitation is the focus on behavioral change. Some training programs are offered for reasons that do not relate to behavioral change. If e-learning is being offered solely for compliance only (without any attending desire for change), then it is possible that other factors, not included in our model, may come into play. For example, employees may be influenced by what they perceived to be the risk to themselves and the organization for not completing the training. Our model is also limited in that we discussed only one type of pre-training intervention — an individualized intervention most similar to the concept of attentional advice. Cannon-Bowers et al. (1998) offer alternative interventions that might be useful for both improving use and learning. In order to keep our model testable, we limited our discussion.

A final limitation of the model discussed here is that we have offered a theory-driven, practical recommendation without providing in-depth detail on the intervention to be employed. Future research would be useful to determine the precise features of appropriate interventions beyond what we have spelled out here. We also encourage greater elaboration of the processes of change that would be used for learners in various stages. For example, Prochaska et al. (1992) discuss dramatic relief as one process that is helpful for transition from pre-contemplation to contemplation (see Table 3 for a description). How could this therapeutic technique be adopted to a work setting? Research to examine the relative effectiveness of different approaches is also encouraged. Such research would be most powerful if it was conducted as field experiments — randomizing employees to receive no intervention, targeted intervention using one approach, and targeted intervention using another approach. In this way, the model could be examined as a whole while also experimenting with the details of how to best intervene to improve usage.

In this manuscript we have offered a model that advances both theory and practice related to e-learning. Drawing on prior research on pre-training interventions, technology acceptance, and participation in employee development, we summarized the most proximal determinants of e-learning use. Moreover, using a well-established theory of behavior change, we propose a means by which organizations can bolster participation both at the individual and at more collective levels. Guided by this model, we hope that both researchers and practitioners will be able to increase the use of the ever increasing store of digital learning materials available to employees.

References


