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Understanding and measuring formal communication quality for technology implementation: A test during the anticipation stage

Hsingyi P. Tsai [a,*], Deborah R. Compeau [b]

[a] Cedarville University, 251 N Main Street, Cedarville, OH 45385, USA
[b] Carson College of Business, PO Box 644743, Washington State University, Pullman, WA 99164-4743, USA

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ABSTRACT

Successfully introducing new technologies to employees remains a critical and challenging task for managers. Practitioner and academic research points to the crucial role of formal communication in the success of technology implementation. We developed a scale for measuring formal communication quality and assessed its influence using three samples of working professionals who were anticipating new technologies at work. Informed by the coping model of user adaptation, we examined the direct and indirect effects of formal communication quality during the anticipation stage of a technology implementation project on employees' cognitions, emotions and intention to connect with colleagues in order to prepare themselves for the new technologies. The results validate our conceptualization of formal communication as a second-order formative construct with information quality in four content areas (i.e., *what*, *how*, *why* and *when*) as the first-order dimensions. Our findings affirm the role of formal communication as a managerial influence mechanism that positively affects an employee's preliminary evaluation of a new IT during the anticipation stage. The evaluation of the new IT triggered emotions, and the emotions in turn motivated employees to seek opinions and camaraderie from others as a means of adapting to the new IT. Our post hoc analyses illustrate the dynamic nature of the relationship among formal communication quality, beliefs, emotions and coping intentions as the implementation unfolds. Our work contributes to the literature by improving the operationalization of formal communication quality, expanding the current understanding of seeking social support and revealing new insight about the temporal dynamics of the relationships in the nomological network during the anticipation stage. The validated scale of formal communication can be a useful tool for managers who wish to evaluate the effectiveness of their communication and to assess its impact on employees' adaptation.

Introduction

Since the 1980s, businesses have continued to leverage a wide range of emerging information technologies (ITs) to create and sustain competitive advantage by designing and implementing new business processes and developing new IT-enabled products or services. With more than a trillion dollars budgeted each year for new technologies (IDC, 2020), the stakes are high. Yet successful IT-enabled change remains challenging to accomplish, with only 37% of such efforts rated as successful (Lindsay et al., 2018). Both

* Corresponding author.
E-mail addresses: ptsai@cedarville.edu (H.P. Tsai), deborah.compeau@wsu.edu (D.R. Compeau).

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academic research (e.g., Allen et al., 2007; Miller et al., 1994; van den Heuvel et al., 2013) and practitioner research (e.g., de la Boutetiere et al., 2018; Lindsay et al., 2018) recognize the importance of change management efforts, especially top-down communication to promote employee buy-in and increase the chance of implementation success.

Unfortunately, recognizing the importance of formal communication does not ensure that it is effectively conducted. A survey of more than 100 internal communication practitioners by Arthur J. Gallagher & Co. (2018) provided alarming statistics about the lack of emphasis on formal communication across industries: only 17% consider their own line managers to be effective communicators. Moreover, nearly 40% of companies provide little to no measurement of the impact of internal communication. Among the reasons for limited measurement is a lack of measurement tools.

Our analysis of the literature suggests a critical gap that limits our ability to measure and understand the effects of formal communication on IT-enabled change. We observe that the conceptualization of effective formal communication is inadequate, as most researchers focus solely on information quality attributes, such as timeliness and accuracy, and pay little attention to the completeness of content coverage (i.e., the types of information that people want to have during the change). A few qualitative studies speak to content coverage (Allen et al., 2007; Aubert et al., 2013; Tsai and Compeau, 2017), but there is no systematic investigation of this aspect of formal communication quality. Continuing to rely on an over-simplified conceptualization of formal communication quality means that researchers and practitioners may remain oblivious to communication practices which are timely and accurate in one content area but not consistently so across all. In addition, no theoretical model holistically examines the influence of formal communication on employees' beliefs, emotions and technology acceptance behaviors. Problems in the conceptualization of formal communication and the theoretical models of its influence limit our ability to effectively design and measure high-quality communication in this context.

In this paper, we draw on the coping model of user adaptation (CMUA, Beaudry and Pinsonneault, 2005) as the foundation for theorizing the impact of formal communication in the context of IT-enabled change. CMUA is an appropriate theoretical foundation to study the emotionally charged context of technology implementation (Klein and Sorra, 1996) because CMUA provides the means to theoretically connect the introduction of a new IT as a stimulus to individuals' reaction to the stimulus, including their cognitions regarding the new IT (i.e., performance expectancy, effort expectancy), emotional responses to the new IT (i.e., anxiety and enthusiasm) and coping intention (i.e., intention to seek instrumental and emotional support). Thus, our model provides a holistic picture of how employees prepare themselves for using the new IT. Building on CMUA, we examine the relationship between formal communication and employees' responses during the anticipation stage of IT implementation (i.e., pre-implementation) because formal communication during this stage plays an especially important role in influencing employees' openness to change (Miller et al., 1994). It is during the anticipation stage that employees form their initial impressions of a new IT, and the expectations formed during this period comprise the basis for future judgments (Bhattacherjee, 2001; Venkatesh, 2000). Thus, communication from upper- and middle-level managers early on is instrumental in shaping employees' later satisfaction with a new IT (Oliver, 1980). Moreover, given limited tangible experience with the artifact, employees' initial impressions are heavily influenced by the official information about the artifact (Leonardi, 2009). Based on the above synthesis we propose two research questions (RQs):

- RQ 1: How does formal communication during the anticipation stage affect employees' cognitions, emotions and behaviors as they prepare themselves for using a new IT?
- RQ 2: What characteristics of formal communication during the anticipation stage make it effective in influencing employees' responses to the new IT?

We adapted MacKenzie et al.'s (2011) procedures for measurement development and validation to conceptualize formal communication, construct a scale and validate it in a CMUA-based nomological network. Formal communication quality during the anticipation stage of IT-enabled change is conceptualized as an aggregate multidimensional construct (Law et al., 1998) with four dimensions formed by different content areas: *what* the new digital solution is going to be, *how* it will affect the individual's job, *why* it is being implemented and *when* the changes will occur. We conducted three studies to refine the measures, test the measures in a nomological network and assess the robustness of the findings across different samples. The empirical studies demonstrate the structure of formal communication quality (as per RQ2) and show how employees' perception of formal communication influences their perception of, and emotional response to, a new IT, which in turn influences their behaviors of seeking social support (as per RQ1). Our post hoc tests provide additional insight, such as the temporal dynamics among the four dimensions of formal communication quality, the varying impact of effort expectancy on enthusiasm across user groups and the waning strength of anxiety in driving employees to seek instrumental support as the implementation unfolds. Based on these findings we propose tangible action for practitioners and researchers.

Conceptualizing formal communication quality

To develop our conceptualization of formal communication quality (FCQ), we examined research in the technology acceptance literature, since FCQ forms one of the antecedents of acceptance. We also examined the change management literature, which lays the foundation of change communication research. Both bodies of knowledge contribute to the understanding of formal communication, but neither by itself paints a complete picture of this concept and its impact in the context of technology implementation.

In the change management literature, which focuses on all types of organizational change (e.g., mergers, downsizing, workflow redesign), formal communication[1] refers to information from official sources announcing organizational changes intended to facilitate adaptation to the shifting environment in which the business operates. Formal communication quality is typically measured as the *quality of information* perceived by recipients and encompasses characteristics of change-related information, such as timeliness, usefulness, completeness and adequacy (e.g., Allen et al., 2007; Bordia et al., 2004; Jimmieson et al., 2004; Rogiest and Segers, 2015; van den Heuvel et al., 2013, 2015; Wanberg and Banas, 2000). This approach is rooted in Miller et al.'s (1994) study on openness to change.

To understand how formal communication has been conceptualized in the technology acceptance literature, we searched the *Business Source Complete* database for empirical studies written in English and published in peer-reviewed academic journals between 1990 and spring 2020. We sought articles that investigated how information about IT implementations was provided to the intended users. We used a variety of search terms to cast a net wide enough to capture different labels referring to the same concept.[2] Meanwhile, in order to increase the relevance of the search results, we confined the context to technology acceptance, technology implementation and user resistance. We also used forward-searching on articles that we found to identify additional relevant studies. Appendix A lists 14 empirical studies.[3] The IT artifacts include enterprise resource planning (ERP) systems, task management systems, e-learning systems, electronic medical record systems and cloud-based databases. The majority used quantitative surveys to test hypotheses about the impact of formal communication on technology acceptance, either during the active implementation stage or at some point after the implementation was completed (i.e., post-implementation). The major conceptualization of formal communication, consistent with the change management literature, is an employee's perception of the information regarding the implementation of a new IT (Bhattacherjee and Sanford, 2006; Bueno and Salmeron, 2008; Chiu, 2018; Ilie and Turel, 2020; Lee, 2008; Li, 2015, 2012; Mayeh et al., 2016; Meier et al., 2013; Tsai and Compeau, 2017). The perception includes various attributes of the information, such as accuracy or truthfulness (Aubert et al., 2013; Bueno and Salmeron, 2008; Mayeh et al., 2016), adequacy (Lee, 2008; Meier et al., 2013; Tsai and Compeau, 2017), completeness (Aubert et al., 2013), timeliness (Aubert et al., 2013; Meier et al., 2013) and usefulness (or value) (Bhattacherjee and Sanford, 2006; Li, 2015, 2012; Meier et al., 2013).

In the change management literature and the technology acceptance literature, studies have broadly acknowledged the importance of information quality. The operationalization of information quality, however, excludes details of the content coverage of the communication. Content areas are merely implied in the explanations of influence tactics deployed by managers. For instance, the tactic of *rational persuasion* communicates why a new IT is instrumental for accomplishing a task, *legitimacy* involves referencing to corporate policies and established practices, *collaboration* involves promising the provision of resources (e.g., training) and *apprising* relates to communicating how the employee may personally benefit from the new IT (Chiu, 2018; Ilie and Turel, 2020). Only a few studies (Allen et al., 2007; Tsai and Compeau, 2017) have formally articulated specific content areas that propel individuals to view formal communication as informative. These papers highlight the importance of considering **content coverage** in addition to information quality attributes. After all, a company might provide high-quality information in one content area (e.g., the functionalities of the new IT) but not in other areas (e.g., when training sessions will be available). Equating formal communication solely with general information quality may lead to incorrect evaluation of formal communication quality. Distinguishing different content areas in addition to traditional information quality attributes (e.g., timeliness, accuracy) may enhance our understanding of the means by which formal communication influences employees' reactions. This distinction also opens up the possibility of investigating questions such as whether some content areas are more or less important at different points in time.

Building on Tsai and Compeau (2017), we propose the following four content areas that are indispensable for employees to make sense of new IT implementations. The information about the features and functionality of a new IT (*what*) is the most basic implementation information disseminated to intended users. In addition to this basic understanding, employees also need to understand *how* a new IT will affect them, such as whether it will impact the future pace of their work life, their professional identity or their job security. Furthermore, information about the purposes of adopting a new IT (*why*) allows employees to see the logic behind the new IT and connect the implementation of this new IT to strategic purposes, such as standardizing business processes or unifying customer experiences across different regions. Finally, information about the timing (*when*) of various implementation activities (e.g., the availability of a trial version, piloting schedule and training sessions) allows employees to establish a mental timetable of steps that must occur for them to be ready to use the new IT to perform tasks.

[1] In the change management literature, formal communication is also known as change communication or implementation communication.

[2] Search terms include combinations of these adjectives and nouns: project, implementation, managerial, official, organizational, formal, persuasive, informational, communication, information, introduction, influence and persuasion.

[3] We excluded empirical studies that involved IT artifacts in the consumer domain (e.g., online banking, e-government portal, autonomous vehicle, no-touch payment etc.) or no IT artifact at all (e.g., accepting advice from a colleague). We also excluded empirical studies on the national level (e.g., cultural factors). While managerial influence (Leonard-Barton and Deschamps, 1988) in the context of technology implementation has been widely studied in the information systems literature, relatively few studies specifically examined formal communication. We excluded concepts related to but distinct from formal communication, such as social influence, which is a combination of subjective norm, social factors and image (Venkatesh et al., 2003). Another example is management support, a combination of perceived normative pressure and facilitating conditions (Kim and Kankanhalli, 2009). Management support may be inferred from formal communication but is not formal communication itself. We also excluded from further review studies on leadership style (e.g., Homburg et al., 2010) because the goal of this review was to identify the existing conceptualization of formal communication rather than its antecedents or consequences.

		Content Areas			
		What	How	Why	When
Information Quality Attributes	Timely				
	Useful				
	Relevant				
	⋮				
	Sufficient				

Fig. 1. Conceptualization of FCQ.

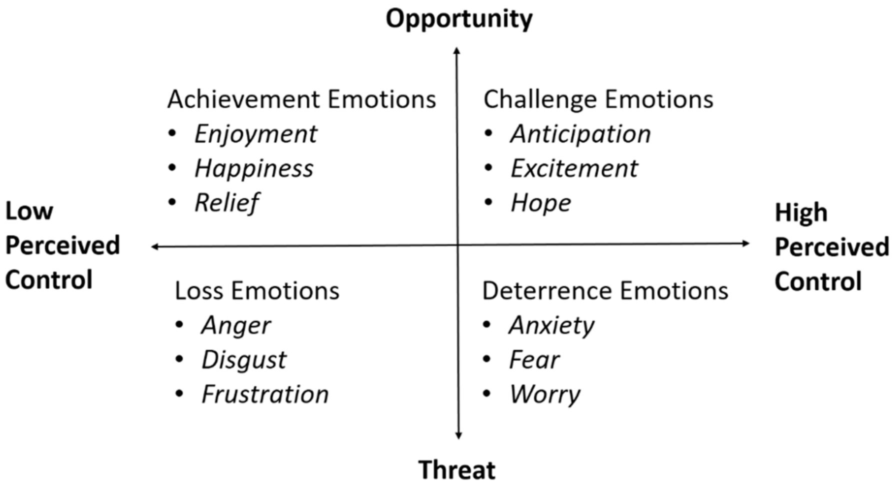

Fig. 2. Emotion Categories in Beaudry and Pinsonneault (2010, p.694).

Synthesizing the four content areas with the attributes of information quality, we define formal communication quality as

> *an individual's perception of the quality of information provided by the organization about what the new IT does, how it will affect the individual, why it is being implemented and when it is going to be implemented.*

We define this perception as an individual's subjective evaluation of the quality of information regarding the implementation of a new IT. This evaluation combines information quality attributes and content area coverage (see Fig. 1). That is, an information recipient evaluates the information quality according to the four major content areas of IT implementation – *what*, *how*, *why* and *when*. The perception is dynamic rather than stable; it may change whenever a new piece of information is received and evaluated.

Theoretical foundations

To theorize the influence of FCQ on individuals' responses to IT-enabled change (i.e., our first research question), we draw on the coping model of user adaptation (CMUA; Beaudry and Pinsonneault, 2010, 2005). The change management literature links change-related information during the anticipation stage to reduced anxiety and psychological strain in employees (Bordia et al., 2004; Miller et al., 1994), suggesting the need to theorize FCQ from a stress and coping perspective. CMUA, derived from the transaction model of stress and coping (Lazarus and Folkman, 1984), focuses on how individuals interpret the introduction of a new IT to form their appraisals of and emotional responses to a new IT and on how these responses lead to adaptation behaviors. Thus, CMUA allows us to meaningfully establish the linkage between FCQ and the broad range of cognitive, emotional and behavioral outcomes involved in the introduction of a new IT. In addition, while extant user adaptation research is mostly conducted during the post-implementation stage, Beaudry and Pinsonneault (2005) acknowledge that user adaptation may begin as soon as an employee becomes aware of the potential consequences of a new IT (e.g., through processing an announcement made by management). Therefore, CMUA is a suitable theory for explaining the influence of FCQ during the anticipation stage.

CMUA views any official communication about a new IT, including the initial announcement and ongoing status updates, as a stimulus that propels employees to assess whether the arrival of the new IT constitutes a threat or an opportunity (i.e., the primary appraisal). Then, employees evaluate whether they have enough resources to mitigate the threat or to take advantage of the opportunity (i.e., the secondary appraisal) (Beaudry and Pinsonneault, 2005). These two types of cognitive appraisals are the direct result of being exposed to the stimulus and they determine a range of emotional responses (Fig. 2). For example, challenge emotions are the result of a favorable primary appraisal (i.e., opportunity) and a favorable secondary appraisal (i.e., having behavioral control over the IT event), whereas loss emotions are responses to a pending threat that is beyond a person's control (Beaudry and Pinsonneault, 2010).

The combination of the primary and secondary appraisals affects emotions, and emotions affect the deployment of adaptation

Table 1
Summary of Combination of Key Concepts in Example Studies.

	Cognitive Appraisal		Emotion	Adaptation Strategy
	Perceived Technology Attribute	Primary & Secondary Appraisal		
Beaudry and Pinsonneault (2005)		√		√
Barki et al. (2007)				√
Beaudry and Pinsonneault (2010)			√	√
Fadel and Brown (2010)	√	√		
Choi et al. (2011)	√		√	
Elie-Dit-Cosaque and Straub (2011)		√		√
Fadel (2012)				√
Stein et al. (2015)	√	√	√	√
Bala and Venkatesh (2016)		√		√
Tsai and Compeau (2017)		√	√	√

Table 2
Adaptation strategies.

Focus	Adaptation Strategy (Study)	Meaning
Problem-focused	• Task-Technology Adaptation (Barki et al., 2007) • Task Adaptation (Beaudry and Pinsonneault, 2010) • Work Adaptation (Fadel, 2012) • Tool Adaptation (Stein et al., 2015) • Exploration to Innovate (Bala and Venkatesh, 2016) • Exploitation (Bala and Venkatesh, 2016)	Realizing the benefits of the new IT through exploration and experimentation by oneself
	• Individual Adaptation (Barki et al., 2007) • Seeking Instrumental Support (Beaudry and Pinsonneault, 2010; Stein et al., 2015) • Self-Adaptation (Fadel, 2012)	Realizing the benefits of the new IT with the help of external sources of information (e.g., training, user manual)
	• Exploration to Revert (Bala and Venkatesh, 2016)	Actively resisting the new IT by seeking ways to hold onto the old way of working
Emotion-focused	• Venting (Beaudry and Pinsonneault, 2010; Stein et al., 2015) • Seeking Social Support (Beaudry and Pinsonneault, 2010; Fadel, 2012; Stein et al., 2015)	Preserving the self with help from external sources
	• Psychological Distancing (Beaudry and Pinsonneault, 2010; Fadel, 2012) • Avoidance (Bala and Venkatesh, 2016; Fadel, 2012)	Passively resisting the new IT by ignoring it

strategies. For example, anger propels a person to be psychologically distant from a new IT, while excitement is a predictor of task adaptation (Beaudry and Pinsonneault, 2010). The adaptation efforts are associated with personal effectiveness and efficiency, emotional stability, negative impact handling and purposes of IT usage (Beaudry and Pinsonneault, 2010, 2005).

Applications and extensions of CMUA

The seminal work on user adaptation by Beaudry and Pinsonneault (2005) inspired several studies (Table 1) that examined different combinations of the major components of CMUA (i.e., cognitive appraisal, emotion and adaptation strategy).

Other than Tsai and Compeau (2017), the majority of studies were conducted during the impact stage (i.e., post-implementation). Among these studies, **cognitive appraisal** typically comprises the assessment of threat (or opportunity) (i.e., primary appraisal) and perceived control (i.e., secondary appraisal) and occasionally includes subjective evaluation of the attributes of a new IT (e.g., performance expectancy). If employees believe that their performance will be improved as a result of using a new IT, they will view the new IT as an opportunity; if they anticipate a steep learning curve for using it proficiently, then they may equate the new IT with a threat (Bala and Venkatesh, 2016; Elie-Dit-Cosaque and Straub, 2011). **Emotion**, the least studied component, includes positive (e.g., happiness) and negative (e.g., anger) feelings. Conversely, **adaptation strategy** is the most studied component. Several adaptation strategies have emerged (Table 2);[4] although these strategies bear different labels, they overlap conceptually. Overall, user adaptation research paints a consistent picture in which appraisals ultimately affect the choice of adaptive or maladaptive behaviors related to IT use.

[4] A notable exclusion from Table 2 is the adaptation strategies proposed by Beaudry and Pinsonneault (2005), namely benefit maximizing, benefit satisficing, disturbance handling and self-preservation. These strategies combine problem- and emotion-focused coping in a single blended strategy and thus are not considered further in this study.

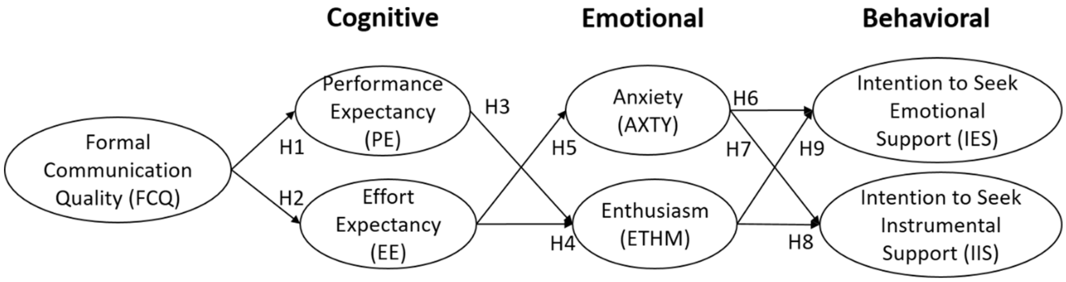

Fig. 3. The Nomological Network.

Table 3
Definition of Constructs in the Nomological Network.

	Construct Name	Definition
	Formal Communication Quality	An individual's perception of the quality of information provided by the organization about what the new IT does, how it will affect the individual's work, why it is being implemented and when it is going to be implemented
Cognitive Response	Performance Expectancy	The degree to which an individual believes that using the new IT will help him or her to attain gains in job performance (Venkatesh et al., 2003, p. 447)
	Effort Expectancy	The degree of ease associated with the use of the new IT (Venkatesh et al., 2003, p. 450)
Emotional Response	Anxiety	A state of distress or physiological arousal in response to stimuli including novel situations and the potential for undesirable outcomes (Brooks and Schweitzer, 2011, p. 44)
	Enthusiasm	A highly aroused and positive state in response to potential desirable outcomes or rewards (Russell, 1980; Shiota et al., 2011)
Behavioral Response	Intention to Seek Emotional Support	The intention to seek from colleagues moral support, sympathy, or understanding of the individual's feeling about the new IT (Carver et al., 1989)
	Intention to Seek Instrumental Support	The intention to seek from colleagues advice, assistance, or information about the new IT (Carver et al., 1989)

One major insight that informed our theorizing is the cues identified by Stein et al. (2015) suggesting that cognitive appraisals are contingent upon five types of cues: (1) *interactions with others* (i.e., what management and the IT project team say about the IT and how they say it), (2) *IT instrumentality* (i.e., perceived attributes of the new IT), (3) *IT symbolism* (i.e., the symbolic meaning of the IT), (4) *involvement in change* (i.e., the employee's involvement in the project) and (5) *identity work* (i.e., the impact of the IT on ones' work-related identity). We are particularly intrigued by the first two cues because of their relevance to our research. We view implementation information from higher-ups (i.e., cue #1) as the impetus that shapes an employee's perception of a new IT (i.e., cue #2) during the anticipation stage. Perceived attributes of the new IT (i.e., IT instrumentality), in turn, play an important role in shaping primary appraisals (Fadel and Brown, 2010). Based on what managers say about the new IT during the anticipation stage, appraisals allow an employee to derive personal meanings related to that new IT. The CMUA extension by Stein et al. (2015) enables us to plug formal communication into a theoretical model that includes CMUA's major components, i.e., perceived IT attributes, emotion and adaptation strategy, as illustrated in the next section.

Research model and hypotheses

Building on this theoretical foundation, we construct a nomological network (Fig. 3) to show how formal communication quality influences an employee's evaluation of the new IT.

We focus on the cues of formal communication and IT instrumentality for forming cognitive appraisals (Stein et al., 2015). IT instrumentality is captured by **performance expectancy** and **effort expectancy**, the most fundamental user beliefs in the technology acceptance literature. The roots of the former include perceived usefulness, and those of the latter include complexity and ease of use (Venkatesh et al., 2003).

In terms of possible emotional responses, we focus on **anxiety** and **enthusiasm**[5] because they represent opposite valences and reflect contrasting outcomes of the primary appraisal. They also reflect different degrees of perceived control in the secondary appraisal: whereas enthusiasm is associated more with the assessment that a situation is within one's personal control, anxiety is associated more with the assessment that a situation is out of one's control (Smith and Ellsworth, 1985). Both are concerned with potential future outcomes (Bagozzi, 1992) and are thus fitting for understanding employees' emotional responses during the anticipation stage.

[5] We did not include achievement emotions (e.g., gladness) or loss emotions (e.g., anger) because they are concerned with outcomes in the past or present (Bagozzi, 1992). Since our study is situated in the pre-implementation stage of the change, focusing on future-oriented emotions is appropriate.

We chose to investigate **intention to seek social support** as our adaptation strategy because employees are not yet able to change their routines, modify their work environments, or explore new technology during the anticipation stage. We predict that social interaction will be a prominent vehicle for employees to adapt to the new IT, making our choice temporally appropriate and relevant. Seeking social support has two purposes: gaining *emotional support,* as a form of emotion-focused coping, and gaining *instrumental support* (e.g., insider information, insight, financial resource), as a form of problem-focused coping (Carver et al., 1989). Table 3 lists the definitions of all constructs in the nomological network.

Impact of formal communication on cognitive appraisals

High-quality formal communication is expected to influence the cognitive appraisals of performance expectancy. During the anticipation stage of IT implementation, formal communication is the primary means by which employees gain the information needed to understand, for example, the technology's capabilities, its alignment with the company's mission, planned training schedules and provisions of an online help-desk (Davidson, 2002). Formal communication can thus be understood as a form of informational social influence (Deutsch and Gerard, 1955; Ilie and Turel, 2020) and its quality influences the extent to which employees accept it as evidence of reality and become convinced of the utility of the new IT. Providing high-quality information about *what* the new IT is, *how* it will affect the individual's job and *why* it is being adopted offers guidance to the prospective user about the benefits of the new IT and the ways in which it will be helpful to them. The provision of high-quality information is thus expected to increase the individual's performance expectations surrounding the new IT. Moreover, providing high-quality information across all of the content areas reduces uncertainty about the new technology, which creates openness (Miller et al., 1994; van den Heuvel et al., 2013; Wanberg and Banas, 2000) that can influence assessments of the new IT, even if the information is not directly germane to perceptions of performance expectancy (Minge and Thüring, 2018).

The relationship between formal communication quality and performance expectancy has received strong empirical support. For instance, in the context of ERP system training, Bhattacherjee and Sanford (2006) and Li (2015, 2012) found a direct relationship between a trainer's argument quality and perceived usefulness (which is a major component of performance expectancy). Amoako-Gyampah (2007) found a positive relationship between the argument for change (i.e., the rationale) and the perceived usefulness of an ERP system. In the context of implementing an electric medical record system in a hospital, Ilie and Turel (2020) reported a positive relationship between a managers' levels of persuasion (e.g., providing evidence of improving patient care) and inspirational appeal (e.g., the vision of using the new system) and medical practitioners' perceived usefulness of the system. Hence, we propose:

H1: *The higher the quality of formal communication, the higher the level of performance expectancy.*

In addition to its influence on performance expectancy, we argue that when high-quality formal communication exists across all four major content areas, employees will develop more favorable perceptions of effort expectancy. Providing information about a new IT's characteristics (i.e., *what*), rationale behind the adoption (i.e., *why*) and the schedule of providing various support resources (i.e., *when* and *how*) helps employees develop a stronger mental model of the new IT and helps them realize that they are capable of using it. As a result, their effort expectancy (which primarily reflects perceived ease of use) should improve.

Empirical support in the technology acceptance literature is abundant. Li (2012) found a positive relationship between the argument quality of a trainer and employees' perceived ease of use of an ERP system. In their study of seven companies' implementation of ERP systems, Mayeh et al. (2016) found a positive relationship between high-quality communication and perceived ease of use. In the context of implementing an electric medical record system in a hospital, Ilie and Turel (2020) found that healthcare professionals' perceived ease of use is predicted by management's explanation of how the new system could benefit them personally and by verbal promises ensuring resource provision (e.g., training). Hence, we hypothesize:

H2: *The higher the quality of formal communication, the more favorable the assessment of effort expectancy.*

Impact of cognitive appraisals on emotion

According to CMUA, an individual's evaluation of an artifact (i.e., appraisal) influences the emotions that he or she experiences. The evaluation of functionalities of a new IT and the personal meaning derived from that evaluation (e.g., "I will be able to get the work done with fewer clicks.") are cognitive cues that lead to emotions (Stein et al., 2015). The roles of performance expectancy and effort expectancy are somewhat different. If employees believe their performance will be improved (i.e., more effective or more efficient) as a result of using the new IT, they are likely to view the new IT as an opportunity for them to meet performance goals (Bala and Venkatesh, 2016; Elie-Dit-Cosaque and Straub, 2011). This appraisal associated with personal gain or growth is thus related to challenge emotions (e.g., anticipation, excitement, hope) (Beaudry and Pinsonneault, 2010). Therefore, stronger performance expectancy is expected to result in stronger positive emotions. The lack of strong performance expectations, however, does not constitute a threat for employees and thus performance expectations are not hypothesized to influence negative emotions such as anxiety. Thus, we propose:

H3: *The more favorable the assessment of performance expectancy, the higher the level of enthusiasm.*

Like performance expectancy, effort expectancy is positively associated with perceived prospects for gain or growth (Fadel and Brown 2010), resulting in challenge emotions such as excitement, anticipation and hope (Beaudry and Pinsonneault, 2010). The belief that a new IT requires less effort to master suggests that less effort will be required to complete the individual's job; this leaves greater opportunity to improve work in other ways or to reclaim the time spent and apply it toward personal priorities and tasks. In addition, effort expectancy is associated with reducing threats (Fadel and Brown 2010). If an individual believes a new IT is difficult to use and likely to require a high degree of effort, they are more likely to view the new IT as a threat (Bala and Venkatesh, 2016; Elie-Dit-Cosaque and Straub, 2011), eliciting the concomitant emotions of anxiety, fear and worry (Beaudry and Pinsonneault, 2010). Several studies support this hypothesized relationship in the context of technology adoption (Bala and Venkatesh, 2016; Choi et al., 2011; Fugate et al., 2011; Smith and Ellsworth, 1985). Thus, we propose:

H4: *The more favorable the assessment of effort expectancy, the higher the level of enthusiasm.*
H5: *The more favorable the assessment of effort expectancy, the lower the level of anxiety.*

Impact of emotion on adaptation strategy

Negative emotions are associated with emotion-focused coping strategies, which help individuals regulate negative emotions and restore emotional stability. Specifically, anxiety is associated with seeking emotional support across scenarios in which individuals are anticipating the occurrence of an uncertain event (Beaudry and Pinsonneault, 2010). For instance, patients anticipating surgeries reach out to others for reassurance (Aust et al., 2016) and college students anticipating final exams seek sympathy from peers (Rovira et al., 2005). Hence, we propose:

H6: *The higher the level of anxiety, the higher the level of intention to seek emotional support.*

Although Beaudry and Pinsonneault (2010) did not hypothesize a relationship between anxiety and seeking instrumental support, we argue that anxiety drives individuals to reach out to others for both types of support. Anxiety is a highly activated emotion triggered by uncertain situations (Smith and Ellsworth, 1985). Since anxiety can undermine individuals' confidence, it can motivate them to gather more intelligence about an uncertain situation by talking to others (Brooks et al., 2012; Fenlason et al., 2016). For instance, if employees do not know how to formulate their own interpretation of an unfamiliar situation caused by a new IT, they may turn to members of their reference groups (Bruque et al., 2008). Similarly, if they are anxious about not having the right skills to use a new IT, their anxiety may prompt them to look for possible resources upon which they can later draw (Sykes et al., 2009). Thus, we hypothesize:

H7: *The higher the level of anxiety, the higher the level of intention to seek instrumental support.*

Prior research using the transactional model of stress and coping (Lazarus and Folkman, 1984) focuses on handling undesirable situations that exceed a person's ability to manage. Although it is less intuitive to associate the theory with positive emotions, Folkman and Moskowitz (2000) call for exploration of the role of positive emotions in stressful situations, arguing that positive emotions facilitate adaptation through positive reappraisal, problem-focused coping and infusing ordinary events with positive meaning. Based on Folkman and Moskowitz (2000), Beaudry and Pinsonneault (2010) suggest that individuals who are excited about the opportunity associated with a new IT will seek instrumental support. We extend their theorizing to the anticipation stage and propose that an individual who is enthusiastic about a new IT will seek instrumental help from others to facilitate future mastery. Thus, we hypothesize:

H8: *The higher the level of enthusiasm, the higher the level of intention to seek instrumental support.*

Folkman and Moskowitz (2000) and Beaudry and Pinsonneault (2010) are silent about the relationship between positive emotions and emotion-focused coping. We suggest that enthusiasm prompts individuals to proactively discuss their feelings with others. Sharing emotions through verbal or non-verbal communication with other people activates the reward-related area of the brain, specifically, the ventral striatum and the orbitofrontal cortex (Wagner et al., 2014). A positive emotional episode feels even more positive when the individual has someone else to share it with (Wagner et al., 2014). Thus, people are neurologically wired to involve others in their positive emotions. Communicating with others about his/her positive emotions makes the individual feel understood and validated (Gable et al., 2006). The behavior of reaching out to others for non-instrumental reasons also facilitates the relationship building that allows a person to cultivate his or her social capital for later use (Fredrickson and Joiner, 2002; Greene et al., 2006). Therefore, we predict:

H9: *The higher the level of enthusiasm, the higher the level of intention to seek emotional support.*

Scale development and validation

Based on the conceptual definition and analysis presented earlier, we developed the FCQ scale and assessed its content validity using multiple panels of judges. We validated the instrument through three studies. A pre-test with 107 professional employees allowed us to evaluate and refine the scale. We assessed the construct validity through our main study with 278 employees who were experiencing IT change across a range of organizations (i.e., main study). Finally, we conducted a follow-up study of 68 instructors

Table 4
Question Stem.

Content Area	Question Stem
What	To what extent do you think the official information concerning the features and functionality of the new technology is _____?
How	To what extent do you think the official information concerning the potential impacts of the new technology on you is _____?
Why	To what extent do you think the official information concerning the rationale of adopting the new technology is _____?
When	To what extent do you think the official information concerning the timeline of various implementation activities is ____?

Table 5
Item Evaluation Results.

	Sum Score (Complete)		Sum Score (Complete)
WHAT1_timely	24 (57.1%)	WHY1_timely	25 (71.4%)
WHAT2_useful	24 (57.1%)	WHY2_useful	25 (71.4%)
WHAT4_reliable	23 (57.1%)	WHY4_convincing	25 (71.4%)
WHAT3_accurate	22 (42.9%)	WHY5_reasonable	24 (71.4%)
WHAT5_relevant	22 (42.9%)	WHY3_truthful	22 (42.9%)
WHAT6*_sufficient	21 (42.9%)	WHY6*_sufficient	20 (28.6%)
		WHY7*_relevant	22 (42.9%)
HOW6_relevant	29 (85.7%)	WHEN1_timely	29 (85.7%)
HOW2_useful	27 (71.4%)	WHEN5_realistic	24 (57.1%)
HOW1_timely	25 (57.1%)	WHEN2_useful	25 (42.9%)
HOW3_truthful	25 (57.1%)	WHEN7_sufficient	23 (42.9%)
HOW4_convincing	26 (57.1%)	WHEN6_relevant	22 (28.6%)
HOW5*_realistic	24 (42.9%)	WHEN3*_reliable	21 (42.9%)
HOW7*_sufficient	24 (57.1%)	WHEN4*_truthful	21 (42.9%)

N = 7 judges
* Removed after this step

anticipating the introduction of a new learning management system at a university.

We analyzed our data using Partial Least Squares (PLS) for the three studies, implemented in SmartPLS version 3.2.8 (Ringle et al., 2015). We determined that Smart PLS is appropriate for this study for several reasons. First, our focal construct, FCQ, is a formative second-order construct. While covariance-based structural equation modeling (CB-SEM) techniques are capable of estimating such constructs, additional constraints must be added to the model in order to accommodate them (Diamantopoulos, 2011; Hair et al., 2016). PLS requires no additional constraints and thus allows us to test our model as specified. Second, PLS is valuable when the goal of the research is theory development and when prediction of the dependent variables is important. Our research seeks to develop a theory of the measurement of FCQ rather than the overall testing of an established theoretical model and is thus consistent with the use of PLS. In addition, when developing measurement instruments, predictive validity is a critical test of the new construct's validity (MacKenzie et al., 2011); thus, an analytical technique focused on prediction is appropriate. Finally, our approach offers a useful complement to Mackenzie et al. (2011), who demonstrate their method using CB-SEM techniques but do not argue that CB-SEM is preferred for this type of work. We extend their work by demonstrating the efficacy of PLS-SEM for data analysis in our context.

Measures

Formal communication quality

We first created a description for each of the four content areas (i.e., *what*, *how*, *why* and *when*), using it as the question stem for the first order dimensions (Table 4).

We identified thirty-two descriptors of information and communication quality based on a review of existing measures of communication quality (e.g., *timely*, *adequate* and *useful* from Miller and Monge, 1985) and change communication principles and guidelines (e.g., *realistic* from Schweiger and Denisi, 2016). To balance between having a variety of descriptors and minimizing potential respondent fatigue, we consolidated descriptors that seemed overlapping (e.g., *honest* and *truthful*) and eliminated those that were reversely coded (e.g., *poor*) or less common (e.g., *appropriate, satisfactory, fluent, balanced*). The result was a pool of ten candidate items – accurate, convincing, realistic, reasonable, relevant, reliable, sufficient, timely, truthful, and useful. We did not aim to create a set of universal descriptors that applied to all content areas; rather, we selected descriptors based on the degree to which the descriptor is meaningful for the content area. For instance, *convincing* is appropriate for *why*, but not necessarily for *what*, because *why* has an evaluative component that makes persuasion more important. Out of the ten candidate items, we selected seven descriptors for *how*, *why* and *when*, and six for *what*.

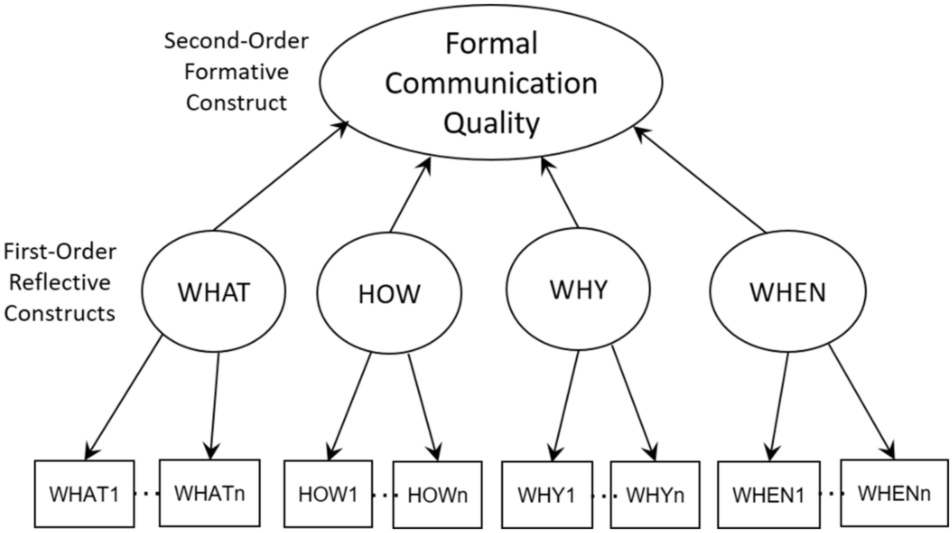

Fig. 4. Structure of Formal Communication Quality.

Content validity assessment

We conducted two tests to ensure the content validity of the construct. Card sorts assessed the extent to which each item corresponded to its intended construct (Moore and Benbasat, 1991). Four doctoral students from a business school served as judges; they reviewed the items along with definitions of the first-order dimensions and were able to successfully sort them into the intended categories. Doctoral students are commonly used for such tasks. They are appropriate since they are familiar with the principles of measure development, and they have experience (as do almost all professionals) with the introduction of new IT. Next, we conducted an item evaluation survey to assess the face validity of the items. A new panel of seven judges was asked to evaluate the extent to which each item was representative of its intended construct (i.e., face validity), using a 5-point Likert scale, with 1 being *not representative at all* and 5 *perfectly representative*. Following Saxe and Weitz (1982) we computed a sum score (i.e., the sum of seven judges' rating of an item) and a complete score that represented the percentage of judges who rated the item as either 4 or 5. To be considered adequate in this analysis, an item must have a sum score higher than 21 (i.e., on average, the seven judges thought of an item as at least moderately representative). This criterion led to the removal of four items (i.e., WHAT6, WHY6, WHEN3 and WHEN4 in Table 5). If a category had more than five descriptors, then we selected the five best performers based on the combination of the sum score and the complete score.[6] The outcome of this step is a scale of twenty items for measuring the information quality in *what*, *how*, *why* and *when*.

Measurement model specification

We modeled FCQ as a second-order formative construct with four first-order constructs that captured the perceived quality of the content in each of the four content areas (Fig. 4). The content areas are not interchangeable; leaving out any area potentially makes FCQ conceptually incomplete (Petter et al., 2007). Moreover, there is no reason to expect the change of quality in one content area to affect the quality of another area. Finally, these first-order constructs could have different consequences. For instance, the uncertainty generated by low-quality communication regarding personal impacts (i.e., HOW) may cause more anxiety among employees, while poor communication concerning the functionality of a new technology (i.e., WHAT) may lead to apathy.

The four first-order dimensions are reflective. The judgment of quality attributes (e.g., timeliness) is a reflection of an underlying sense of communication quality within a content area rather than a reflection of attributes that make up quality. While, objectively, it might be possible for communication to be accurate but not timely, we argue that respondents take a more holistic approach when assessing communication quality and that they assess the dimensions more on the basis of their underlying perceptions. This approach is consistent with both the change management literature (Allen et al., 2007; Bordia et al., 2004; Lewis, 2006; Miller et al., 1994) and the technology acceptance literature (Bala and Venkatesh, 2016).

Other constructs in the nomological network

We used perceived usefulness (Davis et al. 1989) and perceived ease of use (Moore and Benbasat, 1991) to represent the perceived IT attributes.[7] Our emotion constructs were measured using items from two existing taxonomies of emotions (Richins, 1997; Storm and

[6] WHY3 and WHY 7 had identical sum scores and complete scores. We retained WHY3 (truthful) as it reflected a slightly more distinct aspect of the communication quality than WHY7 (relevant).

[7] For the pre-test we used the scale of perceived usefulness and the scale of perceived ease of use. We believe they are equivalent to performance expectancy and effort expectancy, respectively, as the items mostly overlap. For the sake of consistency, from this point on we will refer to them as performance expectancy (PE) and effort expectancy (EE) in reporting the results.

Table 6
Weights of the First-Order Dimensions (Pre-Test).

	Weight
WHAT -> FCQ	0.35**
HOW -> FCQ	0.28**
WHY -> FCQ	0.26**
WHEN -> FCQ	0.32**

** Significant at $p < 0.01$.

Table 7
Path Coefficient, F-Square and Effect Size (Pre-Test).

	Path Coefficient	F-Square	Effect Size
FCQ -> PE	0.39**	0.18	Medium
FCQ -> EE	0.40**	0.19	Medium
PE -> ETHM	0.56**	0.51	Large
EE -> AXTY	−0.41**	0.20	Medium
EE -> ETHM	0.29**	0.14	Small
AXTY -> IES	0.41**	0.20	Medium
AXTY -> IIS	0.38**	0.16	Medium
ETHM -> IES	0.35**	0.14	Small
ETHM -> IIS	0.38**	0.17	Medium

** Significant at $p < 0.01$.
FCQ = Formal Communication Quality, PE = Performance Expectancy, EE = Effort Expectancy, ETHM = Enthusiasm, AXTY = Anxiety, IES = Intention to Seek Emotional Support, IIS = Intention to Seek Social Information.

Storm, 1987). Five items each were selected to assess enthusiasm (ETHM) and anxiety (AXTY). An example of ETHM is “When I think about using this new technology for my work, I feel *excited*.” For measuring the intention to seek support, we screened 38 coping tactics (Lewis and Seibold, 1996) to identify direct actions that aim to reduce the uncertainty associated with a new IT (e.g., “request information about the purpose of the change”). We used these tangible actions to capture the behavioral intention to seek instrumental support (IIS). An example is “I am going to look for more information from colleagues about this new technology.” Lewis and Seibold’s list of tactics did not contain anything related to emotion-focused coping, so we adapted the scale of seeking emotional social support (Carver et al., 1989) to the context of technology implementation. An example of the intention to seek emotional support (IES) is: “I am going to find out whether colleagues feel the same as I do about this new technology.” See Appendix B for a complete list of the items.

Pre-Test: Scale evaluation and refinement

Sample

In our pre-test, we randomly sampled alumni from the business school of a Canadian public university and invited 1445 individuals to participate in an online survey. To identify those individuals who were anticipating a new technology, we asked a screening question: “Is your company currently introducing to you a new information technology that you might use for your job later?” 294 responses were received. 137 individuals (46.6%) answered “no” to the screening question, 155 individuals (52.7%) answered “yes,” and 2 individuals did not answer that screening question but completed the rest of the survey. Among the 157 individuals, 26 abandoned the survey immediately after the screening question. Among the 131 individuals who answered some portion of the survey, 24 missed 5% or more of the 48 questions, leaving 107 usable responses. This falls just short of the needed cases (n = 113) to achieve 80% power for a small effect size ($R^2 = 10\%$) at the 5% significance level but is well above the sample (n = 41) needed for a moderate effect (Hair et al., 2016). See Appendix C for details of the sample.

Results

The primary purpose of the pre-test was to assess the FCQ measures. We began by assessing the measurement properties of the first-order dimensions of FCQ. Composite reliabilities all exceeded 0.90 (Appendix D, Table D1). Consistent with our expectations, the principal component analysis (Appendix D, Table D2) identified four factors and highlighted a few items that could be reworded or dropped to improve convergent validity. The loadings and cross-loadings of the items of the first-order constructs were satisfactory (Appendix D, Table D3). The Fornell-Larcker criterion (1981) (Appendix D, Table D1) and the heterotrait-monotrait ratio of correlations (HTMT) (Appendix D, Table D4) indicated adequate discriminant validity (Hair et al., 2016). Next, we assessed the weights of

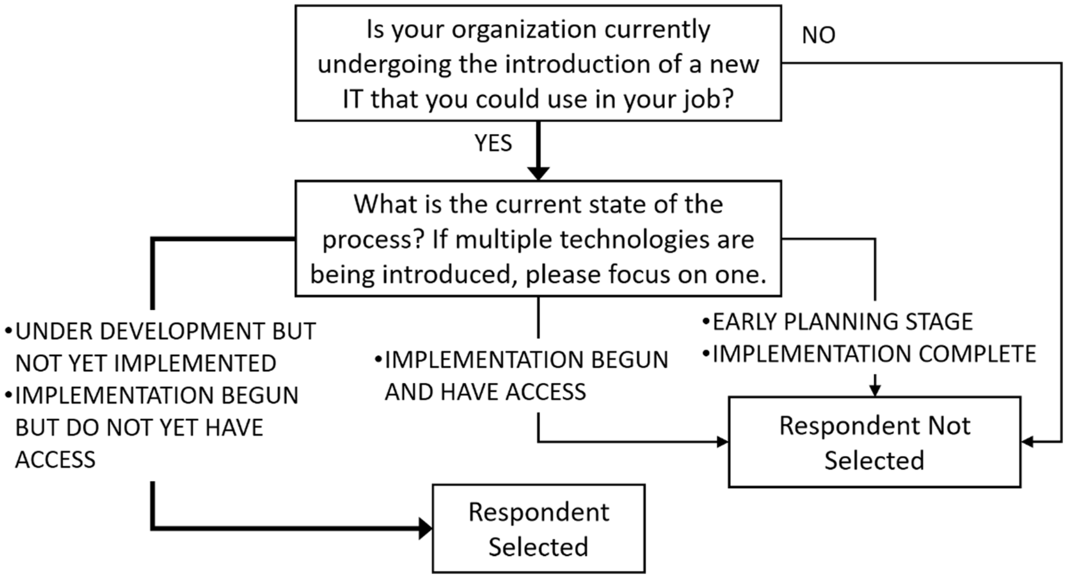

Fig. 5. Inclusion and Exclusion Criteria.

the first-order dimensions on the second-order construct (Cenfetelli and Bassellier, 2009), using bootstrapping with 5,000 subsamples. All the weights were significant (Table 6), indicating support for our proposed conceptualization.

In our analysis of the research model, all hypotheses were supported (Table 7), indicating support for nomological validity. The variance explained ranged between 16% and 55% (Appendix D, Table D5).

Measure revisions

Our pretest showed general support for the model and our conceptualization of FCQ. All items from the first-order constructs performed adequately in the pre-test, so no items were added or dropped. Before moving on to the main study, however, we invited six working professionals to review the questions and incorporated their input to improve readability with minor changes in wording. For instance, the original question stem for ***when*** (Table 4) was changed to "The formal communication about **the timing of various implementation activities** has been ______" (Appendix B).

Main Study: Validation

Sample

An important decision in designing the main study was whether to survey individuals in a single firm which was implementing a new IT or to survey individuals across many firms, as we had done in the pre-test. We chose the latter because focusing on a single organization could limit the variability in formal communication quality and thus hinder the testing of our model.

In 2017 we used the Qualtrics™ national (U.S.) panel to recruit respondents who were anticipating the introduction of a new IT at work but had no tangible experience using it. Prior research has demonstrated that through proper control and vetting afforded by the technology, panel data produces valid results (Lowry et al., 2016; Steelman et al., 2014). We used screening questions to ensure that respondents were truly at the anticipation stage (Fig. 5).

Out of the 451 respondents who met the screening criteria, we removed 78 respondents who failed either one of the two attention-check questions embedded in the online survey, 49 respondents whose completion time was less than four minutes for the 75 questions[8], 42 respondents whose description of the new IT in question was either blank or irrelevant (e.g., "don't know," text pasted from online news, or random keystrokes) and four respondents who skipped more than 5% of the questions. The final sample contained 278 respondents, with an overall missing data rate of $<0.1\%$. We used mean replacement for handling the missing value in the SmartPLS operations. In order to achieve 80% power for a small effect size ($R^2 = 10\%$) at the 5% significance level, 113 cases are needed (Hair et al., 2016). Thus, our sample size is adequate.

Details on sample characteristics are provided in Appendix C. According to the U.S. Bureau of Labor Statistics (2017), the percentage of female participants in our study (40%) was lower than the national cross-industry average in that year (47%) and the average age of our participants (40) was younger than the national median age (42) across genders and industries. Nonetheless, the data appear to be broadly representative of the population. We coded respondents' open-ended descriptions of the new IT into

[8] Four minutes was determined as the minimum time for completion of the survey through pre-testing.

categories (Table 8). The precision of our coding of IT types was constrained by the amount of textual description provided. For instance, unknown software accounted for nearly 11%, and an example of the description is "new software." Nearly two thirds (61.5%) of respondents reported that the new technology had not yet been implemented, while the rest indicated that the implementation had begun but access to the new technology had not yet been granted.

Measurement model analysis

As in the pre-test, we assessed the loadings and cross-loadings of the items of the first-order constructs (Appendix E, Table E1) and the discriminant validity using the Fornell-Larcker criterion (1981) (Appendix E, Table E2) and the HTMT ratios (Appendix E, Table E3) (Hair et al., 2016). All items exhibited loadings above 0.70; the cross-loadings were all lower than the loadings (Appendix E, Table E1), indicating an adequate level of convergent validity. Internal consistency reliabilities were all above 0.70 and the average variance extracted (AVE) values were all above 0.50 (Appendix E, Table E2). The correlation between WHAT and WHY was the same as the square root of the AVE (0.83) indicating a potential lack of discriminant validity. This concern was also reflected in the heterotrait-monotrait ratio between WHAT and WHY (0.94). Further assessment of the cross-loadings identified high cross-loadings across the two dimensions. Dropping two items (WHY2 – "useful" and WHAT1 – "timely") reduced the correlations. With this change, discriminant validity among the first-order dimensions of FCQ is satisfied (Appendix E, Tables E1 through E-3), though the dimensions remained highly correlated. Even though the four dimensions were highly correlated, all VIFs were less than 4 (Appendix E, Table E4). The weight of the path between each first-order construct and FCQ is statistically significant (Appendix E, Table E5), ranging between 0.23 and 0.32.

For other variables in the nomological network, scales exhibited an adequate level of internal consistency reliabilities and convergent validity. Item-to-construct loadings were all above 0.7 and AVE values were all above 0.5 (Appendix E, Table E1). None of the inter-construct correlations exceeded the square root of the AVE (Appendix E, Table E2). Except the path between Performance Expectancy and Enthusiasm, all the heterotrait-monotrait ratios were below 0.85 (Appendix E, Table E3), indicating adequate discriminant validity. The ratio for the path between Performance Expectancy and Enthusiasm was 0.851; after removing ETHM3 ("excited") which had a cross-loading of 0.72 with Performance Expectancy, the ratio went down to 0.81.

Structural model analysis

FCQ explained 32% of the variance in Performance Expectancy and 35% of the variance in Effort Expectancy (see Fig. 6). Performance Expectancy and Effort Expectancy explained 52% of the variance in Enthusiasm, and Effort Expectancy explained 17% of the variance in Anxiety. The two emotions explained 22% of the variance in Intention to Seek Emotional Support and 24% of the variance in Intention to Seek Instrumental Support. All hypotheses were supported. FCQ had a large impact (>0.35) on Performance Expectancy and Effort Expectancy. Performance Expectancy had a large effect on increasing Enthusiasm, while Effort Expectancy had a medium effect (>0.15) on Anxiety and a small effect (>0.02) on Enthusiasm. Enthusiasm had a medium effect on the Intention to seek either type of social support, while Anxiety had a small effect. Table E6 in Appendix E shows the f square of each relationship.

Assessing common method bias

To assess the possibility of common method bias (CMB), we followed the measured latent marker variable approach (Chin et al., 2013). We selected blue attitude (i.e., an individual's attitude toward the color blue, Miller and Chiodo, 2008), an ideal marker in our context because it is an assessment of a person's subjective evaluation, like the variables in our model, and yet the preference for the color blue is not expected to bear any relevance to the variables (Simmering et al., 2015). Using the construct-level correction method, we assessed the effect of the marker variable on each of the model relationships. In the presence of the marker variable, six path coefficients either increased or decreased, but only by 0.01. The significance levels of the paths did not change. Based on the evidence we conclude that CMB had no substantive effect on our findings.

Post hoc tests

Our analysis of the structural model demonstrated FCQ's nomological validity: FCQ influences the evaluation of the new IT, which in turn triggers emotional and coping responses as predicted by CMUA. To further explore the theoretical implications of our analysis, we conducted a series of post hoc tests. Our first test considered whether the results depend on whether implementation of the IT has begun (our two inclusion criteria in Fig. 5). Our second and third tests examined the extent to which Performance Expectancy and Effort Expectancy mediate the impact of FCQ on emotions, first in the overall model and then in the models at different time points. We also conducted a multigroup analysis to compare the results (i.e., software versus infrastructure technologies, managerial versus non-managerial respondents).

Comparison across time. Our sample comprised an earlier phase of the anticipation stage (i.e., the development has begun but the implementation has not yet begun, n = 171) and a later phase (i.e., the implementation has begun but I have not yet received access to the technology, n = 107). Bootstrapping was performed with 5,000 subsamples. The multigroup analysis (Appendix F, Table F1) indicates that the impact of FCQ on perceived IT attributes (PE and EE) remained stable across the two groups. The analysis also provides evidence that the relative importance of the four first-order dimensions may shift over time. In the earlier group, HOW was the strongest contributor to FCQ; in the later group, WHEN became the strongest contributor. While the differences in the weights of WHEN are not significant and the differences in the weights of HOW are significant only at $p < 0.10$, the change in the ordering of the weights suggests that information needs differ at different points in time. The multigroup analysis further shows that the impact of PE and EE on emotions differed according to time. The effect of PE on ETHM increased over time, while the effect of EE decreased. The effect of EE on AXTY increased over time such that more positive perceptions of EE promoted an even stronger reduction in AXTY in the later phase. For the later group, EE had no impact on ETHM, and AXTY was not a significant predictor of the intention to seek instrumental support.

Mediation analysis. To test whether perceived IT attributes mediate the relationships between FCQ and emotions, we followed the procedures outlined by Hair et al. (2016). The paths between FCQ and AXTY and between FCQ and ETHM were both statistically significant in the absence of performance expectancy and effort expectancy. In the presence of effort expectancy, the FCQ-AXTY path ceased to be significant. The FCQ-ETHM path remained significant when either performance expectancy or effort expectancy was present. Thus, the FCQ-AXTY relationship was fully mediated by effort expectancy, while the FCQ-ETHM relationship was partially mediated by performance expectancy and effort expectancy. Additional analysis of mediation at the two different time points (Appendix F, Table F2) suggests that this partial mediation was only present during the earlier phase of the anticipation stage.

Comparison across IT types. We made a purposeful decision to test our model across a variety of ITs and contexts to maximize variation in our constructs. However, such variability could mask the influence of important variables. To assess this risk, we coded our data into two categories: software application-based implementation (n = 190) and infrastructure-based implementation (n = 88). The multigroup analysis showed no significant difference in the pattern of path coefficients across the two groups, but the EE-ETHM path was significant only for the infrastructure-based implementation (Appendix F, Table F3).

Comparison across respondent types. We tested the impact of respondent types. Managerial employees, including upper, middle, and first-line managers (n = 140), were compared with non-managerial employees such as consultants, researchers, skilled labor, administrative staff and support staff (n = 133).[9] The multigroup analysis indicates two differences. First, EE reduced anxiety to a much greater extent among non-managerial respondents. Secondly, the EE-ETHM relationship was significant only with the managerial respondent. In other words, how easy it is to use a new IT did not excite non-managerial respondents. The pattern of other paths remained the same across the two groups (Appendix F, Table F4).

Cross-Validation

Our final test of the measure involved cross-validation in a different context. We conducted a field study in a small private four-year liberal arts university in the context of switching to a new learning management system. The final sample size comprised 68 instructors – 56% of the respondents were male and 22% had managerial obligations (e.g., department chair) in addition to their teaching role at the time of the survey. The average organizational tenure was 11 years (stdev = 9.6). The average teaching load was 20 credit hours per academic year (stdev = 8.2). The underlying structure of FCQ's four first-order constructs was similar to that in the main study (Appendix G, Table G1, G2 and G3). Other than H7 (" The higher the level of anxiety, the higher the level of intention to seek instrumental support.") and H9 (" The higher the level of enthusiasm, the higher the level of intention to seek emotional support")[10], all other hypotheses are supported (Appendix G, Table G4). FCQ explained 33% of the variance in relative advantage and 16% of the variance in perceived ease of use. The two beliefs explained 68% of the enthusiasm, and perceived ease of use explained 33% of the variance in anxiety. Both emotions explained 7% of the variance in intention to seek emotional support and 17% of the variance in intention to seek instrumental support (Appendix G, Table G5). Perceived IT attributes fully mediated between FCQ and emotions (Appendix G, Table G6), which matches our findings in the late group of the main study (Appendix F, Table F2). The findings from this single-technology, single-site study increased our confidence in the validity of our theorizing regarding FCQ's structure and its impact on user adaptation.

Discussion

Our research comprises scale development, theorizing and validation, using procedures adapted from MacKenzie et al. (2011). We developed a new conceptualization of FCQ that embeds the assessment of information quality in four specific content areas – the functionality (*what*), the personal impact (*how*) and the purpose (*why*) of the new IT, and the timeline (*when*) of the implementation plan. We developed an instrument to assess FCQ, drawing on prior research in information systems and change management. Through the lens of CMUA, we demonstrated the validity of our measure and the impact of FCQ in a nomological network. Our findings – across three studies – affirm the role of formal communication as a managerial influence mechanism that positively affects an employee's

[9] Five cases were excluded from this analysis. These individuals described themselves as self-employed or "other" and it was not clear whether they had managerial responsibility.

[10] This lack of support for these two hypotheses could be attributed to the sample size.

Table 8
Information Technologies Being Implemented by Category.

Infrastructure (n = 88)	Count (%)	Software (n = 190)	Count (%)
Cloud and mobile	16.9	Transaction support	16.5
Hardware (e.g., tablet, scanner)	12.9	Database and analytics	16.2
Operating systems (e.g., Windows)	1.8	Collaboration	6.1
		Human resource management	6.1
		Security and risk management	3.6
		Productivity support	2.9
		Artificial intelligence	2.5
		Inventory management	2.5
		Software development kit	1.1
		Unknown	10.8

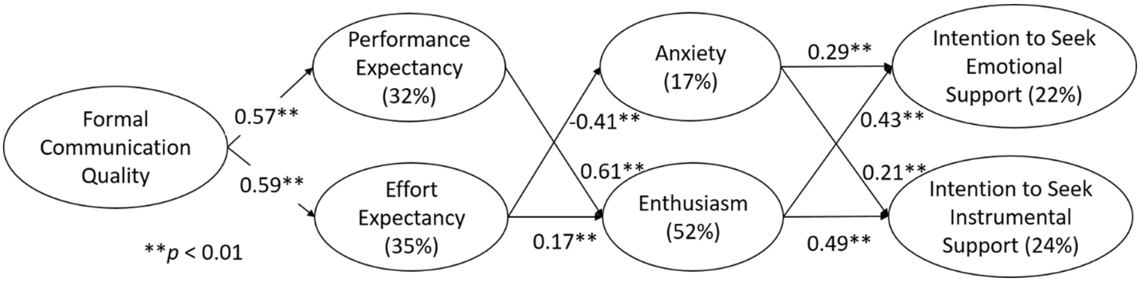

Fig. 6. Model Testing Results (Main Study).

evaluation of a new IT during the anticipation stage. The preliminary evaluation stimulated emotions, and the emotions motivated prospective users to seek opinions and camaraderie from others as a means of adapting to the new IT. Our work bridges the change management and technology acceptance literatures, expands the current understanding of seeking social support and illustrates the intricate dynamics of the nomological network across time.

Theoretical contributions

This study makes three distinct contributions to the literature. First, we link the change management and technology acceptance literatures by establishing the connection between FCQ and user adaptation during the anticipation stage of an IT-enabled change. The change management literature (see Oreg et al., 2011 for a review) has accumulated a wealth of insights about the importance of formal communication during the anticipation stage, but it does not provide a coherent theoretical integration across the cognitive, emotional and behavioral responses to organizational change. That is, the mechanisms through which the three categories of employee responses are linked, if linked at all, have not been articulated. We address this gap by drawing on user adaptation research from the technology acceptance literature to theorize the impact of formal communication during the anticipation stage. CMUA-based studies allow us to delineate and test the theoretical relationship between formal communication and employees' views of and feelings about a new IT and their adaptive actions. We demonstrate the influence of FCQ on user adaptation before employees have tangible experience with the new IT. Our work validates the relationship among various components of CMUA and extends the work of Stein et al (2015) by examining the relationships between the cues that influence an employee's appraisals. More precisely, we show how the cue *interactions with others* (i.e., a similar concept to formal communication) influences the cue *IT instrumentality* (i.e., Performance Expectancy and Effort Expectancy). Our research points to the possibility of establishing a structure within some of, if not all, the five cues.

Second, our investigation expands the extant understanding of seeking social support. In the user adaptation literature, it is assumed that positive emotion is only related to instrumental support, while negative emotion is only related to seeking emotional support (Beaudry and Pinsonneault, 2010). In our sample, anxiety also drove individuals to seek advice (i.e., instrumental support), at least during the earlier phase of the implementation, and enthusiasm drove individuals to find someone to share that excitement (i.e., emotional support) throughout the whole anticipation stage.

Third, our post hoc analyses revealed temporal dynamics. For instance, the weights of the four content areas making up FCQ may differ over time. *How* information was the strongest contributor to FCQ in the earlier phase of anticipation and that importance shifted to *when* information in the later phase. The relative importance of *what* and *why* remained stable. We believe the transactional model of stress and coping (Lazarus and Folkman, 1984) provides a plausible explanation. Upon interacting with a novel situation, the individual first assesses the personal meaning of the situation. In the early stage of the implementation, as employees start to be exposed to information about a new IT, their evaluation may revolve around *how* it might impact them, and this self-centered appraisal, driven by the survival instinct, is prioritized above and beyond their need to know about the strategic reasons behind the technology adoption or the timetable of the implementation. Thus, they pay more attention to *how*-related information in the earlier stage. As the implementation process unfolds, this *how*-related understanding becomes stable and their attention shifts to information relating to the actual schedule of implementation events, such as training sessions and the arrival of new devices.

The effect of time was also evident in the varying strengths of relationships in the rest of the nomological network. While the EE-AXTY relationship was enduring across time, the EE-ETHM relationship and the AXTY-IIS relationship were significant for the earlier respondents only. As for why AXTY-IIS ceased to be significant in the later group ($p = 0.06$), a plausible explanation is the sample size of this group ($n = 107$). Nonetheless, we cannot rule out the possibility that anxious respondents sought solely emotional support (e.g., understanding, encouragement) in the later phase of the anticipation stage. That is, they did not want more information about the new IT at that time; they simply did not want to feel alone in facing this change. Our results show that user adaptation during the anticipation stage is not a uniform or static experience: the focus of employees' attention, the triggers of emotions and the choice of seeking either type of social support vary over time. This insight will allow user adaptation researchers to view technology implementation with a new temporal perspective.

Managerial implications

Three managerial implications emerge from these findings. Management, as an influence agent, has firsthand information about the details of implementation projects and can thus influence employees' views of a new IT by improving the coverage and quality of the information presented to employees. As employees make sense of the impending arrival of a new technology, their preliminary understanding needs to encompass *what* the new IT is, *why* it is important to adopt it, *how* it will affect them personally and *when* the impact will materialize. Providing high-quality information across all four content areas can make employees' evaluations of a new IT more favorable.

Our analysis of the temporal dynamics of the model shows that the *how* aspect is most influential in shaping employees' evaluation of FCQ during the earlier phase of the anticipation stage. Thus, it is imperative for managers to craft communication delineating how the new IT will affect each employee professionally and personally as early as when the first announcement is made. As the rollout date draws near, emphasizing various resources (e.g., availability of training, appointment of a go-to person in each department) can greatly reduce the anxiety of the staff. Equipped with this insight, managers can be more intentional in elaborating different content areas at different points of time. Getting the timing right could make the messages more powerful and bring about a more fulfilling work experience and greater organizational effectiveness, both of which are essential for unlocking the power of IT for its strategic value.

Finally, we provide a validated FCQ scale that can be used to assess communication effectiveness during digital transformation. Periodically assessing how employees perceive and react to official messages about a new IT may facilitate managers' fine-tuning of messages and monitoring of user adaptation as the implementation progresses.

Limitations

We acknowledge three principal limitations of our work. First, as is common with individual-level surveys, the data are cross-sectional, so causal conclusions must be made with caution. The temporal dynamics of the four content areas were established through comparing two subgroups of the sample. Our conclusions about their relative influence over time are based on one sample. Similarly, our conclusions about the causality between the components of CMUA are based on theory and not statistically proven.

Our analysis of the measurement model in the main study also shows high cross-loadings and correlations between the dimensions of FCQ. While our model meets the minimum thresholds for discriminant validity and the correlations and cross-loadings are lower in the pre-test and the cross-validation, these high values suggest that the content areas may not be independent. Organizations that present high-quality information in one content area are more likely (though not guaranteed) to do so in other areas. However, in the presence of these high correlations, the weights assigned to the different content areas may be influenced by multicollinearity. Caution in the interpretation of those weights is thus urged, and future research to examine the relative influence of the different content areas is needed.

Finally, our assessment of the formal communication did not focus on whether the implications of the new IT for employees were positive or negative. Rather, we assessed how well the information was explained to recipients. We thus assume that the nature of the information was favorable, or at least not threatening or negative. To assess the validity of this assumption, we examined the types of IT that respondents were anticipating. None of the technologies described represented job-eliminating technologies. We did not observe a high level of anxiety among the respondents. Thus, we do not feel that our assumption is inappropriate. Nonetheless, we encourage future research to understanding how the personal meaning of the IT-enabled change affects the structure of FCQ (e.g., relative importance of what, how, why and when) and the relationship between FCQ and employees' responses (e.g., does performance expectancy still mediate between FCQ and emotions?).

Future research directions

In addition to opportunities related to the limitations noted above, we see several opportunities for future research. First, we did not theorize the antecedents of FCQ. We conceptualized FCQ and investigated its consequences. Factors that may shape FCQ (e.g., organizational climate, leadership style, Homburg et al., 2010; Rogiest and Segers, 2015) await theorization. We also invite researchers to contemplate the conditions under which the four content areas are more likely to covary. Logically, we do not anticipate these content areas to covary; empirically, the extent to which they are related to one another varied greatly across our three studies. In the main study, the four dimensions are highly correlated ($r = 0.74 – 0.76$) but this pattern is not present in the other two studies. The three samples differ according to education levels; one plausible explanation is that more educated respondents, like those in the pretest and the cross-validation, are more sensitive to the distinctions between the content areas. If so, the structure of FCQ might be contingent upon sample characteristics. This hypothesis awaits validation through replication of the study using samples of contrasting education levels.

Future research should also consider a longitudinal design to investigate the influence of coping intentions on coping behaviors during the anticipation stage and to assess the extent to which coping endeavors during the anticipation stage influence psychological and behavioral responses during the impact stage. The connection between the behavioral intention to seek social support for camaraderie and advice, the actual behavior of connecting with others, and desirable outcomes such as increased computer self-efficacy (Compeau and Higgins, 1995) and effective use (Burton-Jones and Grange, 2013) are yet to be tested. Extending the study across implementation periods would allow researchers to determine whether or how our constructs in the anticipation stage affect the post-implementation stage, enabling an assessment of the ultimate influence of FCQ on IT implementation outcomes.

Another plausible direction would be the elaboration of the role of emotion, the least studied component in the user adaptation research (Table 1). Stein et al. (2015) theorized the relationship between various cues and emotions. Our model only included two types of cues and two contrasting emotions. Future research should expand the range of emotions by investigating relevant but less examined emotions during the anticipation stage such as apathy (Lapointe and Rivard, 2005) and gratitude (Fehr et al., 2017).

Conclusion

The change management and technology acceptance literatures have established the importance of formal communication in fostering employees' acceptance of a new IT. However, both literatures implicitly assume a uniform coverage across content areas in the messages communicated to employees. Moreover, the underlying mechanisms for formal communication to affect employees' adaptation to the new IT were not directly explained and tested. This paper describes how we improved existing measures of formal communication quality, constructed a CMUA-based nomological network and tested the performance of the new scale. With three different samples, we arrived at a consistent finding: formal communication during the anticipation stage is the impetus that propels employees to prepare themselves – cognitively, emotionally and behaviorally – for a new IT, and we provide preliminary evidence of the temporal dynamics associated with this adaptation process.

Appendix A. Literature review

See Table A1.

Table A1
Formal Communication in Technology Acceptance Studies.

Author (Year)	Construct Name (Meaning)	Construct Nature	Context (Method)	Timing	Theoretical Lens	Example of Operationalization (Number of Items, Direction)	Dependent Variable (Finding)
Amoako-Gyampah and Salam (2004)	Project communication (perception of being informed)	Individual level	ERP system implementation at an American healthcare product manufacturer (survey)	Implementing (some modules have been rolled out while others have not)	TAM (Davis et al., 1989)	"I was well-informed about the project through the company newsletters." (2, Reflective)	Shared beliefs about benefits of ERP (supported)
Amoako-Gyampah (2007)	Argument for change (reasons for adopting the new technology)	Individual level	ERP system implementation at an American healthcare product manufacturer (survey)	Implementing (some modules have been rolled out while others have not)	TAM (Davis et al., 1989)	Its ability to allow greater coordination among functional units (5, Reflective)	Perceived usefulness (supported)
Aubert et al. (2013)	Communication quality (content and form)	Individual level	ERP system implementation at an international manufacturing plant (case study)	Post-implementation	Information systems success (DeLone and McLean, 2003)	Content: completeness, credibility, accuracy, purpose adequacy (N/A) Form: timeliness, openness, audience adequacy, bidirectionality, balance between formality and informality (N/A)	Project success (partially supported)
Bhattacherjee and Sanford (2006)	Information for attitude change =Argument quality (perceived quality of training information) + Source credibility (trainer's competence)	Individual level	Document management system implementation at a Ukrainian local government (survey)	Implementing (training)	Elaboration likelihood model (Petty and Cacioppo, 1984)	Argument quality: "The information provided during the DMS training was helpful." (4, Reflective) Source credibility: "The person providing the DMS training was trustworthy." (4, Reflective)	Perceived usefulness and attitude (supported)
Bueno and Salmeron (2008)	Communication (perceived quality and availability of information and perception of being informed)	Individual level	ERP system implementation at 9 Spanish companies (survey)	Implementing (all respondents had received training, some had partial use)	Extension of TAM (Davis et al., 1989)	"A fluent communication exists with respect the ERP." And "I am informed of the advantages and obstacles of ERP." (6, Reflective)	Facilitating conditions (supported)
Chiu (2018)	Managers' influence tactics (hard, soft and rational persuasion from authority figures to change subordinates' attitude or behavior)	Individual level	e-learning system implementation at a Taiwanese manufacturing company (survey)	Post-implementation (3 years later)	leadership influence (Yukl et al., 2008)	Rational persuasion: "Explained clearly the benefits the e-learning system will bring to the company." (2, Reflective) Collaboration: "Offered to provide resources you would need to use the e-learning system (e.g. training sessions)." (2, Reflective) Apprising: "Explained how the e-learning system could help your career." (2, Reflective) Inspirational appeal: "Described how using the e-learning system would match your personal values and work values." (2, Reflective)	Attitude (supported)
Ilie and Turel (2020)	Managers' influence tactics (hard, soft and rational persuasion from authority figures to change subordinates' attitude or behavior)	Individual level	Electronic record system at a U.S. hospital (survey)	Implementing (right after a module was implemented)	leadership influence (Yukl et al., 2008)	Rational persuasion: "Explained why the system project is practical and effective for your clinical job." (4, Reflective) Collaboration: "Offered to provide	Perceived usefulness and ease of use (partially supported)

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Table A1 (*continued*)

Author (Year)	Construct Name (Meaning)	Construct Nature	Context (Method)	Timing	Theoretical Lens	Example of Operationalization (Number of Items, Direction)	Dependent Variable (Finding)
						adequate resources (e.g., computers) for your use of the system." (4, Reflective) Apprising: "Explained how using the system will help you attain a personal objective." (4, Reflective) Inspirational appeal: "Described a clear, inspiring vision of what the system can accomplish." (4, Reflective)	
Lee (2008)	Implementation information (availability and content)	Individual level	ERP system implementation at a U.S. local school district (qualitative survey)	Post-implementation	N/A	N/A	Resistance to change
Li (2012)	Persuasive message=Argument quality (perceived quality of training information) + Source credibility (trainer's competence)	Individual level	ERP system implementation at multiple Taiwanese companies (survey)	Implementing (training)	Elaboration likelihood model (Petty and Cacioppo, 1984)	Argument quality: "The information provided by my company during the information system training session was informative." (3, Reflective) Source credibility: "The person providing the information system training was credible." (4, Reflective)	Information seeking, normative pressure, perceived usefulness, ease of use, affect (supported)
Li (2015)	Persuasive message=Argument quality (perceived quality of training information) + Source credibility (trainer's competence)	Individual level	ERP system implementation at multiple Taiwanese companies (survey)	Implementing (training)	Elaboration likelihood model (Petty and Cacioppo, 1984)	Argument quality: "The information provided by my company during the information system training session was informative." (3, Reflective) Source credibility: "The person providing the information system training was credible." (4, Reflective)	Perceived usefulness, ease of use, playfulness (partially supported)
Mayeh et al. (2016)	Communication (perceived quality and availability of information and perception of being informed)	Individual level	ERP system implementation at seven Iranian companies (survey)	Implementing and post-implementation	TAM (Davis et al., 1989)	"A fluent communication exists with respect the ERP." And "I am informed of the advantages and obstacles of ERP."(6, Reflective)	PUs (not supported), perceived EOU, trust for system and vendor (supported)
Meier et al. (2013)	Information quality (the characteristics of the information)	Individual level	Digitalization at a German local government (survey)	Pre-implementation	Resistance to change (Oreg, 2006)	"The information I have received about the changes has been timely/useful/adequate." (4, Reflective)	Resistance to change (partially supported)
Ruta (2005)	Communication plan (channel, vehicle, audience)	Organizational	Global HR portal implementation by Hewlett-Packard (case study)	Post-implementation	Change management theory and technology acceptance theory	N/A	Technology acceptance
Tsai and Compeau (2017)	Formal communication (availability of information in four content areas)	Individual level	Patient database implementation in Canada (case study)	Pre-implementation	CMUA (Beaudry and Pinsonneault, 2005)	N/A	Suspense

Appendix B. Measures

All scales are on a 5-point Likert scale (*strongly disagree* to *strongly agree*).

Formal Communication Quality

In this section, we ask you about any formal communication that you may have received regarding this new technology. By formal communication, we mean planned communication initiated by the organization in order to release information to employees.

Formal communication regarding new technology can have different aspects. For each aspect, please use the scale to indicate the extent to which you personally agree or disagree with the description

The formal communication about the functionality and features of the new information technology has been _____.
- WHAT1: timely
- WHAT2: useful
- WHAT3: accurate
- WHAT4: reliable
- WHAT5: relevant

The formal communication about the potential impacts of the new information technology on you has been _____.
- HOW1: timely
- HOW2: useful
- HOW3: truthful
- HOW4: convincing
- HOW5: relevant

The formal communication about the purpose of this new information technology has been _____.
- WHY1: timely
- WHY2: useful
- WHY3: truthful
- WHY4: convincing
- WHY5: reasonable

The formal communication about the timing of various implementation activities has been _____.
- WHEN1: timely
- WHEN2: useful
- WHEN3: realistic
- WHEN4: relevant
- WHEN5: sufficient

See Table B1.

Table B1
Measures for Other Constructs in the Nomological Network.

Pre-Test	Main Study
Cognitive Response	
Perceived Usefulness (Davis et al. 1989) • PU1: Using this new technology for my job will enable me to accomplish tasks more quickly. • PU2: Using this new technology will improve my job performance. • PU3: Using this new technology for my job will increase my productivity. • PU4: Using this new technology will enhance my effectiveness on the job. • PU5: Using this new technology will make it easier to do my job. • PU6: I will find this new technology useful for my job.	Performance Expectancy (Venkatesh et al., 2003) • PE1: I will find this new technology useful in my job. • PE2: Using this new technology in my job will enable me to accomplish tasks more quickly. • PE3: Using this new technology in my job will increase my productivity. • PE4: If I use this new technology, I will increase my chances of getting a raise.
Perceived Ease of Use (Moore and Benbasat, 1991) • PEOU1: My interaction with this new technology will be clear and understandable. • PEOU2: I believe that it will be easy to get this new technology to do what I want it to do. • PEOU3: Overall, I believe that this new technology will be easy to use. • PEOU4: Learning to operate this new technology will be easy.	Effort Expectancy (Venkatesh et al., 2003) • EE1: My interaction with this new technology will be clear and understandable. • EE2: It will be easy for me to become skillful at using this new technology. • EE3: I will find this new technology will be easy to use. • EE4: Learning to operate this new technology will be easy for me

(*continued on next page*)

Table B1 (*continued*)

Pre-Test	Main Study
Emotional Response Anxiety (Richins, 1997; Storm and Storm, 1987) When I think about using this new technology for my work, I feel _____. AXTY1: Anxious AXTY2: Uneasy AXTY3: Nervous AXTY4: Worried AXTY5: Intimidated	
Enthusiasm (adapted from Richins 1997, Storm and Storm 1987) When I think about using this new technology for my work, I feel _____. ETHM1: Optimistic ETHM2: Delighted ETHM3: Excited ETHM4: Energized ETHM5: Enthusiastic	
Behavioral Response Intention to Seek Emotional Support (adpated from Carver et al. 1989) • IES1: I am going to talk about this new technology to someone who can understand how I feel about it. • IES2: I am going to find out whether colleagues feel the same as I do about this new technology. • IES3: I am going to talk to someone who can help me feel better about this new technology.	
Intention to Seek Instrumental Support (adapted from Carver et al., 1989; L. K. Lewis and Seibold, 1996) • IIS1: I am going to look for more information from colleagues about this new technology. • IIS2: I am going to ask around and find out more about this new technology. • IIS3: I am going to observe what colleagues say about this new technology. • IIS4: I am going to ask colleagues about what they think of this new technology. • IIS5: I am going to pay more attention to what colleagues say about this new technology	
Marker Variable Blue Attitude (Miller and Chiodo 2008; in Simmering et al 2015) • I prefer blue to other colors. • I like the color blue. • I like blue clothes. • I hope my next car is blue.	

Appendix C. Respondents

See Table C1.

Table C1
Respondents Demographics.

Pre-Test	Main Study
Sample Source (Sample Size)	
Canadian business school alumni (107)	U.S. national panel (278)
Age	
41	40
Gender	
Male: 67%, Female: 33%	Male: 60%, Female: 40%
Education Level	
77% had some graduate work or graduate degrees.	• 40% had a university or college degree. • 21% had a graduate degree. • 15% had some college or university. • 13% had an associate degree. • 8% had a secondary school education. • 4% had professional degree (e.g., MD).
Experience with Information Technology	
22 years	22 years
Tenure with the Current Employer	
9 years	9 years
Tenure with the Current Position	
4 years	8 years
Position Type	
• 37% middle management • 32% professionals • 18% executives • 10% first line management • 3% others	• 30% middle management • 21% professionals • 18% administrative or support staff • 11% upper management • 10% junior management • 6% skilled laborers • 3% consultants and researchers • 1% self-employed or others
Industry	
• 32% in finance • 14 in IT/telecommunication • 14% in consulting • 9% in manufacturing • 5% in energy/utility	• 14% in arts, entertainment or recreation • 13% in telecommunication • 11% in healthcare or social assistance • 10% in wholesale

Appendix D. Model Assessment (Pre-Test)

See Table D1-D5.

Table D1
Construct Reliability and Discriminant Validity.

	Reliability		Discriminant Validity†										
	CR‡	AVE	FCQ	PU	PEOU	AXTY	ETHM	IES	IIS	WHAT	HOW	WHY	WHEN
FCQ	0.96	N/A	N/A										
PU	0.94	0.74	0.39	0.86									
PEOU	0.86	0.60	0.40	0.50	0.78								
AXTY	0.93	0.71	−0.14	−0.18	−0.41	0.84							
ETHM	0.95	0.79	0.40	0.70	0.56	−0.30	0.89						
IES	0.85	0.65	0.09	0.16	−0.07	0.31	0.22	0.81					
IIS	0.88	0.59	0.22	0.33	0.02	0.26	0.27	0.71	0.77				
WHAT	0.96	0.84	0.84	0.33	0.39	−0.05	0.37	0.02	0.20	0.92			
HOW	0.92	0.70	0.85	0.32	0.29	−0.13	0.33	0.05	0.08	0.64	0.84		
WHY	0.92	0.69	0.79	0.32	0.32	−0.18	0.27	0.10	0.22	0.49	0.63	0.83	
WHEN	0.95	0.80	0.83	0.33	0.32	−0.11	0.35	0.12	0.21	0.60	0.57	0.55	0.89

†The diagonal cells contain the square root of the construct's AVE.
‡ CR = Composite Reliability

Table D2
Principal Components Analysis.

	Factor Loadings			
WHEN1_timely	**0.89**	0.11	0.19	0.13
WHEN2_useful	**0.81**	0.26	0.30	0.22
WHEN3_realistic	**0.78**	0.29	0.02	0.17
WHEN4_relevant	**0.79**	0.24	0.24	0.23
WHEN5_sufficient	**0.77**	0.27	0.18	0.19
WHAT1_timely	0.44	**0.63**	0.28	0.12
WHAT2_useful	0.21	**0.83**	0.34	0.15
WHAT3_accurate	0.27	**0.87**	0.27	0.10
WHAT4_reliable	0.28	**0.87**	0.21	0.16
WHAT5_relevant	0.19	**0.86**	0.20	0.23
HOW1_timely	0.41	0.19	**0.63**	0.25
HOW2_useful	0.18	0.29	**0.81**	0.25
HOW3_truthful	0.32	0.15	**0.75**	0.20
HOW4_convincing	0.10	0.29	**0.70**	0.19
HOW5_relevant	0.09	0.38	**0.73**	0.30
WHY1_timely	0.46	0.14	0.33	**0.49**
WHY2_useful	0.19	0.13	0.36	**0.71**
WHY3_truthful	0.19	0.07	0.27	**0.76**
WHY4_convincing	0.18	0.11	0.12	**0.87**
WHY5_reasonable	0.16	0.29	0.15	**0.83**

Table D3
Loadings and Cross Loadings (Pre-Test).

	FCQ	PU	PEOU	AXTY	ETHM	IES	IIS	WHAT	HOW	WHY	WHEN
PU1	0.37	**0.86**	0.47	−0.21	0.63	0.06	0.20	0.31	0.29	0.30	0.31
PU2	0.33	**0.88**	0.38	−0.11	0.63	0.24	0.36	0.23	0.27	0.28	0.29
PU3	0.37	**0.91**	0.52	−0.20	0.66	0.11	0.26	0.35	0.30	0.26	0.28
PU4	0.27	**0.90**	0.38	−0.14	0.57	0.17	0.28	0.19	0.23	0.21	0.25
PU5	0.28	**0.83**	0.31	−0.08	0.49	0.21	0.36	0.24	0.26	0.26	0.18
PU6	0.40	**0.76**	0.50	−0.18	0.58	0.06	0.27	0.33	0.29	0.33	0.36
PEOU1	0.40	0.47	**0.65**	−0.13	0.42	0.06	0.20	0.39	0.28	0.31	0.34
PEOU2	0.37	0.47	**0.87**	−0.34	0.57	−0.08	0.00	0.32	0.27	0.27	0.34
PEOU3	0.28	0.37	**0.86**	−0.45	0.46	−0.06	−0.04	0.30	0.18	0.24	0.19
PEOU4	0.15	0.17	**0.71**	−0.33	0.20	−0.19	−0.13	0.15	0.13	0.16	0.07
ANXT1	0.01	−0.05	−0.26	**0.81**	−0.16	0.37	0.34	0.00	−0.01	−0.02	0.04
ANXT2	−0.13	−0.26	−0.39	**0.88**	−0.40	0.23	0.13	−0.06	−0.08	−0.13	−0.17
ANXT3	−0.19	−0.14	−0.39	**0.88**	−0.28	0.26	0.26	−0.08	−0.22	−0.26	−0.10
ANXT4	−0.21	−0.24	−0.39	**0.86**	−0.30	0.19	0.10	−0.09	−0.17	−0.26	−0.19
ANXT5	−0.07	−0.11	−0.31	**0.79**	−0.15	0.22	0.23	0.00	−0.05	−0.12	−0.10
ETHM1	0.44	0.67	0.57	−0.32	**0.90**	0.13	0.23	0.40	0.33	0.33	0.38
ETHM2	0.43	0.67	0.61	−0.35	**0.92**	0.13	0.15	0.39	0.36	0.30	0.36
ETHM3	0.29	0.63	0.54	−0.31	**0.86**	0.11	0.15	0.26	0.26	0.15	0.27
ETHM4	0.31	0.56	0.38	−0.18	**0.89**	0.36	0.33	0.29	0.27	0.21	0.25
ETHM5	0.30	0.58	0.41	−0.20	**0.87**	0.28	0.34	0.28	0.25	0.21	0.26
ISES1	0.12	0.07	−0.05	0.33	0.16	**0.85**	0.59	0.07	0.07	0.14	0.13
ISES2	0.14	0.26	0.05	0.07	0.32	**0.76**	0.60	0.07	0.11	0.20	0.12
ISES3	−0.06	0.08	−0.16	0.31	0.08	**0.80**	0.54	−0.09	−0.05	−0.09	0.02
ISSI1	0.14	0.29	0.00	0.24	0.16	0.49	**0.80**	0.17	0.03	0.14	0.11
ISSI2	0.15	0.34	0.07	0.18	0.22	0.48	**0.78**	0.14	0.02	0.10	0.20
ISSI3	0.01	0.24	−0.05	0.27	0.17	0.57	**0.82**	0.07	−0.10	0.05	0.01
ISSI4	0.31	0.17	0.06	0.07	0.27	0.60	**0.67**	0.18	0.24	0.33	0.27
ISSI5	0.25	0.23	−0.02	0.22	0.22	0.60	**0.76**	0.22	0.15	0.24	0.23
WHAT1	0.76	0.30	0.36	−0.06	0.34	0.13	0.27	**0.83**	0.57	0.47	0.61
WHAT2	0.79	0.33	0.36	−0.04	0.37	0.06	0.22	**0.93**	0.63	0.46	0.52
WHAT3	0.77	0.26	0.31	−0.02	0.27	−0.04	0.12	**0.94**	0.60	0.41	0.55
WHAT4	0.78	0.28	0.36	−0.08	0.33	−0.01	0.19	**0.95**	0.57	0.45	0.55
WHAT5	0.76	0.31	0.37	−0.04	0.37	−0.05	0.14	**0.91**	0.56	0.46	0.51
HOW1	0.73	0.19	0.20	−0.08	0.12	0.11	0.10	0.53	**0.79**	0.58	0.56
HOW2	0.75	0.27	0.28	−0.13	0.29	−0.03	−0.01	0.58	**0.90**	0.57	0.47
HOW3	0.70	0.31	0.24	−0.13	0.32	0.06	0.10	0.48	**0.84**	0.50	0.54

(continued on next page)

Table D3 (*continued*)

	FCQ	PU	PEOU	AXTY	ETHM	IES	IIS	WHAT	HOW	WHY	WHEN
HOW4	0.64	0.33	0.25	−0.13	0.37	0.10	0.11	0.50	**0.78**	0.44	0.39
HOW5	0.73	0.26	0.24	−0.05	0.31	−0.01	0.04	0.60	**0.87**	0.55	0.43
WHY1	0.70	0.23	0.31	−0.12	0.22	0.21	0.26	0.47	0.55	**0.77**	0.57
WHY2	0.66	0.21	0.34	−0.23	0.22	0.06	0.11	0.40	0.57	**0.85**	0.44
WHY3	0.60	0.20	0.14	−0.18	0.12	0.01	0.11	0.34	0.53	**0.81**	0.41
WHY4	0.60	0.39	0.28	−0.12	0.33	0.08	0.17	0.32	0.45	**0.85**	0.42
WHY5	0.68	0.31	0.26	−0.12	0.24	0.06	0.23	0.48	0.51	**0.87**	0.44
WHEN1	0.69	0.30	0.27	−0.08	0.34	0.16	0.23	0.46	0.46	0.46	**0.89**
WHEN2	0.82	0.31	0.32	−0.07	0.33	0.14	0.24	0.60	0.61	0.57	**0.94**
WHEN3	0.67	0.34	0.25	−0.07	0.26	0.07	0.23	0.51	0.39	0.41	**0.86**
WHEN4	0.77	0.32	0.35	−0.15	0.31	0.11	0.15	0.55	0.55	0.54	**0.90**
WHEN5	0.73	0.20	0.22	−0.15	0.29	0.04	0.09	0.54	0.51	0.47	**0.87**

Table D4
Heterotrait-Monotrait Ratio of Correlations.

	FCQ	PU	PEOU	AXTY	ETHM	IES	IIS	WHAT	HOW	WHY
PU	0.42									
PEOU	0.45	0.56								
AXTY	0.18	0.21	0.49							
ETHM	0.42	0.74	0.63	0.33						
IES	0.18	0.23	0.19	0.36	0.28					
IIS	0.28	0.38	0.19	0.29	0.31	0.92				
WHAT	0.87	0.34	0.44	0.07	0.39	0.12	0.23			
HOW	0.93	0.36	0.34	0.15	0.37	0.12	0.18	0.69		
WHY	0.87	0.35	0.38	0.22	0.30	0.22	0.26	0.53	0.71	
WHEN	0.87	0.35	0.35	0.16	0.37	0.15	0.26	0.63	0.62	0.60

Table D5
R-Square (Pre-Test).

	R^2
PU	0.16
PEOU	0.16
AXTY	0.17
ETHM	0.55
IES	0.21
IIS	0.20

Appendix E. Model Assessment (Main Study)

See Tables E1-E6.

Table E1
Loadings and Cross Loadings (Main Study).

	FCQ	PE	EE	AXTY	ETHM	IES	IIS	WHAT	HOW	WHY	WHEN
PE1	0.52	**0.89**	0.54	−0.22	0.64	0.20	0.29	0.44	0.50	0.46	0.45
PE2	0.41	**0.84**	0.43	−0.14	0.52	0.20	0.23	0.34	0.45	0.31	0.35
PE3	0.54	**0.88**	0.50	−0.16	0.67	0.24	0.35	0.49	0.52	0.45	0.46
EE1	0.53	0.58	**0.80**	−0.28	0.49	0.13	0.18	0.48	0.49	0.48	0.44
EE2	0.42	0.37	**0.75**	−0.21	0.30	0.07	0.11	0.39	0.38	0.40	0.35
EE3	0.52	0.46	**0.84**	−0.39	0.47	0.10	0.15	0.51	0.46	0.42	0.47
EE4	0.41	0.36	**0.81**	−0.41	0.35	0.07	0.13	0.41	0.38	0.36	0.34
ANXT1	−0.07	−0.03	−0.22	**0.75**	0.03	0.26	0.20	−0.10	−0.07	−0.07	−0.02
ANXT2	−0.31	−0.31	−0.44	**0.87**	−0.33	0.09	−0.01	−0.33	−0.32	−0.24	−0.24
ANXT3	−0.17	−0.07	−0.26	**0.82**	−0.14	0.11	0.06	−0.23	−0.15	−0.13	−0.10
ANXT4	−0.25	−0.23	−0.39	**0.87**	−0.25	0.16	0.10	−0.29	−0.25	−0.17	−0.19
ANXT5	−0.15	−0.14	−0.32	**0.78**	−0.14	0.18	0.11	−0.17	−0.18	−0.09	−0.09
ETHM1	0.44	0.60	0.45	−0.27	**0.84**	0.29	0.38	0.38	0.42	0.38	0.41
ETHM2	0.51	0.61	0.49	−0.22	**0.87**	0.32	0.39	0.46	0.48	0.40	0.49
ETHM4	0.46	0.62	0.41	−0.15	**0.88**	0.33	0.34	0.40	0.42	0.36	0.44
ETHM5	0.48	0.61	0.42	−0.11	**0.87**	0.34	0.41	0.40	0.44	0.42	0.48
ISES1	0.23	0.22	0.13	0.10	0.32	**0.81**	0.60	0.19	0.22	0.21	0.21
ISES2	0.16	0.18	0.15	0.11	0.29	**0.74**	0.63	0.17	0.10	0.11	0.20
ISES3	0.12	0.19	0.03	0.23	0.29	**0.83**	0.58	0.11	0.10	0.09	0.13
ISSI1	0.25	0.28	0.14	0.07	0.35	0.58	**0.78**	0.25	0.20	0.20	0.23
ISSI2	0.18	0.26	0.13	0.17	0.34	0.59	**0.79**	0.16	0.13	0.16	0.20
ISSI3	0.15	0.19	0.14	−0.01	0.25	0.51	**0.73**	0.18	0.13	0.12	0.13
ISSI4	0.21	0.32	0.20	0.04	0.39	0.66	**0.81**	0.21	0.17	0.16	0.22
ISSI5	0.26	0.24	0.08	0.11	0.34	0.54	**0.74**	0.21	0.23	0.24	0.26
WHAT2	0.80	0.47	0.55	−0.21	0.45	0.19	0.27	**0.86**	0.67	0.65	0.69
WHAT3	0.73	0.34	0.44	−0.27	0.39	0.16	0.21	**0.84**	0.59	0.63	0.59
WHAT4	0.77	0.42	0.43	−0.25	0.40	0.17	0.19	**0.87**	0.62	0.68	0.64
WHAT5	0.75	0.44	0.49	−0.23	0.37	0.13	0.21	**0.82**	0.68	0.61	0.60
HOW1	0.76	0.52	0.45	−0.17	0.49	0.22	0.22	0.62	**0.81**	0.65	0.64
HOW2	0.74	0.55	0.51	−0.25	0.46	0.17	0.20	0.62	**0.84**	0.55	0.61
HOW3	0.74	0.40	0.42	−0.22	0.36	0.10	0.12	0.62	**0.82**	0.60	0.61
HOW4	0.80	0.47	0.45	−0.20	0.45	0.13	0.22	0.66	**0.86**	0.67	0.66
HOW5	0.72	0.41	0.42	−0.19	0.36	0.10	0.18	0.62	**0.83**	0.53	0.57
WHY1	0.72	0.34	0.35	−0.10	0.35	0.18	0.17	0.60	0.55	**0.80**	0.67
WHY3	0.71	0.33	0.42	−0.14	0.35	0.11	0.16	0.61	0.60	**0.83**	0.58
WHY4	0.79	0.45	0.47	−0.12	0.40	0.18	0.24	0.67	0.64	**0.85**	0.69
WHY5	0.73	0.45	0.48	−0.22	0.39	0.09	0.21	0.64	0.61	**0.84**	0.59
WHEN1	0.74	0.41	0.38	−0.07	0.46	0.19	0.22	0.55	0.61	0.66	**0.81**
WHEN2	0.82	0.44	0.51	−0.17	0.45	0.20	0.25	0.69	0.66	0.69	**0.88**
WHEN3	0.80	0.44	0.45	−0.16	0.50	0.19	0.27	0.64	0.65	0.67	**0.88**
WHEN4	0.77	0.40	0.41	−0.16	0.39	0.18	0.23	0.64	0.63	0.63	**0.85**
WHEN5	0.79	0.39	0.42	−0.14	0.46	0.20	0.23	0.68	0.63	0.62	**0.87**

Table E2
Construct Reliability and Discriminant Validity.

	Reliability		Discriminant Validity[†]										
	CR[‡]	AVE	FCQ	PE	EE	AXTY	ETHM	IES	IIS	WHAT	HOW	WHY	WHEN
FCQ	0.96	N/A	N/A										
PE	0.90	0.76	0.57	0.87									
EE	0.88	0.64	0.59	0.56	0.80								
AXTY	0.91	0.67	−0.24	−0.20	−0.41	0.82							
ETHM	0.92	0.75	0.55	0.71	0.51	−0.22	0.86						
IES	0.84	0.63	0.21	0.25	0.12	0.19	0.37	0.80					
IIS	0.88	0.59	0.28	0.34	0.18	0.11	0.44	0.76	0.77				
WHAT	0.91	0.72	0.90	0.49	0.56	−0.28	0.47	0.19	0.26	0.85			
HOW	0.92	0.69	0.90	0.56	0.54	−0.25	0.51	0.17	0.23	0.76	0.83		
WHY	0.90	0.69	0.89	0.48	0.52	−0.18	0.45	0.17	0.23	0.76	0.72	0.83	
WHEN	0.93	0.74	0.91	0.49	0.51	−0.17	0.53	0.22	0.28	0.74	0.74	0.76	0.86

[†]The diagonal cells contain the square root of the construct's AVE.
[‡] CR = Composite Reliability

Table E3
Heterotrait-Monotrait Ratio of Correlations (Main Study).

	FCQ	PE	EE	AXTY	ETHM	IES	IIS	WHAT	HOW	WHY
PE	0.62									
EE	0.66	0.66								
AXTY	0.25	0.22	0.46							
ETHM	0.59	0.81	0.59	0.25						
IES	0.26	0.32	0.17	0.24	0.47					
IIS	0.31	0.40	0.22	0.14	0.51	0.98				
WHAT	0.98	0.57	0.66	0.32	0.54	0.25	0.30			
HOW	0.98	0.65	0.63	0.27	0.57	0.22	0.26	0.86		
WHY	0.99	0.55	0.62	0.20	0.52	0.22	0.27	0.88	0.83	
WHEN	0.98	0.55	0.58	0.18	0.59	0.28	0.31	0.83	0.82	0.87

Table E4
VIF of the Four First-Order Constructs.

	FCQ
WHAT	3.16
HOW	2.92
WHY	3.10
WHEN	3.11

Table E5
Weight (Main Study).

	Weight
WHAT -> FCQ	0.25**
HOW -> FCQ	0.31**
WHY -> FCQ	0.23**
WHEN -> FCQ	0.32**

** Significant at $p < 0.01$.

Table E6
Coefficient and Effect Size (F-Square).

	Coefficient	F-Square	Effect Size
FCQ -> PE	0.57**	0.47	Large
FCQ -> EE	0.59**	0.54	Large
PE -> ETHM	0.61**	0.53	Large
EE -> AXTY	−0.41**	0.20	Medium
EE -> ETHM	0.17**	0.04	Small
AXTY -> IES	0.29**	0.10	Small
AXTY -> IIS	0.21**	0.06	Small
ETHM -> IES	0.43**	0.23	Medium
ETHM -> IIS	0.49**	0.30	Medium

** Significant at $p < 0.01$

Appendix F. Post Hoc Analysis

See Tables F1-F4

Table F1
Multigroup Analysis (Early vs. Late).

	Path Coefficient (Early)	Path Coefficient (Late)	Path Coefficients Difference
FCQ -> PE	0.50**	0.63**	0.12
FCQ -> EE	0.60**	0.58**	0.03
PE -> ETHM	0.41**	0.76**	0.35†
EE -> AXTY	−0.28**	−0.56**	0.28†
EE -> ETHM	0.32**	0.07	0.25†
AXTY -> IES	0.30**	0.28**	0.02
AXTY -> IIS	0.26**	0.15	0.10
ETHM -> IES	0.45**	0.47**	0.02
ETHM -> IIS	0.45**	0.59**	0.14
WHAT -> FCQ	0.25**	0.25**	0.00
HOW -> FCQ	0.33**	0.29**	0.04
WHY -> FCQ	0.24**	0.23**	0.01
WHEN -> FCQ	0.31**	0.32**	0.02

* $p < 0.05$.
** $p < 0.01$.
† p is<0.025 or larger than 0.975 at the 95% confidence level.

Table F2
Mediation.

	Path Coefficients(All)	Path Coefficients (Early)	Path Coefficients (Late)	Path Coefficients Difference
FCQ -> PE	0.57**	0.50**	0.63**	0.12
FCQ -> EE	0.59**	0.60**	0.58**	0.03
FCQ -> AXTY	0.00	−0.05	0.06	0.11
FCQ -> ETHM	0.18**	0.24**	0.08	0.16
PE -> ETHM	0.55**	0.36**	0.72**	0.37†
EE -> AXTY	−0.41**	−0.25*	−0.60**	0.35†
EE -> ETHM	0.10	0.21*	0.04	0.17
AXTY -> IES	0.28**	0.30**	0.28**	0.02
AXTY -> IIS	0.21**	0.26**	0.15	0.10
ETHM -> IES	0.43**	0.45**	0.47**	0.01
ETHM -> IIS	0.49**	0.45**	0.59**	0.14
WHAT -> FCQ	0.25**	0.25**	0.25**	0.00
HOW -> FCQ	0.31**	0.33**	0.29**	0.05†
WHY -> FCQ	0.23**	0.24**	0.23**	0.01
WHEN -> FCQ	0.32**	0.31**	0.33**	0.02

* $p < 0.05$
** $p < 0.01$
† p is<0.025 or larger than 0.975 at the 95% confidence level

Table F3
Multigroup Analysis (Software Application vs. Infrastructure).

	Path Coefficient (Software Application)	Path Coefficient (Infrastructure)	Path Coefficients Difference
FCQ -> PE	0.57**	0.57**	0.00
FCQ -> EE	0.60**	0.60**	0.00
PE -> ETHM	0.64**	0.49**	0.15
EE -> AXTY	−0.45**	−0.33**	0.12
EE -> ETHM	0.13	0.30**	0.17
AXTY -> IES	0.28**	0.30**	0.02
AXTY -> IIS	0.22**	0.20*	0.02
ETHM -> IES	0.43**	0.46**	0.02
ETHM -> IIS	0.52**	0.43**	0.09
WHAT -> FCQ	0.25**	0.26**	0.01
HOW -> FCQ	0.30**	0.34**	0.04
WHY -> FCQ	0.23**	0.25**	0.03
WHEN -> FCQ	0.32**	0.30**	0.02

* $p < 0.05$
** $p < 0.01$

Table F4
Multigroup Analysis (Managerial vs. Non-managerial Respondents).

	Path Coefficient (Managerial)	Path Coefficient (Non-managerial)	Path Coefficients Difference
FCQ -> PE	0.59**	0.54**	0.05
FCQ -> EE	0.65**	0.54**	0.11
PE -> ETHM	0.59**	0.63**	0.04
EE -> AXTY	−0.30**	−0.52**	0.22†
EE -> ETHM	0.23**	0.12	0.11
AXTY -> IES	0.27**	0.35**	0.07
AXTY -> IIS	0.18*	0.29**	0.11
ETHM -> IES	0.51**	0.32**	0.19
ETHM -> IIS	0.49**	0.48**	0.01
WHAT -> FCQ	0.25**	0.26**	0.01
HOW -> FCQ	0.30**	0.33**	0.03
WHY -> FCQ	0.25**	0.22**	0.03
WHEN -> FCQ	0.31**	0.32**	0.01

* $p < 0.05$.
** $p < 0.01$.
† p is<0.025 or larger than 0.975 at the 95% confidence level.

Appendix G. Cross Validation

The cross validation was conducted through a single-site study: a post-secondary institution where one new technology was being introduced. A digital invitation and two waves of reminders were sent to 241 faculty members between late March and early May 2019, before the new system went live in August 2019. After 13 respondents who had been piloting the new system were removed from the data set, the final sample was comprised of 68 individuals. Instead of using performance expectancy and effort expectancy, we used relative advantage and perceived ease of use (Moore and Benbasat, 1991), respectively. The remaining variables were measured using short forms of the original scales (see Tables G1-G6).

Table G1
Construct Reliability and Correlations.

	Reliability		Discriminant Validity†										
	CR‡	AVE	FCQ	RA	PEOU	AXTY	ETHM	IES	IIS	WHAT	HOW	WHY	WHEN
FCQ	0.95	N/A	N/A										
RA	0.94	0.80	0.57	0.89									
PEOU	0.90	0.75	0.40	0.64	0.87								
AXTY	0.94	0.89	−0.25	−0.35	−0.58	0.94							
ETHM	0.94	0.89	0.49	0.81	0.65	−0.40	0.94						
IES	0.79	0.66	−0.02	0.05	−0.07	0.19	0.08	0.81					
IIS	0.81	0.69	0.46	0.49	0.39	−0.10	0.41	0.13	0.83				
WHAT	0.94	0.84	0.90	0.45	0.35	−0.24	0.32	−0.02	0.39	0.92			
HOW	0.95	0.87	0.88	0.53	0.35	−0.25	0.43	−0.01	0.42	0.78	0.93		
WHY	0.97	0.92	0.77	0.53	0.28	−0.15	0.59	0.00	0.43	0.56	0.60	0.96	
WHEN	0.97	0.92	0.79	0.42	0.36	−0.20	0.31	−0.03	0.29	0.67	0.56	0.43	0.96

†The diagonal cells contain the square root of the construct's AVE.
‡ CR = Composite Reliability.

Table G2
Heterotrait-Monotrait Ratio of Correlations.

	FCQ	RA	PEOU	AXTY	ETHM	IES	IIS	WHAT	HOW	WHY
RA	0.61									
PEOU	0.45	0.72								
AXTY	0.27	0.38	0.66							
ETHM	0.54	0.90	0.74	0.46						
IES	0.09	0.10	0.11	0.25	0.12					
IIS	0.64	0.69	0.57	0.30	0.59	0.21				
WHAT	0.97	0.49	0.40	0.26	0.36	0.09	0.56			
HOW	0.94	0.57	0.40	0.28	0.48	0.07	0.59	0.85		
WHY	0.81	0.56	0.30	0.17	0.65	0.12	0.59	0.60	0.63	
WHEN	0.84	0.44	0.41	0.22	0.33	0.04	0.40	0.72	0.60	0.45

Table G3
Weight (Cross-Validation).

	Weight
WHAT -> FCQ	0.30**
HOW -> FCQ	0.31**
WHY -> FCQ	0.30**
WHEN -> FCQ	0.29**

** Significant at $p < 0.01$.

Table G4
Coefficient, F-Square and Effect Size (Cross-Validation).

	Coefficient	F-Square	Effect Size
FCQ -> RA	0.57**	0.49	Large
FCQ -> PEOU	0.40*	0.19	Medium
RA -> ETHM	0.67**	0.84	Large
PEOU -> AXTY	−0.58**	0.49	Large
PEOU -> ETHM	0.21*	0.08	Small
AXTY -> IES	0.27*	0.06	Small
AXTY -> IIS	0.08	0.01	Not Applicable
ETHM -> IES	0.18	0.03	Not Applicable
ETHM -> IIS	0.44**	0.20	Medium

** Significant at $p < 0.01$.
* Significant at $p < 0.05$.

Table G5
R-Square (Cross-Validation).

	R^2
RA	0.33
PEOU	0.16
AXTY	0.33
ETHM	0.68
IES	0.07
IIS	0.17

Table G6
Mediation Analysis (Cross-Validation).

	Path Coefficient
FCQ -> RA	0.58**
FCQ -> PEOU	0.40**
FCQ -> AXTY	−0.03
FCQ -> ETHM	0.04
RA -> ETHM	0.65**
PEOU -> AXTY	−0.56**
PEOU -> ETHM	0.21*
AXTY -> IES	0.27*
AXTY -> IIS	0.08
ETHM -> IES	0.18
ETHM -> IIS	0.44**
WHAT -> FCQ	0.29**
HOW -> FCQ	0.31**
WHY -> FCQ	0.32**
WHEN -> FCQ	0.28**

** Significant at $p < 0.01$.
* Significant at $p < 0.05$.

references

Allen, J., Jimmieson, N.L., Bordia, P., Irmer, B.E., 2007. Uncertainty during organizational change: managing perceptions through communication. J. Chang. Manag. 7, 187–210.
Amoako-Gyampah, K., 2007. Perceived usefulness, user involvement and behavioral intention: an empirical study of ERP implementation. Comput. Human Behav. 23, 1232–1248.
Amoako-Gyampah, K., Salam, A.F., 2004. An extension of the technology acceptance model in an ERP implementation environment. Inf. Manag. 41, 731–745.
Arthur J. Gallagher & Co, 2018. Elevate The Conversation: 2018 State of the Sector on Internal Communication. Arthur J. Gallagher & Co.

Aubert, B., Hooper, V., Schnepel, A., 2013. Revisiting the role of communication quality in ERP project success. Am. J. Bus. 28, 64–85.
Aust, H., Rüsch, D., Schuster, M., Sturm, T., Brehm, F., Nestoriuc, Y., 2016. Coping strategies in anxious surgical patients. BMC Health Serv. Res. 16, 1–10.
Bagozzi, R.P., 1992. The self-regulation of attitudes, intentions, and behavior. Soc. Psychol. Q. 55, 178–204.
Bala, H., Venkatesh, V., 2016. Adaptation to information technology: a holistic nomological network from implementation to job outcomes. Manage. Sci. 62, 156–179.
Barki, H., Titah, R., Boffo, C., 2007. Information system use-related activity: an expanded behavioral conceptualization of individual-level information system use. Inf. Syst. Res. 18, 173–192.
Beaudry, A., Pinsonneault, A., 2010. The other side of acceptance: studying the direct and indirect effects of emotions on information technology use. MIS Q. 34, 689–710.
Beaudry, A., Pinsonneault, A., 2005. Understanding user responses to information technology: a coping model of user adaptation. MIS Q. 29, 493–524.
Bhattacherjee, A., 2001. Understanding information systems continuance: an expectation-confirmation model. MIS Q. 25, 351–370.
Bhattacherjee, A., Sanford, C., 2006. Influence processes for information technology acceptance: an elaboration likelihood model. Manag. Inf. Syst. Q. 30, 805–825.
Bordia, P., Hobman, E., Jones, E., Gallois, C., Callan, V.J., 2004. Uncertainty during organizational change: types, consequences, and management strategies. J. Bus. Psychol. 18, 507–532.
de la Boutetiere, H., Montagner, A., Reich, A., 2018. Unlocking success in digital transformations. McKinsey & Company.
Brooks, A.W., Schweitzer, M., 2011. Can nervous nelly negotiate? How anxiety causes negotiators to make low first offers, exit early, and earn less profit. Organ. Behav. Hum. Decis. Process. 115, 43–54.
Brooks, A.W., Schweitzer, M.E., Gino, F., 2012. Anxiety, advice, and the ability to discern: feeling anxious motivates individuals to seek and use advice. J. Pers. Soc. Psychol. 102, 497–512.
Bruque, S., Moyano, J., Eisenberg, J., 2008. Individual adaptation to IT-induced change: the role of social networks. J. Manag. Inf. Syst. 25, 177–206.
Bueno, S., Salmeron, J.L., 2008. TAM-based success modeling in ERP. Interact. Comput. 20, 515–523.
Bureau of Labor Statistics, 2017. U.S. Bureau of Labor Force Statistics [WWW Document]. URL https://www.bls.gov/cps/demographics.htm (accessed 7.15.19).
Burton-Jones, A., Grange, C., 2013. From use to effective use: a representation theory perspective Andrew. Inf. Syst. Res. 24, 632–658.
Carver, C.S., Scheier, M.F., Weintraub, J.K., 1989. Assessing coping strategies: a theoretically based approach. J. Pers. Soc. Psychol. 56, 267–283.
Cenfetelli, R.T., Bassellier, G., 2009. Interpretation of formative measurement in information systems research. MIS Q. 33, 689–707.
Chin, W.W., Kim, Y.J., Lee, G., 2013. Testing the differential impact of structural paths in PLS analysis: a bootstrapping approach. In: New Perspectives in Partial Least Squares and Related Methods. Springer, New York, NY, pp. 221–229.
Chiu, H.H., 2018. Employees' intrinsic and extrinsic motivations in innovation implementation: the moderation role of managers' persuasive and assertive strategies. J. Chang. Manag. 18, 218–239.
Choi, J.N., Sung, S.Y., Lee, K., Cho, D.S., 2011. Balancing cognition and emotion: innovation implementation as a function of cognitive appraisal and emotional reactions toward innovation. J. Organ. Behav. 32, 107–124.
Compeau, D.R., Higgins, C., 1995. Computer self-efficacy: development of a measure and initial test. MIS Q. 19, 189–211.
Davidson, E., 2002. Technology frames and framing: a socio-cognitive investigation of requirements determination. MIS Q. 26, 329–358.
Davis, F.D., Bagozzi, R.P., Warshaw, P.R., 1989. User acceptance of computer technology: a comparison of two theoretical models. Manage. Sci. 35, 982–1003.
DeLone, W.H., McLean, E.R., 2003. The DeLone and McLean model of information systems success: a ten-year update. J. Manag. Inf. Syst. 19, 9–30.
Deutsch, M., Gerard, H.B., 1955. A study of normative and informational social influences upon individual judgment. J. Abnorm. Soc. Psychol. 51, 629–636.
Diamantopoulos, A., 2011. Incorporating formative measures into covariance-based structural equation models. MIS Q. Manag. Inf. Syst. 35, 335–358.
Elie-Dit-Cosaque, C.M., Straub, D.W., 2011. Opening the black box of system usage: user adaptation to disruptive IT. Eur. J. Inf. Syst. 20, 589–607.
Fadel, K.J., 2012. User adaptation and infusion of information systems. J. Comput. Inf. Syst. 52, 1–10.
Fadel, K.J., Brown, S.A., 2010. Information systems appraisal and coping: the role of user perceptions. Commun. Assoc. Inf. Syst. 26, 107–126.
Fehr, R., Fulmer, A., Awtrey, E., Miller, J., 2017. The grateful workplace: a multilevel model of gratitude in organizations. Acad. Manag, Rev.
Fenlason, K.J., Beehr, T.A., Journal, S., Mar, N., 2016. Social support and occupational stress: effects of talking to others. J. Organ. Behav. 15, 157–175.
Folkman, S., Moskowitz, J.T., 2000. Positive affect and the other side of coping. Am. Psychol. 55, 647–654.
Fornell, C., Larcker, D.F., 1981. Structural equation models with unobservable variables and measurement error: algebra and statistics. J. Mark. Res. 18, 382–388.
Fredrickson, B.L., Joiner, T., 2002. Positive emotions trigger upward spirals toward emotional well-being. Psychol. Sci. 13, 172–175.
Fugate, M., Harrison, S., Kinicki, A.J., 2011. Thoughts and feelings about organizational change: a field test of appraisal theory. J. Leadersh. Organ. Stud. 18, 421–437.
Gable, S.L., Gonzaga, G.C., Strachman, A., 2006. Will you be there for me when things go right? Supportive responses to positive event disclosures. J. Pers. Soc. Psychol. 91, 904–917.
Greene, K., Derlega, V.J., Alicia, M., 2006. Self-disclosure in personal relationships. In: Vangelisti, A.L., Perlman, D. (Eds.), The Cambridge Handbook of Personal Elationships. Cambridge University Press, New York, NY, pp. 409–427.
Hair, J.F., Hult, G.T.M., Ringle, C.M., Sarstedt, M., 2016. A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), 1st ed. Sage Publications Inc., Thousand Oaks, CA.
Homburg, C., Wieseke, J., Kuehnl, C., 2010. Social influence on salespeople's adoption of sales technology: a multilevel analysis. J. Acad. Mark. Sci. 38, 159–168.
IDC, 2020. Global ICT Spending Forecast 2020 – 2023 [WWW Document]. IDC.com. URL https://www.idc.com/promo/global-ict-spending/forecast (accessed 1.14.21).
Ilie, V., Turel, O., 2020. Manipulating user resistance to large-scale information systems through influence tactics. Inf. Manag. 57, 103178.
Jimmieson, N.L., Terry, D.J., Callan, V.J., 2004. A longitudinal study of employee adaptation to organizational change: the role of change-related information and change-related self-efficacy. J. Occup. Health Psychol. 9, 11–27.
Kim, H.W., Kankanhalli, A., 2009. Investigating user resistance to information systems implementation: a status quo bias perspective. MIS Q. 33, 567–582.
Klein, K.J., Sorra, J.S., 1996. The challenge of innovation implementation. Acad. Manag. Rev. 21, 1055–1080.
Lapointe, L., Rivard, S., 2005. A multilevel model of resistance to information technology implementation. MIS Q. 29, 461–491.
Law, K.S., Wong, C.-S., Mobley, W.H., 1998. Toward a taxonomy of multidimensional constructs. Acad. Manag. 23, 741–755.
Lazarus, R.S., Folkman, S., 1984. Stress, Coping, and Adaptation. Springer-Verlag, New York.
Lee, A.E., 2008. Where good ERP implementations go bad: a case for continuity. Bus. Process Manag. J. 14, 327–337.
Leonard-Barton, D., Deschamps, I., 1988. Managerial influence in the implementation of new technology. Manage. Sci. 34, 1252–1265.
Leonardi, P.M., 2009. Why do people reject new technologies and stymie organizational changes of which they are in favor? Exploring misalignments between social interactions and materiality. Hum. Commun. Res. 35, 407–441.
Lewis, L.K., 2006. Employee perspectives on implementation communication as predictors of perceptions of success and resistance. West. J. Commun. 70, 23–46.
Lewis, L.K., Seibold, D.R., 1996. Communication during intraorganizational innovation adoption: predicting users' behavioral coping responses to innovations in organizations. Commun. Monogr. 63, 131–157.
Li, C.Y., 2015. The effects of source credibility and argument quality on employees' responses toward information system usage. Asia Pacific Manag. Rev. 20, 56–64.
Li, C.Y., 2012. Persuasive messages on information system acceptance: a theoretical extension of elaboration likelihood model and social influence theory. Comput. Human Behav. 29, 264–275.
Lindsay, B., Smit, E., Waugh, N., 2018. How the Implementation of Organizational Change is Evolving. McKinsey & Company.
Lowry, P.B., D'Arcy, J., Hammer, B., Moody, G.D., 2016. "Cargo Cult" science in traditional organization and information systems survey research. J. Strateg. Inf. Syst. 25, 232–240.
MacKenzie, S.B., Podsakoff, P.M., Podsakoff, N.P., 2011. Construct measurement and validation procedures in MIS and behavioral research: integrating new and existing techniques. MIS Q. 35, 293–334.
Mayeh, M., Ramayah, T., Mishra, A., 2016. The role of absorptive capacity, communication and trust in ERP adoption. J. Syst. Softw. 119, 58–69.
Meier, R., Ben, E.R., Schuppan, T., 2013. ICT-enabled public sector organisational transformation: factors constituting resistance to change. Inf. Polity 18, 315–329.

Miller, B.K., Chiodo, B., 2008. Academic entitlement: adapting the equity preference questionnaire for a university setting. In: The Southern Management Association Meeting. St. Pete Beach, FL.
Miller, K.I., Monge, P.R., 1985. Social information and employee anxiety about organizational change. Hum. Commun. Res. 11, 365–386.
Miller, V.D., Johnson, J.R., Grau, J., 1994. Antecedents to willingness to participate in a planned organizational change. J. Appl. Commun. Res. 22, 59–80.
Minge, M., Thüring, M., 2018. Hedonic and pragmatic halo effects at early stages of user experience. Int. J. Hum. Comput. Stud. 109, 13–25.
Moore, G.C., Benbasat, I., 1991. Development of an instrument to measure the perceptions of adopting an information technology innovation. Inf. Syst. Res. 2, 192–222.
Oliver, R.L., 1980. A cognitive model of the antecedents and consequences of satisfaction decisions. J. Mark. Res. 17, 460.
Oreg, S., 2006. Personality, context, and resistance to organizational change. Eur. J. Work Organ. Psychol. 15, 73–101.
Oreg, S., Vakola, M., Armenakis, A.A., 2011. Change recipients' reactions to organizational change: a 60-year review of quantitative studies. J. Appl. Behav. Sci. 47, 461–524.
Petter, S., Straub, D., Rai, A., 2007. Specifying formative constructs in Information Systems research. MIS Q. 31, 623–656.
Petty, R.E., Cacioppo, J.T., 1984. The effects of involvement on responses to argument quantity and quality: central and peripheral routes to persuasion. J. Pers. Soc. Psychol. 46, 69–81.
Richins, M., 1997. Measuring emotions in the consumption experience. J. Consum. Res. 24, 127–146.
Ringle, C.M., Wende, S., Becker, J.-M., 2015. SmartPLS 3.
Rogiest, S.E., Segers, J., 2015. Climate, communication and participation impacting commitment to change. J. Organ. Chang. Manag. 28, 1094–1106.
Rovira, T., Fernandez-Castro, J., Edo, S., 2005. Antecedents and consequences of coping in the anticipatory stage of an exam: a longitudinal study emphasizing the role of affect. Anxiety, Stress Coping 18, 209–225.
Russell, J.A., 1980. A circumplex model of affect. J. Pers. Soc. Psychol. 39, 1161–1178.
Ruta, C.D., 2005. The application of change management theory to HR portal implementation in subsidiaries of multinational corporations. Hum. Resour. Manage. 44, 35–53.
Saxe, R., Weitz, B.A., 1982. The SOCO scale: a measure of the customer orientation of salespeople. J. Mark. Res. 19, 343–351.
Schweiger, M.D., Denisi, S.A., 2016. Communication with employees following a merger: a longitudinal field experiment. Acad. Manag. J. 34, 110–135.
Shiota, M.N., Neufeld, S.L., Yeung, W.H., Moser, S.E., Perea, E.F., 2011. Feeling good: autonomic nervous system responding in five positive emotions. Emotion 11, 1368–1378.
Simmering, M.J., Fuller, C.M., Richardson, H.A., Ocal, Y., Atinc, G.M., 2015. Marker variable choice, reporting, and interpretation in the detection of common method variance: a review and demonstration. Organ. Res. Methods 18, 473–511.
Smith, C.A., Ellsworth, P., 1985. Patterns of cognitive appraisal in emotion: progress in cognitive development research. J. Pers. Soc. Psychol. 48, 813–838.
Steelman, Z.R., Hammer, B.I., Limayem, M., 2014. Data collection in the digital age: innovative alterantives to student samples. MIS Q. 382.
Stein, M.-K., Newell, S., Wagner, E.L., Galliers, R.D., 2015. Coping with information technology: mixed emotions, vacillation, and nonconforming use patterns. MIS Q. 39, 367–392.
Storm, C., Storm, T., 1987. A taxonomic study of the vocabulary of emotions. J. Pers. Soc. Psychol. 53, 805–816.
Sykes, T.A., Venkatesh, V., Gosain., S., 2009. Model of acceptance with peer support: a social network perspective to understand employees' system use. MIS Q. 33, 371–393.
Tsai, H., Compeau, D.R., 2017. Change-related communication and employees' responses during the anticipation stage of IT-enabled organizational transformation: a case study. DATA BASE Adv. Inf. Syst. 48, 30–50.
van den Heuvel, M., Demerouti, E., Bakker, A.B., Schaufeli, W.B., 2013. Adapting to change: the value of change information and meaning-making. J. Vocat. Behav. 83, 11–21.
van den Heuvel, S., Schalk, R., van Assen, M.A.L.M., 2015. Does a well-informed employee have a more positive attitude toward change? The mediating role of psychological contract fulfillment, trust, and perceived need for change. J. Appl. Behav. Sci. 51, 401–422.
Venkatesh, V., 2000. Determinants of perceived ease of use: integrating control, intrinsic motivation, and emotion into the technology acceptance model. Inf. Syst. Res. 11, 342–365.
Venkatesh, V., Morris, M.G., Davis, G.B., Davis, F.D., 2003. User acceptance of information technology: toward a unified view. MIS Q. 27, 425–478.
Wagner, U., Galli, L., Schott, B.H., Wold, A., Van Der Schalk, J., Manstead, A.S.R., Scherer, K., Walter, H., 2014. Beautiful friendship: social sharing of emotions improves subjective feelings and activates the neural reward circuitry. Soc. Cogn. Affect. Neurosci. 10, 801–808.
Wanberg, C.R., Banas, J.T., 2000. Predictors and outcomes of openness to changes in a reorganizing workplace. J. Appl. Psychol. 85, 132–142.
Yukl, G., Seifert, C.F., Chavez, C., 2008. Validation of the extended influence behavior questionnaire. Leadersh. Q. 19, 609–621.