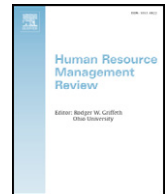




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## The influence of technology on the future of human resource management



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### ABSTRACT

In recent years, information technology has had a profound effect on human resources (HR) processes and practices. However, relatively little research has examined its effectiveness, and most of the existing studies have not assessed the degree to which these new systems enable organizations to reach their HR goals of attracting, motivating and retaining employees. One reason for this is that there are a number of limitations associated with current systems including the fact that they: (a) use one way communication systems, (b) are impersonal and passive, (c) do not always allow for interpersonal interaction, and (d) often create an artificial distance between individuals and organizations. Thus, the primary purposes of the present article are to review the current effects of technology on HR processes, consider the existing literature on the topic, and discuss the advantages and potential limitations of using these systems. In addition, we offer directions for future research and practice on using technology to facilitate HR processes.

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Information technology has had widespread effects on almost every aspect of our society. From the invention of the telegraph to the creation of smartphones, it has changed the way we live our lives and do our jobs. For example, technology has altered the way we purchase products, communicate with others, receive health care services, manage our finances, and educate our students. It has also had a profound impact on organizational processes, including those in Human Resource Management (HR) (Gueutal & Stone, 2005; Kavanagh, Thite, & Johnson, 2015; Parry & Tyson, 2011; Strohmeier, 2007), and transformed the way that organizations recruit, select, motivate, and retain employees. Interestingly, a survey of leading consulting firms indicated that "...there are two primary drivers of change in HR: technology and talent management. ...Continuous innovations in technology will fundamentally change the way HR work is accomplished." (Society for Human Resource Management [SHRM], 2002, p. ii). In this context, we define information technology (hereinafter referred to as technology) as the application of computers and telecommunication devices to collect, store, retrieve, and disseminate data for business purposes ([http://en.wikipedia.org/wiki/Information\\_technology](http://en.wikipedia.org/wiki/Information_technology) retrieved June 18, 2014).

Despite the pervasive impact of technology on HR in organizations, there has been relatively little research that examines its effectiveness (Gueutal & Stone, 2005; Olivias-Lujan, Ramirez, & Zapata-Cantu, 2007; Parry & Tyson, 2011; Ruël, Bondarouk, & Looise, 2004). Thus, we believe that additional research is needed to assess the degree to which technology and electronic human resource manage-

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ment (eHRM) enable organizations to achieve their HR goals (Parry & Tyson, 2011; Stone, Stone-Romero, & Lukaszewski, 2003). e-HRM is defined as a system that allows managers, applicants, and employees access to human resource related information and services through the Internet or an organization's intranet or web portal (Lengnick-Hall & Moritz, 2003).

Given the rapid changes in technology in the past decades, we believe that it will influence the nature of HR processes in the future. Thus, the primary purposes of this paper are to (a) review the current effects of technology on HR processes, (b) consider the existing literature on the topic, (c) discuss the advantages and limitations of these new systems, (d) suggest how it may affect the future of HR, and (e) offer directions for future research and practice.

### 1. How has technology affected HR processes?

The principal goals of HR in organizations are to attract, select, motivate, and retain talented employees in their roles (Katz & Kahn, 1978). These goals have become extremely important in recent years because organizations compete on the basis of the skills and talents of their workers (Huselid, 1995). Technology has transformed the way HR processes are currently managed, mainly in terms of how organizations collect, store, use, and disseminate information about applicants and employees. In addition, it has altered the nature of jobs, job relationships, and supervision. Innovations such as telework, virtual teams, and web-based job applications are due to commensurate innovations in technology. Apart from the impact of technology on HR processes, Kiesler and her colleagues argued that IT now mediates the relationship between individuals and organizations, and subordinates and supervisors (Kiesler, Siegel, & McGuire, 1984). It has also reduced the influence of distance in organizations so that employees can work from home or interact with team members across geographical boundaries. Furthermore, it has enabled organizations to hire individuals with specialized skills in remote parts of the world (e.g., software developers) (Aguinis, Henle, & Beaty, 2001; Aguinis & Lawal, 2013). Therefore, in the paragraphs below, we provide an overview of some of applications of technology and eHRM in organizations. We also provide a brief review of the research on the topic, but note that our review is not exhaustive.

### 2. Goal 1: Attracting a talented and diverse workforce

One of the primary goals of HR is to attract and retain a talented workforce (Katz & Kahn, 1978). The first step is thus recruiting a qualified, diverse, and motivated applicant pool. Effective recruitment can not only enhance the skills and diversity of the workforce, but can also help build customer satisfaction, foster innovation, and encourage creativity (Cox, 1993). Over time, various forms of technology have been introduced to attract applicants, ranging from passive, one-way technologies (e.g., web-based job ads, job boards) to more interactive techniques (such as virtual job fairs). Some estimates indicate that approximately 90% of large organizations use one or more forms of technology to advertise jobs and enable applicants to submit online applications (e.g., Mackelden, 2013). The following paragraphs focus on the use of technology for recruitment, and this process has been labeled as electronic recruiting (e-recruiting).

### 3. Research on e-recruiting

One of the key questions surrounding e-recruiting is "Does information technology enable organizations to increase the number of successful placements made?" Although researchers have begun to analyze e-recruitment factors that affect applicant attraction to organizations (e.g., types of applicants attracted to the organization, website attributes, customization of information provided), little or no research has assessed the effects of e-recruitment on the success of job placements or retention rates (see Dineen & Allen, 2013; Dineen & Soltis, 2011; Stone, Lukaszewski, & Isenhour, 2005; Stone et al., 2003).

Perhaps the most essential question regarding the efficacy of e-recruiting is "Does it attract *talented and diverse* applicants who can perform successfully in organizations?" Although few studies have addressed this question, those results indicated that e-recruiting attracts greater numbers of applicants, but *not* higher quality applicants as compared with traditional recruiting technologies (Chapman & Webster, 2003; Galanaki, 2002). Furthermore, the increased volume of applicants increases administrative and transaction costs (Stone et al., 2005). Even though one study did find that e-recruiting attracted applicants with higher levels of drive, achievement, and persistence than traditional recruiting, that same study found that e-recruiting also appealed to job hoppers with unfavorable backgrounds (McManus & Ferguson, 2003).

In terms of diversity, research thus far suggested that e-recruiting may not help organizations increase workforce diversity (e.g., Kuhn & Skuterud, 2000; McManus & Ferguson, 2003; Zusman & Landis, 2002). For instance, some studies found that older applicants, ethnic minorities, and women were less likely to use e-recruiting than Anglo-Americans (e.g., Kuhn & Skuterud, 2000; McManus & Ferguson, 2003), thus limiting the degree to which organizations meet their diversity goals (see Stone et al., 2003; Stone, Lukaszewski, Stone-Romero, & Johnson, 2013 for a more thorough discussion). One reason for this is that some ethnic minorities (e.g., African-Americans, Hispanic Americans) still have less Internet access at home, and others (e.g., older individuals and women) often have higher computer anxiety and lower computer-self-efficacy than their counterparts (Johnson, Stone, & Navas, 2011; Pew Internet & American Life Project, 2010; Wallace & Clariana, 2005). Notably, the differences between traditional and e-recruiting may be less problematic as younger, more technology-oriented applicants enter the workforce.

In contrast to the studies that focused on applicant characteristics, other research on e-recruiting has focused on characteristics of the technology such as website attributes and the use of customization as a means of influencing applicant satisfaction and attraction to the organization (Dineen & Allen, 2013; Dineen & Soltis, 2011). These results suggested that although the ease of use of the website and its perceived quality were positively related to applicants' attraction to the organization (Scheu, Ryan, & Nona, 1999; Zusman & Landis, 2002), the attractiveness of the website was not related to applicants' motivation to apply for jobs (Cober, Brown, Levy,

Keeping, & Cober, 2003). Other research examined the relative effects of objective (e.g., job attributes), subjective (brand image, fit), and critical factors (e.g., website medium) on applicants' attraction to organizations (Allen, Mahto, & Otondo, 2007). Those findings revealed that organizational image and media richness were positively related to website credibility and attitudes toward the organization (Allen et al., 2007; Badger, Kaminsky, & Behrend, 2014; Lyons & Marler, 2011). Media richness refers to the social, visual, and aural cues inherent in interpersonal communication including non-verbal behaviors, eye contact, and head nodding, (Daft & Lengel, 1986).

Still other studies assessed the impact of customization, or personalization, of e-recruiting information on applicants' attraction to organizations, and found that it (a) encouraged applicants to apply for jobs, (b) persuaded poor-fitting job seekers to eliminate themselves from the applicant pool, and (c) influenced well-fitting applicants to apply for jobs (see Cable & Turban, 2001; Dineen & Allen, 2013; Dineen & Noe, 2009).

#### 4. Limitations of e-recruiting and directions for the future

To date, the research findings on e-recruitment are somewhat mixed, but some evidence suggests that it may increase the efficiency and lower the costs of the recruiting process (Cappelli, 2001). However, studies do not clearly indicate if it helps organizations enhance the goals of attracting a large pool of talented and diverse job applicants (Allen et al., 2007; Chapman & Webster, 2003; Galanaki, 2002; McManus & Ferguson, 2003). One reason for this may be that the current technologies use static, or one-way communication processes that merely provide information to applicants about job openings and enable them to apply for jobs online (e.g., websites, job boards). These technologies do not give applicants the opportunity to ask questions or interact with organizational members. As a result, applicants do not have the opportunity to communicate with actual organizational members or clarify the nature of jobs or the benefits of working for the organization. Thus, we believe that current e-recruiting practices may be extremely impersonal, passive, and create an artificial distance between applicants and organizations.

In contrast to one-way technology, some new interactive technologies may enhance the personalization of e-recruiting, and increase its overall effectiveness (e.g., Web 2.0, social media, virtual reality, blogs, virtual job previews) (see Dineen & Allen, 2013; Sullivan, 2014). For instance, in the future Web 2.0 users will be able to attend virtual job fairs, develop interactive dialogues with organizational members, and experience a virtual preview of life in the organization. A virtual job fair is an online event where employers and potential applicants connect in a virtual environment using computer-based simulations, chat rooms, webinars, and webcasts to browse company booths, upload resumes, and meet with employers ([http://en.wikipedia.org/wiki/Virtual\\_reality](http://en.wikipedia.org/wiki/Virtual_reality) retrieved June 13, 2014). Some organizations are already using *Second Life Virtual Environments* to conduct job fairs (T-Mobile, eBay, Verizon, U.S. Army) (Kaplan & Haenlein, 2009). *Second Life Virtual Environments* allow multiple users to access simulated worlds, and take the form of avatars that are visible to others. The users are also presented with perceptual stimuli, allowed to manipulate elements in the simulated world, and experience a degree of telepresence (<http://secondlife.com/whatis/> retrieved June 14, 2014).

The trend toward use of more interactive technologies for e-recruiting is a positive step toward enhancing the organization's image as a warm and welcoming place to work, and ensuring that e-recruiting meets its intended goals. Research findings regarding traditional recruiting highlight the effectiveness of techniques in terms of interpersonal style of recruiters and their perceived credibility (Rynes, 1991) both of which are possible with interactive technology. Likewise, studies found that some minorities (e.g., Hispanic-Americans, women) are very relationship-oriented and prefer interacting with individuals rather than information technology (Johnson et al., 2011). In this way, the two-way communication processes available with interactive e-recruiting should help attract a more diverse pool of applicants. Overall, the use of interactive technologies should have a positive impact on applicants' motivation to apply for jobs and their subsequent satisfaction levels.

In a related vein, another limitation of e-recruiting technology has been that it is a passive process in which organizations use technology; i.e., post information and wait for applicants to apply for jobs. In the future, e-recruiting may become much more proactive and use social media (e.g., LinkedIn) to scan individual profiles, identify talented employees, and contact them about job openings. In this way, organizations can use technology to reach out to qualified and diverse job applicants, and motivate them to apply for jobs. Moreover, this proactive strategy should be especially effective in terms of enhancing the diversity of the applicant pool. One reason for this is that some minorities (e.g., Hispanic-Americans, older individuals, women) may have reward preferences that are different from the dominant group in our society (e.g., Bell, Marquardt, & Berry, 2014; Guerrero & Posthuma, 2014; Hertel, van der Heijden, de Cange, & Deller, 2013; Stone, Johnson, Stone-Romero, & Hartman, 2006). Therefore, data from social media or crowdsourcing can be used to identify the reward preferences of diverse applicants, and recruitment strategies can be tailored to meet their needs (see Stone et al., 2006; Sullivan, 2014). Crowdsourcing refers to the process of proactively obtaining ideas, information, or needed services by soliciting information or contributions from large groups of people online rather than in traditional face-to-face settings (<http://www.merriam-webster.com/dictionary/crowdsourcing> retrieved June 13, 2014).

#### 5. Goal 2: Selecting talented and diverse employees

A second goal of HR is to select the most talented applicants from among those who apply for the job, and ensure that they represent the diversity of applicants in the labor pool (Guion, 1965). In recent years technology has had a major impact on this process, with some reports indicating that 74% of large U.S. organizations now use electronic selection to facilitate the hiring process (CedarCrestone, 2010). The term e-selection is used here to refer to various forms of technology to assess the degree to which applicants' knowledge, skills, and abilities (KSAs) fit with the job requirements (e.g., web-based job applications, tests, and interviews; see Stone et al., 2013).

A key question is "Does the use of e-selection help organizations hire the most talented and diverse applicants?" There has been some research on e-selection, but we know of no research that has examined this overall question. Instead, some studies have examined the effectiveness and acceptance of e-selection in terms of each of the following four steps: job analysis, job applications, tests, and interviews. A brief review of that research follows.

### 5.1. Electronic job analysis

Electronic job analysis (EJA) allows subject matter experts in different geographic locations to provide data about job duties and worker requirements, and then work together in a virtual team to come to an agreement about these job and behavioral requirements (Reiter-Palmon, Brown, Sandall, Buboltz, & Nimps, 2006). Initial findings from this research indicated that EJA methods resulted in more comprehensive descriptions of jobs, and shorter completion times compared with traditional job analysis methods (Reiter-Palmon et al., 2006).

### 5.2. Electronic job applications

Organizations are also using web-based application systems that require applicants to apply for jobs online, and use keyword screening systems to determine whether applicants are qualified for the job. There has been considerable research on web-based applications, and studies examined the effects of website characteristics on applicants' attraction to organizations (see section on e-recruiting) (e.g., Allen et al., 2007; Cober et al., 2003; Dineen & Allen, 2013; Lyons & Marler, 2011; Zusman & Landis, 2002). Other studies assessed the legality of the content of these applications (Wallace, Tye, & Vodanovich, 2000), administrative use of these systems (Mohamed, Orife, & Wibowo, 2002), and individual factors that affect use rates (McManus & Ferguson, 2003; Pew Internet & American Life Project, 2010; Stone et al., 2003). For instance, Wallace et al. (2000) found that 97.5% of online applications contained at least one illegal or non-job-related question. In addition, a study on administrative factors found that the criteria used for keywords were not always based on job-analysis (Mohamed et al., 2002). Furthermore, results of a study by McManus and Ferguson (2003) found that there were age, sex, and race differences in the use and acceptance of online job application systems.

### 5.3. Electronic tests and personality inventories

Most of the research on e-testing has focused on the measurement equivalence of computerized versus paper forms of various cognitive ability tests and personality inventories (Mead & Drasgow, 1993; Ployhart, Weekley, Holtz, & Kemp, 2003; Potosky & Bobko, 2004; Tippins, 2009). For example, some studies found that applicants' scored lower on computerized cognitive ability tests that were unsupervised than paper and pencil versions that were supervised (Coyne, Warszta, Beadle, & Sheehan, 2005). Other studies found a moderate correlation ( $r = .60$ ) between the online and paper versions of cognitive ability tests, but the mean scores on the computerized version were significantly lower than those on the paper version (Potosky & Bobko, 2004). In addition, one study found that younger individuals performed better on computerized cognitive ability tests than older individuals, but there were no age differences in performance on the paper version of the test (Potosky & Bobko, 2004). It should be evident from the brief review above that the research on the equivalence of computerized and paper and pencil version of cognitive ability tests is not conclusive.

Apart from studies on cognitive ability tests, research examined the equivalence of computerized and paper versions of situational judgment tests (SJT). One study found that, relative to paper tests, computerized SJTs were characterized by lower mean scores and higher response variability (Ployhart et al., 2003). However, that same study found that the computerized SJTs exhibited more normal distributions, higher internal consistency reliability estimates, and higher relations with other measures compared with paper versions of SJTs (Ployhart et al., 2003). Thus, results of research on the equivalence of computerized and paper forms of SJTs were mixed.

Research on the equivalence of computerized and paper and pencil versions of personality inventories also produced inconsistent findings. Whereas some studies found that computerized and paper personality inventories yielded equivalent results (Chuah, Drasgow, & Roberts, 2006; Cronk & West, 2002; Meade, Michels, & Lautenschlager, 2007; Oswald, Carr, & Schmidt, 2001; Salgado & Moscoso, 2003), other studies found that scores on the two forms of personality inventories were equivalent (e.g., Buchanan & Smith, 1999; Meade et al., 2007; Ployhart et al., 2003).

### 5.4. Electronic interviews

Organizations are using a variety of information technologies to conduct job interviews (e.g., face-to-face, telephone, videoconferencing). Several studies compared the effectiveness of different interview technologies on job applicant ratings (face-to-face, telephone, videoconference; see Silvester, Anderson, Haddleton, Cunningham-Snell, & Gibb, 2000; Straus, Miles, & Levesque, 2001). However, the results of that research were inconsistent. One study found that applicants were rated lower when the interview was conducted by telephone than by face-to-face methods (Silvester et al., 2000). However, Straus et al. (2001) found that applicants were rated higher in terms of ability and likeability using telephone than face-to-face methods, but there were no differences in ratings of applicants between videoconferencing and face-to-face methods. Interestingly, researchers argued that videoconference interviews may not always be effective because they do not include rich information (e.g., body language, facial expressions) that is inherent in face to face interviews (Chapman, Uggerslev, & Webster, 2003).

## 6. Limitations of current e-selection systems and directions for the future

Based on the current research, it is not clear if e-selection systems enable organizations to hire the most talented applicants or increase the diversity of their workforces. One reason for this is that studies indicated that scores on computerized cognitive ability tests, SJTs, and personality inventories were not always equivalent to paper versions of these assessment methods (e.g., Ployhart et al., 2003; Potosky & Bobko, 2004; Stone et al., 2013). Another reason is that computerized versions of tests and personality inventories may be much more cognitively demanding than paper versions because applicants must perform two tasks simultaneously (i.e., manage the computer and complete the test (Stone et al., 2013)). As a result, the scores on the computerized tests may be a function of not only the applicants' cognitive abilities, but also their level of computer skills and computer anxiety. Therefore, if applicants' lack computer skills and/or have high levels of computer anxiety, their scores on computerized tests or personality inventories will not be construct valid measures of the underlying factors.

Concerns about the impact of computer skills and anxiety on test scores may be particularly problematic with members of some protected groups (e.g., older applicants, African-Americans, Hispanic-Americans). A possible reason for this is older individuals, women, ethnic minorities, and those with low socioeconomic status are less likely to have access to computers, and often have lower levels of computer skills than majority group members (e.g., *Pew Internet & American Life Project, 2010; Wallace & Clariana, 2005*). Research also suggested that there are sex and racial differences in computer anxiety, which may negatively affect performance on computerized tests and thus applicants' use of e-selection systems (see Frericks, Ehrhart, & O'Connell, 2003; O'Connell, Doverspike, Gillikin, & Meloun, 2001; Wallace & Clariana, 2005). In view of these findings, organizations need to ensure that all applicants have computer skills before administering online tests, or use alternative assessment methods for those who do not have these skills (Tippins, 2009). Thus, organizations need to ensure that applicants have needed computer skills or low levels of computer anxiety before administering employment tests. For example, they could provide training on basic computer skills prior to testing. Alternatively, they might use virtual environments to create virtual work samples that assess applicants' ability to perform the job. These virtual work samples could also be used to give applicants a realistic preview of what it is like to work for the organization. Some organizations (e.g., Toyota) are already using online work samples to hire employees (Winkler, 2006).

Another potential limitation of e-selection systems is that electronic interviews may be less effective, and viewed less positively by applicants than face to face interviews (e.g., Bauer, Truxillo, Paronto, Weekley, & Campion, 2004; Chapman et al., 2003). A possible explanation for this is that videoconference interviews may not provide rich information about applicants (e.g., facial expressions), and this places limits on the inferences made from the interview (Chapman et al., 2003). For instance, images on videoconference interviews are not always detailed, and some technologies (e.g., Skype) may provide hazy pictures of candidates.

Another reason is that compared to electronic interviews, face to face interviews are much more personal, and allow for interpersonal interaction. As a result, applicants may be more likely to accept jobs with companies that use face to face than electronic interviews because they allow them to gather information about jobs, and make them feel like the organization cares about employees. Given these limitations, organizations might want to use new cloud-based videoconferencing in the future (e.g., Omnijoin, Zoom) because it offers high quality HD video and audio, can be accessed by mobile devices, and is typically much more flexible than previous technologies (Parker, 2014).

In summary, we believe that the use of new technologies may enable e-selection systems to overcome some of their current limitations, and help organizations achieve their goals of hiring the most qualified and diverse employees. However, research is needed to assess the effectiveness of these new methods.

## 7. Goal 3: Increasing the knowledge, skills, and abilities of employees

A third goal of HR is to enhance the knowledge, skills, and abilities of employees through training and development. A variety of technologies have been adopted by organizations in an attempt to more effectively deliver and manage the training process. These "e-learning" or "e-training" initiatives range from merely providing training materials online, to using a variety of technologies to deliver course content and support trainee communication (e.g., videoconferencing, virtual simulations). With a bit of hyperbole, it has been argued that e-learning may be the biggest innovation to affect training technology "since the invention of the chalkboard..." (Horton, 2000, p. 6). Recent research found that over 25% of corporate training hours are now online, and nearly 40% these initiatives are technology supported (Miller, 2012). Additionally, research showed that e-learning provides greater flexibility, efficiency, convenience for trainees, and decreased costs compared to traditional training methods (Salas, DeRouin, & Littrell, 2005; Welsh, Wanberg, Brown, & Simmering, 2003). To wit, Cisco estimated cost savings of 40–60% (Gill, 2000), and IBM delivered 500% more training at one third the cost (Hall & LeCavalier, 2000).

Of interest here is the extent to which research has assessed the effectiveness of e-learning. Specifically, the question is "Does e-learning enhance employees' knowledge, skills, satisfaction levels, and/or their utility judgments?" These outcomes are similar to those identified by training researchers such as Kirkpatrick (1976), Kraiger, Ford, and Salas (1993), and Salas et al. (2005). The most commonly assessed outcomes are knowledge gain and satisfaction (Johnson, Hornik, & Salas, 2008). Satisfaction is particularly important in e-learning because research revealed that trainees' satisfaction is positively related to their post-training motivation, self-efficacy, and knowledge (e.g., Carswell & Venkatesh, 2002; Orvis, Fisher, & Wasserman, 2009; Roca, Chiu, & Martínez, 2006; Sitzmann, Brown, Casper, Ely, & Zimmerman, 2008). Utility judgments are also essential because trainees' perceptions of the utility of the training may be more effective predictors of training transfer than either satisfaction or knowledge gain (Alliger, Tannenbaum, Bennett, Traver, & Shotland, 1997).

## 8. Research on e-training and e-learning

Researchers have broadly investigated three types of antecedents to e-learning effectiveness: training technology, training design, and trainee characteristics (Johnson et al., 2008). Each of these issues will be considered below.

### 8.1. Training technology

There is much debate about the reliance of technology for the delivery of training. Some researchers argued that web-based instruction is advantageous because it offers increased customization, flexibility, and learner control (Hiltz & Wellman, 1997; Salas et al., 2005). However, others contend that the use of these technologies is less effective because it isolates trainees from each other, reduces communication, and decreases trainee satisfaction (Piccoli, Ahmad, & Ives, 2001; Richardson & Swan, 2003). For example, one study found that trainees using a sophisticated classroom management system spent more time communicating about how to use the technology than they did on learning, and thus performed more poorly than a group using email systems (Alavi, Marakas, & Yoo, 2002). In contrast, results of another study revealed that when learners believed that the technology supported their preferred learning approach they had better learning outcomes (declarative knowledge, satisfaction, and utility judgments) than when it was not consistent with their preferences (Hornik, Johnson, & Wu, 2007).

Research also found that employees prefer face-to-face training over e-learning because e-learning is often socially isolating, and does not always provide timely feedback (Johnson et al., 2008; Phillips, Phipps, & Zuniga, 2000). For this reason, several researchers argued that organizations need to use blended learning methods (Benbunan-Fich & Hiltz, 2003; Salas et al., 2005). Blended learning uses both online and face-to-face components to increase the degree to which trainees feel connected with others, have richer levels of personal communication, and control over the learning process (e.g., Salas et al., 2005). Some research on blended learning indicated that learners in this context have higher levels of motivation to learn, better metacognition, and higher course grades than when either a traditional or e-learning settings are used (Benbunan-Fich & Hiltz, 2003; Klein, Noe, & Wang, 2006).

The findings from the research noted above suggested that technology can affect learning outcomes. However, Brown and Charlier (2013) argued that e-learning research should decrease the emphasis on comparing technologies, and demonstrate how it influences the "... effectiveness of a particular medium once it is selected" (p. 39). Meta-analytic studies on the effectiveness of web-based versus classroom-based instruction supported their argument. In particular, when these different types of training used the same instructional methods, the learning outcomes were comparable (Sitzmann, Kraiger, Stewart, & Wisher, 2006). These results suggested that organizations should integrate technology in the design of training rather than compare the effectiveness of different technologies.

### 8.2. Training design

Regardless of the technology employed, researchers have long argued that a number of key features are needed to create an optimal learning environment (e.g., Noe & Colquitt, 2002). For instance, training should be designed to (a) include content that is meaningful to trainees, (b) incorporate opportunities for practice, (c) provide trainees with control and feedback, and (d) give trainees an opportunity to interact with others (Noe & Colquitt, 2002). Notably, Brown (2001) found variability in the amount of practice provided in e-learning programs, suggesting that trainees often skipped through material which reduced their gains in knowledge. As a result, he argued that trainees learn more in e-learning when there is an opportunity to practice, and when they take the time needed to complete the experience than when they do not.

Some researchers also maintained that an advantage of e-learning is that trainees have more control over their learning than in a traditional environment, and learner control is positively related to both satisfaction and learning outcomes (Orvis, Brusso, Wasserman, & Fisher, 2011; Orvis et al., 2009; Salas et al., 2005). However, studies indicated that not all trainees respond positively when given greater control over their learning (Brown, 2001). In this vein, Santhanam, Sasidharan, and Webster (2008) found that when learners were trained to utilize self-regulating online learning strategies, their performance was higher than when they were not trained to use these strategies.

Another line of research regarding training design focused on communication and social presence as important factors for e-learning effectiveness. Social presence refers to "the degree of salience of the other person in the social interaction, and the consequent salience of the interpersonal relationship" (Short, Williams, & Christie, 1976, p. 65). Several studies found that the more individuals had an opportunity to communicate with others the higher their performance and satisfaction levels (Barak & Rafaeli, 2004; Johnson et al., 2008). In addition, learners who were part of a group had higher levels of communication, and better course outcomes than those who were not part of a team (Benbunan-Fich & Arbaugh, 2006). These findings suggested that social presence created a shared learning environment which increased trainee connections, attention to the ideas of other trainees, and the amount of information shared (Johnson et al., 2008). Several studies also found that social presence was positively related to training satisfaction and utility judgments (Gunawardena & Zittle, 1997; Johnson, Gueutal, & Falbe, 2009).

An additional factor that may affect the effectiveness of e-learning is the use of active learning techniques such as simulations, games, and role playing (Salas et al., 2005). These methods are thought to enhance e-learning outcomes because they increase trainee engagement and control, offer opportunities for practice, provide immediate feedback, and, in many cases, include interaction with others (Salas et al., 2005). Apart from traditional simulations and games, several e-learning technologies such as virtual simulators (e.g., flight simulators, surgical simulators) and computer-based games have been used to train pilots, military recruits, managers, and hospital surgeons. Results of research on e-learning simulations and games revealed that these techniques can be effective in

terms of increasing transfer of training, lessening the time needed to learn tasks, and enhancing trainee engagement in the learning process (e.g., Aggarwal et al., 2007; Hays, Jacobs, Prince, & Salas, 1992; Salas et al., 2005).

In recent years, companies have used *gamification* to increase trainee engagement, learning, and the perceived ease of use of information systems. Gamification can be defined as the use of video game thinking, and game mechanics in non-game contexts (e.g., e-training) (<http://en.wikipedia.org/wiki/Gamification> retrieved June 13, 2014). A review of recent research on gamification revealed it provides positive effects, but these effects are dependent on the context and the characteristics of users (Hamari, Koivisto, & Sarsa, 2014). As a result, additional research is needed to examine the effectiveness of gamification.

### 8.3. Trainee characteristics

Consistent with traditional training settings, research on e-learning environments identified several trainee characteristics that can influence e-learning outcomes. For example, one study found that trainees' computer experience was positively related to post-training test scores in e-learning environments (Brown, 2001). In addition, other studies found that trainees' performance or mastery orientation was positively related to learning processes and outcomes (Brown, 2001; Orvis et al., 2009). In addition, self-regulated learning strategies (e.g., intentional awareness and regulation of cognitive processes) were associated positively with training motivation, motivation, and learning outcomes (Johnson et al., 2009; Wan, Compeau, & Haggerty, 2012).

Furthermore, some researchers suggested that personality characteristics are related to the effectiveness of e-learning technologies (Orvis et al., 2011; Piccoli et al., 2001). For example, individual self-efficacy and computer self-efficacy were found to be associated positively with learning outcomes including performance, trainee satisfaction, and utility judgments (e.g., Johnson et al., 2008, 2009; Marakas, Yi, & Johnson, 1998).

## 9. Limitations of current approaches to e-training and future directions

Overall, there has been considerable research on e-learning, and we have more information about its effectiveness than that of many other eHR processes. Taken together the research reviewed here indicated that regardless of the type of technology, e-training effectiveness depends largely on opportunities for trainees' to (a) maintain control over the learning process, (b) practice, (c) interact with others, and (d) obtain feedback (e.g., Salas et al., 2005). Studies also revealed that trainees prefer face-to-face training over e-learning because it increases the opportunities for communication and interpersonal interaction (Masie, 2001; Phillips et al., 2000). In spite of these findings, research indicated that many e-learning methods are still limited because they are less likely to engage trainees in the learning process, and do not always give them opportunities for interpersonal interaction, practice, or feedback.

In view of this latter finding, some researchers argued that organizations using e-learning should adopt a blended approach, or incorporate technologies that increase opportunities for interpersonal interaction and communication among participants (Salas et al., 2005). Moreover, we believe that some of the new technologies such as Web 2.0 will enhance the effectiveness of e-training because they allow for greater levels of interpersonal interaction than current ones. For instance, in the future, organizations are likely to use virtual environments, virtual simulations, gamification, knowledge repositories, and crowdsourcing to improve the effectiveness of e-training. However, research is needed to assess the degree to which these methods help organizations enhance employees' knowledge, skills and abilities.

Furthermore, current e-training methods are often viewed as inflexible, and do not always include provide trainees with control. As a result, we believe that the increased use of mobile technologies, virtual environments, and gamification should enhance trainee engagement in the learning process, and increase opportunities for them to practice or gain feedback. For instance, research suggested that over 70% of employees want to bring their own mobile devices to work (Forrester, 2012), and trainees view these technologies as more flexible than traditional desk top computers (Gartner, 2012). Thus, the use of new technologies including virtual environments and mobile devices may improve the effectiveness and acceptance of e-learning methods.

There are two main areas where virtual environments can enhance the e-learning process. The first of these is the use of simulations using virtual reality. Virtual Reality has been defined as "a computer technology that enables users to view or 'immerse' themselves in an alternate world (Aguinis et al., 2001). The goal of virtual reality training is for the trainee to become immersed in and interact with the virtual environment in such a way that the environment seems "real" to them. The elements of immersion and interaction are extremely important in the learning process because they make the user feel free to get involved with the virtual environment. Research on virtual simulations found that they improve training outcomes in fields such as medicine (Larsen, Oestergaard, Ottesen, & Sørensen, 2012), oil exploration (Brasil et al., 2011), and the military (Bowman & McMahan, 2007).

A second area of "virtualness" of interest in training is the use of virtual worlds. Virtual worlds are often open-ended, user developed, three dimensional spaces that resemble the actual environments. Trainees in a virtual world are represented by avatars (or simulated bodies) that interact with the virtual environment, and can communicate with other avatars through text and voice. The use of virtual worlds promises greater trainee engagement than traditional online courses because each trainee is immersed in an environment which includes rich visual, audio, and communication stimuli. For example, some companies are using Second Life virtual environments that allows trainees' avatars the opportunity to shape their environments and interact with others (de Noyelles, Hornik, & Johnson, 2014). Research from education found that Second Life can improve trainee engagement (Hearrington, 2010), enhance interaction (Merchant et al., 2012), and improve learning outcomes (Hornik & Thornburg, 2010). In general, research suggests that virtual worlds such as Second Life provide the opportunity for online training to be more immersive, interactive, and engaging.

Despite the promise of virtual reality and virtual worlds, previous studies reported that they can be both technically difficult to navigate and use for communication (de Noyelles, 2012; Mennecke, Hassall, & Triplett, 2008). However, advances in technology, such as wearable virtual reality may be easier to use, and less costly than current methods. Thus, we believe that virtual reality and other new technologies will be used in the near future to deliver training, but research will be needed to assess their effectiveness.

## 10. Goal 4: Managing and enhancing employee performance

One of the most critical goals for HR is the effective management of employee performance, which includes assessing current performance, identifying high and low performers, and providing feedback to employees. Today, 93% of U.S. organizations surveyed use some sort of electronic performance management system (e-PM; CedarCrestone, 2014). There are two primary areas where technology has been used to support the performance management process: performance measurement, and performance feedback (e.g., Cardy & Miller, 2005; Fletcher, 2001; Spinks, Wells, & Meche, 1999). In terms of measurement, e-PM can potentially facilitate the process by using technology to track employee performance throughout the evaluation period, and record both formal and informal evaluations on an ongoing basis. In terms of feedback, e-PM technologies can be used to tabulate the results of multi-rater feedback, disseminate those results to employees and managers, and prompt managers to meet with employees to discuss their performance and needed improvements.

## 11. Research on e-PM

The principal reasons that organizations use e-PM systems is that they believe that technology will streamline the performance evaluation process, cut costs, and decrease the time and effort needed to manage employee performance (e.g., Bartram, 2004; Bracken, Summers, & Fleenor, 1998). Despite the potential advantages of e-PM, research findings revealed that employees have mixed reactions to the use of these systems (Payne, Horner, Boswell, Schroeder, & Stine-Cheyne, 2009). For instance, one study found that employees felt more involved, and believed that supervisors would be more accountable when e-PM was used rather than traditional paper and pencil methods (Payne et al., 2009). However, in that same study, employees reported that the quality of the performance evaluation was lower when e-PM was used compared to traditional systems (Payne et al., 2009). Other research found that differences in reactions to paper-based and e-PM systems were not due to the method of administration, but other factors, including supervisors' span of control, and the type of employee completing the evaluation (Smither et al., 2004). Individuals' satisfaction with performance appraisals is thought to be important because research found that it is positively related to work performance, job satisfaction, organizational commitment, and negatively related to turnover (e.g., Jawahar, 2006; Kuvaas, 2006; Murphy & Cleveland, 1995).

### 11.1. Employee reactions to e-PM feedback

Some other research focused on how employees respond to e-PM feedback (Ang & Cummings, 1994; Kluger & Adler, 1993). For example, results of studies revealed that employees prefer computerized feedback to that provided by a supervisor (Ang & Cummings, 1994; Kluger & Adler, 1993). Computerized feedback also resulted in lower levels of motivation loss (Kluger & Adler, 1993), and higher levels of performance (Earley, 1988) than feedback conveyed by a supervisor. Furthermore, research indicated that employees were more likely to trust feedback provided by a computer than the same feedback communicated by supervisors (Earley, 1988), and computerized feedback was directly related to employees' attention to the task, whereas supervisory feedback directed attention to the evaluation intentions of the supervisor (Kluger & DeNisi, 1996).

Research also found that the motivation for seeking feedback affects employee reactions to computerized versus supervisory feedback (Kluger & Adler, 1993). For instance, if the employee's purpose for seeking feedback was impression management, then computerized feedback resulted in more of a loss of motivation than supervisory feedback. Taken together, these results suggested that the source of feedback (e.g., computer vs. supervisor) can influence employee motivation and affective reactions to feedback, but the relations between computerized feedback and motivation are complex. Additional research is needed to examine the linkages between employee affective and behavioral reactions to electronic or computerized feedback.

### 11.2. Impact of e-PM on employee-supervisory relationships

Another issue surrounding e-PM is its impact on the nature of employee-supervisory relationship. One of the espoused advantages of e-PM is that managers can spend less time measuring performance (collecting performance data, and writing performance appraisals), and more time actually managing performance, thus engaging in more frequent performance-related conversations with employees (Cardy & Miller, 2005). However, some researchers argued that rather than increasing communication about performance, e-PM leads to an oversimplification of performance dimensions, and decreases the accuracy of appraisals (Sulsky & Keown, 1998). The only study that directly addressed this issue was conducted by Zuboff (1988), and found that when computerized e-PM systems were used to automatically capture performance data, managers relied more heavily on computerized data when evaluating performance than interactions with their subordinates. Thus, it appears that computerized e-PM systems may actually decrease rather than increase interactions between supervisors and subordinates. However, additional research is needed to test these conflicting arguments.



## 12. Limitations of e-PM and directions for the future

Not surprisingly, analysts argued that e-PM has a number of advantages including enhanced efficiency, time savings, frequency of feedback, and increased focus on employee development (Spitzer, 2007). However, as noted in the above review, researchers have also identified a number of limitations with e-PM systems. For example, researchers voiced concern that electronic methods may lead to lower quality and decreased accuracy of ratings than traditional systems (e.g., Sulsky & Keown, 1998). As with any performance evaluation system, the data from e-PM need to be relevant and accurate indicators of employee performance, from both objective and subjective perspectives. In terms of performance feedback, the critical question is whether employees understand the computerized feedback, and are able to identify areas and strategies for performance improvement. As a result, electronic feedback may have less influence on employees, and they may be less likely to change their behaviors in response to electronic than face-to-face feedback (Stone & Lukaszewski, 2009). Therefore, the use of e-PM could, in fact, reduce the overall effectiveness of the performance management process. Again, research is needed to test the impact of using electronic methods on the performance management process.

In view of these limitations, we believe that the use of new digital technologies could be used to increase the richness of the communication, and give employees the opportunity to clarify the nature of performance feedback. For example, supervisors might use new high definition cloud versions of virtual conferencing to meet with subordinates and discuss their performance levels. These methods still allow supervisors the opportunity to conduct performance management meetings in different geographic locations, but also give subordinates the opportunity to clarify and understand the nature of the feedback. In addition, the use of internal social platforms (social media) might be used to help supervisors collect performance data on a continuous basis, and provide more frequent praise and feedback. These new forms of social media should also provide opportunities for multi-source feedback from work group members, and make feedback from customers readily available so employees can continually improve their performance.

Another limitation of e-PM is that it may create interpersonal distance between supervisors and subordinates. For example, when feedback is provided electronically, and managers do not meet with employees to discuss their performance, it may be less likely to capture the subordinates' attention, affect their performance, or alter their subsequent behaviors. In addition, electronic feedback may decrease the extent to which subordinates view their managers as credible, trustworthy, or likeable. These attitudes are important because good leader-member relations affect employee job satisfaction, retention, and organizational citizenship behaviors (OCBs), all of which are critical to organizational success (e.g., Gerstner & Day, 1997).

Thus, we believe that organizations might use new interactive technologies to reduce the social distance between supervisors and subordinates. For instance, they might use cloud versions of videoconferencing and internal social media (Enterprise Social Software, Wikis, microblogs, instant messaging, chat rooms) to increase the social interaction between supervisors and subordinates (Gleba & Andreasen, 2014).

Although internal social media can be used to increase multi-source feedback from group members as well as customers, organizations need to monitor these communication channels, just as they would any other channel, to ensure the relevance and appropriateness of the information exchanged. Researchers have long argued that 360 feedback may be subject to biases (e.g., friendship biases), and has the potential to provide inaccurate performance data (Waldman, Atwater, & Antonioni, 1998). A possible reason for this is that raters may not have the opportunity to observe employee performance or be aware of the scope of job requirements and job-related goals (Waldman et al., 1998). Therefore, the data from e-PM technologies may be best when used for employee development rather than reward purposes. To date, there has been very little research on e-PM, and research is needed to test the arguments posed above.

Given the potential limitations with 360 feedback, researchers have argued that multi-rater feedback from work group members should be used for employee development, and separated from overall evaluations. As a result, we believe that new forms of interactive technology (internal social media, microblogs, chat rooms) might facilitate this process. For instance, work group members might use internal social media to provide ongoing feedback and performance information to employees throughout the appraisal period. Then, employees could use the information to improve their performance, but the multi-rater feedback would not be part of the person's yearly evaluation.

## 13. Goal 5: Motivating and retaining talented employees with diverse backgrounds

One of the most important goals of HR is to motivate and retain the most talented employees who come from diverse backgrounds. This goal is critical if any organization is to retain its competitive advantage. In today's environment, organizations are very concerned about not only dealing with a shortage of talent inside and outside the organization, but also preventing the loss of current employees. Granted, these issues have always plagued organizations, but the ramifications are now heightened due to the global competition for talent. In order to achieve these goals, organizations have started using technology to facilitate the compensation and benefits process (e.g., CedarCrestone, 2014; Dulebohn & Marler, 2005; Fay & Nardoni, 2009).

Interestingly, some reports indicated that over 50% of organizations are using technologies to support compensation planning and management processes (Institute for Management & Administration [IOMA], 2011). One of the primary reasons for this trend is that e-compensation systems are thought to reduce administrative costs and the amount of time needed for compensation planning (Gherson & Jackson, 2001; Society for Human Resource Management [SHRM], 2007). As a result, organizations typically use technology to support three major areas of compensation including the: automation of payroll systems, design of compensation systems, and communication and administration of compensation and benefits (Dulebohn & Marler, 2005).

Data from e-compensation systems can facilitate access to internal data (e.g., job descriptions, employee performance data, salary history) and external data (e.g., salary survey data, benchmarking information), which are combined and used to generate job evaluations as well as the pay structure of individual jobs (Fay & Nardoni, 2009). Market survey data are now online, and those surveys can be integrated into an overall electronic compensation system that allows the pay structure to be adjusted based on market changes (Fay & Nardoni, 2009). Given the complexity of data involved in strategic compensation decision making, organizations are adopting e-compensation systems as a type of decision support system that collects, organizes, and analyzes data to facilitate compensation planning (Dulebohn & Johnson, 2013).

Although e-compensation systems are widely used in organizations, relatively little theory or research has examined the effectiveness or acceptance of these technologies (Gueutal & Falbe, 2005; Johnson & Gueutal, 2011; Stone et al., 2003). The existing research focused on two areas: the consequences of implementing e-compensation systems, and employee self-service systems (ESS). Research on the outcomes of e-compensation systems is largely based on industry research, but research on ESS has been much more academically-oriented (Marler & Dulebohn, 2005).

#### 14. Research on e-Compensation systems

It has been argued that e-compensation systems decrease costs, errors, and the time it takes to implement compensation planning (Dulebohn & Marler, 2005). In support of these arguments, research in industry focused primarily on the benefits of implementing e-compensation systems (e.g., Brink & McDonnell, 2003; Dulebohn & Marler, 2005). For example, one report indicated that a company saved \$850,000 per year in administrative costs by automating their compensation planning system (Brink & McDonnell, 2003). In addition, studies claimed that time savings from e-compensation can be significant, with Dell reporting a 65% reduction in compensation planning time (Gherson & Jackson, 2001), and Raytheon decreasing processing time from 12 to 6 weeks (Workscope, 2010). Furthermore, Motorola implemented an integrated compensation system across 65 countries with over 10,000 employees in less than 6 weeks (SHRM, 2007).

Not surprisingly, industry research also found that e-compensation and payroll systems can reduce errors and increase decision accuracy (e.g., American Payroll Association's report 2010). For instance, the American Payroll Association's 2010 report (as cited in Inc. com, 2014) reported that automating payroll systems can reduce mistakes by 80%. In addition, a study by Raytheon revealed that the use of e-compensation systems reduced error rates, resulted in better decision-making, and made compensation planning more visible to employees (Workscope, 2010). Some academic research by Mauldin (2003) found that the use of expert systems in compensation planning (i.e., developing performance contingent incentives) increased decision accuracy. Although the results of industry research support the administrative benefits of e-compensation systems, objective academic research is needed to understand the degree to which these systems help HR meet its goals of motivating and retaining talented employees.

#### 15. Research on employee self-service systems (ESS)

Employee self-service systems (ESS) are the single most popular form of eHR (Gueutal & Falbe, 2005). An ESS uses Internet-based technology and gives employees access to a centralized HR database that allows them to review their personnel data, enroll in benefits, participate in open enrollment, and sign up for training (Marler & Dulebohn, 2005). Some estimates indicated that over 80% of large organizations now use or plan to use an ESS in the near future (CedarCrestone, 2010).

Given that ESS are fairly new systems, there has been relatively little theory or research on the effectiveness or acceptance of ESS systems (e.g., Konradt, Christophersen, & Schaeffer-Kuelz, 2006; Marler & Dulebohn, 2005; Marler, Fisher, & Ke, 2009). One notable exception is an article by Marler and Dulebohn (2005) that developed a model of ESS acceptance based on the Technology Acceptance Model (TAM) of Davis, Bagozzi, and Warshaw (1989). Marler and her colleagues (Marler et al., 2009) followed with an empirical study that examined several factors thought to influence employee acceptance of ESS, and found that attitudes toward technology, and subjective norms were positively related to user intentions to use ESS. Another study of user reactions to ESS found that organizational support and information policy were positively related to perceived ease of use and perceived usefulness of these systems (Konradt et al., 2006). Furthermore, perceived ease of use and usefulness were positively related to employee satisfaction, and system usage, but negatively related to user strain (Konradt et al., 2006).

An interesting case study by Hawking, Stein, and Foster (2004) revealed several benefits and cautions regarding the use of ESS systems. First, the use of ESS was positively related to decreased processing time, increased accuracy of decisions, and improved productivity. Second, the authors also found that, although forced compliance with ESS resulted in initial employee resistance, 80% of employees accepted these new systems after they were trained to use them. Third, their research indicated that the use of ESS changed the role of managers, and required them to use the system for everyday tasks. As a result, ESS increased managerial workload, and after 3 years, managers were still somewhat resistant to them. Given these findings, it appears that employee and managerial acceptance of ESS may depend on such factors as the degree of organizational support, implementation, and system training. Interestingly, the results of this study were consistent with previous arguments (e.g., Stone et al., 2003) that ESS may decrease HR's workload, but actually transfer the work to employees and managers.

#### 16. Limitations of e-compensation and ESS systems

Even though e-compensation systems may have some administrative advantages, one of the major limitations of these systems is that it is not clear that they help organizations motivate and retain critical employees. For example, these systems are based on the

assumption that pay and market based salaries are the primary factors that affect motivation and retention levels. However, it is well known that employees with diverse cultural values have different reward references, and make unique tradeoffs between pay and other important values (e.g., time off with family, location) (Stone et al., 2003; Stone-Romero, Isenhour, & Stone, 2011). For example, today more than ever before organizations have a diverse workforce that include men, women, numerous ethnic groups, people with disabilities, those with LGBT orientations, and a variety of generations (e.g., baby boomers as well as Generation X and Y). It is also expected that members of ethnic subgroups in the U. S. (e.g., Hispanic-Americans, African-Americans, Native Americans) will become the majority in 2060 (U.S. Census Bureau, 2012).

As the diversity of the workforce increases organizations may have to develop new compensation and reward systems to retain critical employees (e.g., Cennamo & Gardner, 2008; Stone et al., 2006; Stone-Romero, Stone, & Salas, 2003). For instance, research on generational differences indicated that the work values of students have changed over time (Twenge, Campbell, Hoffman, & Lance, 2010). Twenge and her colleagues examined the work values of high school students at three different points in time (1976, 1991, and 2006), and found that the importance of leisure increased overtime, but the emphasis on work decreased (Twenge et al., 2010). That same study found that extrinsic values (e.g., status, money) peaked with Generation X, but were higher among Generation Y than Baby Boomers. Furthermore, social values (e.g., altruism) were rated lower among Generation Y than Baby Boomers. Other researchers reported that members of Generation Y were more likely to value job security, a relaxed work environment, and personal growth than other generations (Guillot-Soulez & Soulez, 2014; Po-Ju & Soo, 2008).

In terms of ethnic minorities, some research found that Hispanic-Americans (Hispanics) were more likely to value flexible hours, organizational reputation, and diversity than Anglo-Americans (Anglos) (Stone et al., 2006). In addition, Hispanics with high power distance were more likely to accept lower pay in order to work for a high status organization than Anglos (Stone-Romero et al., 2011). Furthermore, African-Americans were more likely to value lifestyle, work environments and supervisors than Anglos (Hammond, Betz, Multon, & Irvin, 2010).

Taken together, these findings suggested that in order to motivate and retain a diverse workforce, e-compensation systems may need to expand beyond merely pay and benefits, and incorporate the more general notion of "e-rewards." The use of new interactive technologies (e.g., Web 2.0, internal social media, crowdsourcing) may be especially effective in developing these new systems. For instance, organizations might use internal social media or crowdsourcing to identify the reward preferences of employees, and develop cafeteria reward systems that can be used to meet their needs (e.g., Stone et al., 2006). In particular, these new interactive technologies (e.g., internal social media, virtual conferences, crowdsourcing) may help organizations gather and analyze data about employees' reward preferences, and develop more flexible and effective reward systems.

Research on the effectiveness and acceptance of ESS indicated that even though employees are generally satisfied with ESS, there are limitations associated with them that need to be considered. First, some researchers argued that these systems may transfer the work from HR to managers and employees, thus overloading line managers and line employees which may decrease overall productivity in organizations (e.g., Gueutal & Falbe, 2005; Hawking et al., 2004; Stone et al., 2003). Second, benefit systems may be negatively affected by the use of ESS because many employees still need the advice of HR professionals when selecting health insurance or other types of benefits (e.g., Gueutal & Falbe, 2005; Stone et al., 2003). Third, ESS systems tend to be one-way communication systems that do not always give employees the chance to ask questions or interact with expert HR professionals. Therefore, despite the widespread usage of ESS, these systems may not be effective or fully accepted by employees (Marler & Dulebohn, 2005).

Interestingly, research from marketing on service quality examined customers' reactions to a variety of self-service technologies (SSTs) such as ATMs, automated hotel checkout, pay-at-the pump terminals, and retail self-service checkout (see, for example, Bitner, Brown, & Meuter, 2000; Dabholkar & Bagozzi, 2002; Meuter, Ostrom, Roundtree, & Bitner, 2000). These research findings have important implications for understanding employees' reactions to ESS. For example, research on SSTs revealed that a number of factors were related to users' acceptance of these systems including: ease of use, location, time savings, and avoidance of service personnel (Meuter et al., 2000). SST research findings also suggested that system factors affect user dissatisfaction levels, such as technical failure, poor system design, difficulty of use, and loss of password (Meuter et al., 2000). Furthermore, studies found that individual traits such as novelty seeking, computer self-efficacy, self-consciousness, and need for interaction moderated the relationship between SSTs and user attitudes (Dabholkar & Bagozzi, 2002). Other studies found that individuals' motivation, ability, and role clarity were related to attitudes toward SSTs and their usage rates (i.e., Curran, Meuter, & Surprenant, 2003; Meuter, Bitner, Ostrom, & Brown, 2005).

Taken together, the research on SSTs was consistent with a number of elements in the model of ESS acceptance developed by Marler and Dulebohn (2005), including the need to focus on individual factors (e.g., compute self-efficacy, motivation), personal outcome expectancies (e.g., time savings, convenience) in addition to focusing on technology factors (e.g., ease of use). Notably, these findings echo earlier suggestions that organizations should adopt new technologies that provide for two-way communication (e.g., virtual conferences or benefit fairs), and solicit information from employees (e.g., internal social media). In view of these concerns, organizations using e-compensation and/or ESS should adopt technologies that enhance, not replace, the interaction between employees, managers, and HR professionals.

## 17. Conclusion and Perspectives on eHR

In recent years, technology has had a dramatic impact on the field of HR, and as technology evolves it is likely to move the field in some very new directions in the future. Despite the widespread adoption of eHR practices, there are still a number of questions about whether these new systems enable organizations to achieve their primary HR goals. In addition, the current systems have a number of limitations including the fact that they (a) employ one-way communication systems, (b) are impersonal, (c) passive, and (d) may

preclude individuals with low computer skills from gaining access to jobs. Furthermore, some analysts have argued that technology has resulted in a form of "outsourcing" for HR (S. Casino, personal communication, July 15, 2014).

First, given that the "electronic revolution" has been going on for more than 20 years, it's surprising to find so few studies on the various eHR topics and processes. Most of the eHR research has been on e-training and e-recruiting with very little research on other HR areas. Second, the general take-away from eHR research is that many of the traditional HR research findings also apply to eHR. In this sense, even though the technologies used may be new, the basic HR goals still hold true; e.g., the goal of recruitment is to make successful placement, the goal of selection is to hire the most talented and diverse employees, and the goal of training is to enhance the knowledge and skills of the workforce. In spite of these goals, most of the research on e HR has focused on strategies for implementing electronic processes, and increasing their acceptance.. Relatively little research has examined the extent to which e HR enables organizations to achieve their basic HR goals.

The movement toward eHR is expected to grow in the future, and the hope is that research on eHR will also increase. As we undergo this shift in technology, two questions come to mind that will have long-term effects on the field of HR as a whole.

### 18. Is the "real" goal of eHR "efficiency" or "effectiveness"?

This question represents one of the basic conflicts in Management; in this context, the concern is whether the real purpose of eHR is to reduce costs and increase speed of delivery, or to attract, motivate, and retain a highly talented and diverse workforce. Granted, there is a middleground, but as with any area of Management the issue is whether mass implementation is pursued at the expense of specialized services. The danger is that the more HR becomes technology-focused, rather than employee-focused, the field of HR as a whole may be viewed as more of a management "tool" and less as a valued strategic partner. We are not saying that technology doesn't matter, but we are saying that technology is merely a decision support tool that should enhance, not replace, the role of managers and HR professionals in organizations.

### 19. Does eHR result in a transaction-based versus relationship-based approach to employee management?

The findings summarized here suggest that employees prefer more interactive, interpersonal, information-rich approaches to all of the areas of HR management. Although eHR does not preclude that, the emphasis to date has been on using technology to expedite HR "transactions." Similar to the above concern, the issue here is whether the implicit, or even explicit, goal is speed and efficiency of implementation more so than the nature of, and impact on, employee perceptions of organizational climate and culture. To the extent that eHR processes are perceived as impersonal, HR effectiveness will likely decline as well as overall organizational effectiveness.

Both of the arguments presented here may be moot as the incoming generations become the majority of the workforce, both line employees as well as managers. Generation Y, or Millennials (people in their 20's and younger) have grown up with computers and are thus more comfortable computerized interactions. Incoming generations expect information on demand and may even prefer a more expedient versus face-to-face approach to management in general and HR management in particular. Time will tell, but in the meantime, more research is needed to identify the salient factors that contribute to eHR effectiveness. Just as we learned from sociotechnical theory and research regarding, HR and eHR (Stone et al., 2003) have a lot to learn about the interrelationship between the social system and technological system of organizations.

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