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Help! I Need Somebody: New Directions in IT Support

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Abstract

For organizations to derive performance benefits, competitive advantage or simply an adequate return on their IT investments, they must devise ways to ensure that technology is used as required, accurately, creatively and innovatively by individual users. In this paper, we argue that one way in which users develop competence and skill is through their interactions with the IT support function or help desk. Help desks serve as one of the most intensively used organizational mechanisms for improving users' knowledge about technology and how to use it (Nambisan et al. 1999). Using a foundation of knowledge transfer and learning, this paper develops a situated learning two-level framework that integrates cognitive and social cognitive theory to explain how and why the dyadic relationship between users and the IT support personnel results in important performance outcomes for both parties.

Introduction

Technological advances in the functionality, diversity and specialization of business tools, including desktops, laptops, PDAs, wireless connectivity and a multitude of software products offer enormous productivity potential to business. At the same time, they present major assimilation challenges for users (Shaffer 1998). Despite decades of research on adoption and use of technology, understanding user knowledge and skill development about technology remains a key managerial and research problem (Niederman and Webster 1998).

In this environment, computer training and support have taken on increasing importance. There is a growing body of literature examining the way different training methods can improve intentions and use of technology (e.g., Compeau and Higgins 1995; Niederman and Webster 1998). Further, there has been a steady literature investigating the role of IT support for users indicating the relationship between high quality support and user success with technology (Bergeron et al. 1990; Guimaraes 1996; Guimaraes et al. 1999).

In this paper, we view support, specifically in the form of the IT customer support unit, or help desk, as an influential avenue by which knowledge is transferred between IT personnel and users when users experience technical problems. In this way, the provision and use of IT support represents an important avenue of learning for users as they interact with IT personnel to solve IT related problems. These actions can improve the individual users' competence and skill with technology - both know what and know how. However, to date, we have limited understanding of the way in which IT support is involved in the users' learning about technology as they use and experience difficulties with their technology in everyday practice. Thus, in this paper, we turn to theories of learning and social cognitive theory to examine, at a finer level of detail the question: ***how and why does IT support influence users' technology problem resolution and other key user outcomes including knowledge, self-efficacy and affect (including satisfaction)?*** In doing so, our focus is necessarily on the interactions between the user and the IT support personnel, since it is within these interactions, as situated in a support event, that this knowledge transfer has the potential to occur. Moreover, we maintain that understanding the behaviors of the IT personnel (who we will call technologists for convenience), as they serve users is key to understanding this issue.

Background

> *"While the PC has crossed the line from occasional productivity tool to indispensable business appliance, most companies' ability to provide end-user services – with quality, reliability and cost effectiveness – has not kept pace. ...According to International Data Corporation, support costs represent more than 75% of the total cost of PC ownership – and they continue to rise even as hardware prices plummet."* (Shaffer 1998, p. 8)

Historically, organizations and the IT function have helped users to develop knowledge and skills with technology by providing support through a number of mechanisms. In a comprehensive review of end user computing, these mechanisms of IT support were defined as the range of organizational actions taken to plan, organize, staff, support and co-ordinate technology and services to assist end users (Brancheau and Brown 1993). Depending on the size of the organization, IT support activities are formalized to varying degrees in an area of the IT function most frequently known as the information center (IC) (Mirani and King 1994; Guimaraes 1996; Guimaraes et al. 1999).

In their review Brancheau and Brown (1993) concluded that support for end users plays a critical role in their ability to learn and use increasingly complex and diffused technology. Many models of individual IT usage behavior theorize a role for technical support as an important contextual factor ultimately influencing usage through its influence on attitude formation (Thompson et al. 1991; Compeau and Higgins 1995; Mathieson 1991). In these views, the existence of facilitating resources is seen as lowering barriers to use and therefore aiding in the formation of favorable attitudinal perceptions, intention to use and usage. However, empirical findings on the value of support have been mixed. Some previous empirical research has found formal support like an IC, to be less valuable to users (Robey and Zmud 1990). In addition, support has been found to have negative influence on user self-efficacy judgements (Compeau and Higgins 1995) or, contrary to expectations, support as a facilitating condition has no influence on usage (Thomspon et al.1991). Other researchers have found a positive correlation between the provision of support and users' levels of knowledge and ability with technology (Nambisan et al. 1999) and the quality of services provided by the IC and end user computing success and satisfaction (e.g. Mirani and King 1994; Guimaraes et al. 1999).

Research results notwithstanding, it appears that formal technical support has taken on new importance in organizations today. Managerially, the need to provide on-demand technical assistance to users has become a critical and costly activity in organizations as individuals have been provided with an increasingly complex array of communication and information technology (both stationary and mobile) and technology use has become a job requirement rather than an option. Total cost of ownership (TCO) research highlights the important fact that by far, the most costly feature of technology is not acquisition but ongoing ownership, in particular the provision of accessible and reliable support to assist users.

Indeed, a study conducted by the Help Desk Institute in 1996 indicates that as organizations have implemented newer, more complex technologies for users, the volume of calls to the IT support function (or "help desk") from users seeking computer support is growing by 25% per year (Borrego 2000). Overall, organizational use of a formal unit to support end users has grown from 40% of firms in 1985, to 58% in 1991 to 78% in 1996 (Essex et al. 1998). Of the 78% of firms providing user support through the information center, 95% provided a help desk function as one of the mechanisms of support (Guimaraes 1996).

For IT departments, the operation of an efficient and effective help desk operation is growing increasingly complex because of increasing user needs and sophistication and a growth in the technological diversity for which support is required. Concurrently, in order to keep up with demand, the help desk itself has begun to recognize the need to take a more consolidated, sophisticated approach with a focus on acquiring effective problem solving/customer tracking tools and hiring and training highly skilled help desk technologists (Shaffer 1998). In this environment management's focus is on a number of proactive strategies to manage users' needs for support. These include root cause analysis (understanding why users call), call reduction strategies (proactive training and communication to reduce users needs to call the help desk), the development of performance goals, improvement in offering users orientations to new technology, increased training and more frequent user communication (Rumberg 1998). Complicating the management of this function, however, is the fact that most business managers don't see the value of investing in help desk technologies since they do not understand how it might relate to improving the technology usage experience of users. Thus the answer is generally to throw more technologists at the problem rather than infrastructure to support the total help desk operation.

Thus, in light of the significant financial and management resource dedicated to providing support, further research on the support function is warranted. This is particularly true given the inconsistencies that have been the result of past research efforts. One way of resolving these inconsistencies is to move from very general, factors based approaches to research (ie. asking users what they think of support) to more process oriented approaches that investigate the support phenomenon in more detail. As a first step, we propose to examine what it is that IT support personnel provide to users during the support activity and how that may influence

the user. This leads to the next section of the paper where we offer a two-level framework for understanding this aspect of the phenomenon.

Research on IT Support and Proposed Framework

While it seems clear from the above review that on-demand technical assistance is taking on an increasingly important role in supporting end user's use of technology, what is less clear from practice and research to date is how to frame the processes and impacts of such assistance. Recent research has offered a new perspective on this enduring issue. In a study of organizational mechanisms that foster IT knowledge creation and support user innovation with technology, Nambisan et al. (1999) found that customer support units (or help desks) were one of the critical determinants of two types of user capability: technology cognizance (declarative, factual knowledge about technology or "know what") and users' ability to explore a technology (or "know how"). Specifically, they identified 14 organizational mechanisms from literature and a field study (including IT journal subscriptions, task forces, IT steering committees, IT strategic planning units, user groups, vendor demonstrations and customer support units). Of these mechanisms, the 200 user respondents identified the help desk as the mechanisms that they interacted with the most intensely (4.82 on a scale of 7). They suggest this relationship exists because help desks facilitate important knowledge transfer interactions between users and IT personnel. The result of improved user knowledge about technology is a key antecedent to a higher rate of user innovation with technology. They conclude by noting a need "for IS managers to unravel the higher-level roles that various organizational mechanisms can play (for knowledge creation), roles that have hitherto not been noticed or emphasized" (Nambisan et al. 1999, p. 386).

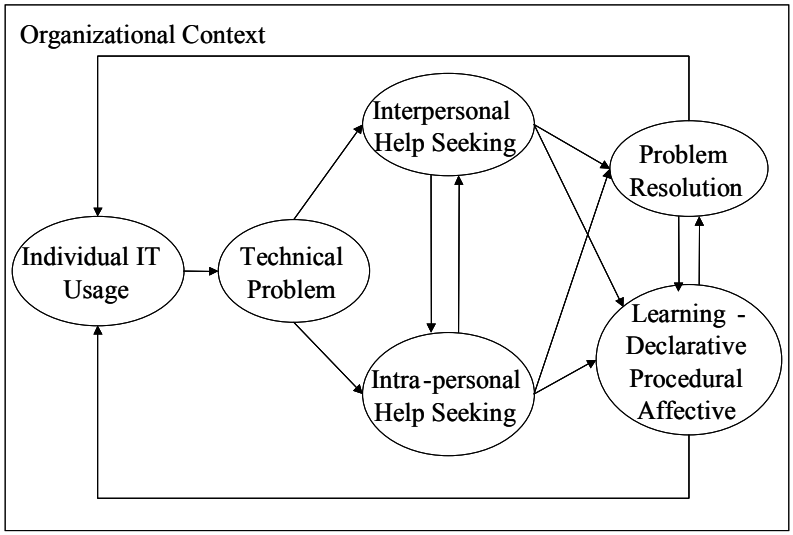

Figure 1. Framework of User Help Seeking Behaviors and Outcomes

In this section, we build on this perspective by developing theoretically based, conceptual frameworks representing two levels of the phenomenon of user-IT support interactions. First we develop the macro conditions and outcomes that guide users when they experience a need for support (see Figure 1). Secondly, we explore the micro, dyadic processes that establish how and why the help desk technologist transfers knowledge about technology to users and influences user-based attitudes (see Figure 2).

The framework in Figure 1 represents the contextual factors, processes and outcomes associated with user's problem solving about IT. As the model shows, the individual is embedded in an organizational context. This context is influential to the degree that the rate of technological change, characteristics of the organizational culture, IT support budget and IT-business relationship impacts the nature and number of problems experience by individuals and their response to the problems they encounter. (Rockhart et al. 1996; Mirani and King 1994). Referring to situated problem solving theory (Sinnott 1989) and theories of help seeking (Ames 1983) we argue that based on attributes of the individual and the problem the individual will select a problem solving strategy that involves either private help seeking activities (where resources can be accessed by the user privately) or interpersonal help seeking activities (where the user involves another person). Additionally private or public help seeking behaviors are likely to be interrelated depending on the complexity of the problem and the extensiveness and persistence of the users help seeking behavior (Ames 1983). The anticipated outcome of these behaviors is a resolution to the technical problem that triggered the event and some influence on the users learning about the problem and the development of understanding about the mechanism of help chosen. The following paragraphs consider the elements of the model in more detail.

Organizational Context: Attributes of the organization serve as important contextual factors establishing boundary influences on the user and IT support function. Specifically, the technology intensity of an organization and the rate of technological change influence both the user and support technologist to the extent that it supports or impairs their ability to develop and maintain a core level of skill and ability around the technology that they must use and service (Rockhart et al. 1996). Further the effectiveness of the relationship between IT and line managers (or two-way alignment) can establish the organizational climate

for service and support (Rockhart et al. 1996). Finally, the degree to which the organization deploys formal mechanisms of support to users will also provide an important contextual factor to understanding the behavior of users and the resources available to technologists to help them (Mirani and King 1994).

User IT Usage, the Problem Event and Problem Solving: As users use their technology resources in every day practice, they experience a multitude of outcomes including satisfaction, effectiveness and, of interest to this paper, technical problems. Adapting the definition of a problem from Levin and Kareev (1980) to suit a technical context, we define a technical problem as a situation in which an individual is unable to achieve some goal that requires the use of an element of their technological resources, after they have taken some actions, without success. In other words a problem is an obstacle to motivated action. Such a definition excludes situations in which an individual elects to (and can afford to) ignore the issue as strictly speaking such a circumstance is not a problem (Sinnott 1989). When users encounter technical problems they will begin a problem solving process involving defining the problem within the context of the task environment, searching and defining possible solutions and selecting and trying alternatives until the problem is solved. (Newell and Simon 1972). As such the user's technical experience and expertise will influence their understanding of their task environment and their framing and interpretation of the technical problem they face (Newell and Simon 1972; Anderson 1990). It seems likely that the nature of the problem and the extent to which the user perceives it as ill-structured and novel will influence the user's problem solving processes.

Importantly, as a problem situated in everyday action, their solution set will naturally include social resources available to them (Levin and Kareev 1980; Sinnott 1989). The availability and study of how social resources influence situated problem solving are important advances to problem solving theory. What this means is studies of problem solving in naturalistic settings must include help seeking and help using as viable problem solving strategies. In our two-level framework, we adopt these theoretical perspectives in two ways. First, in Figure 1, when the user is faced with a technical problem that they cannot solve, they have the option to seek help. This help is distinguished by the degree to which it can be private and intra-personal or more public and interpersonal. Theorists of help seeking behaviors have found that individuals have a heterogeneous approach to help seeking which is driven by a combination of processes involving attribution and image management (Ames 1983). In other words, an individual forms a perception of the reasons for why they require help which are generally based on preserving their own self-image and attributing the reasons for the problem in a way so as to maintain their positive self concept of ability (Ames 1983). To the degree that the individual relates the problem to their own performance, we assert that the self-image perception that an individual holds will influence their initial choice of private help vs. public help. Additionally self-image perceptions will influence the users level of persistence with the private mode over the other as they attempt to resolve their problems. However, context plays an important role here since instrumental help seeking to resolve a task oriented problem will be seen as a successful problem solving strategy and therefore the user will not be concerned with their own self image (Ames 1983). Thus the degree to which the individual relates the problem to the task at hand will influence their choice of the most efficient helping source without regard to their self-image. The second way in which we incorporate the social and interpersonal nature of help seeking is in Figure 2, where our model examines the dyadic problem solving processes between the individual and the technologist. We develop our arguments around this process below.

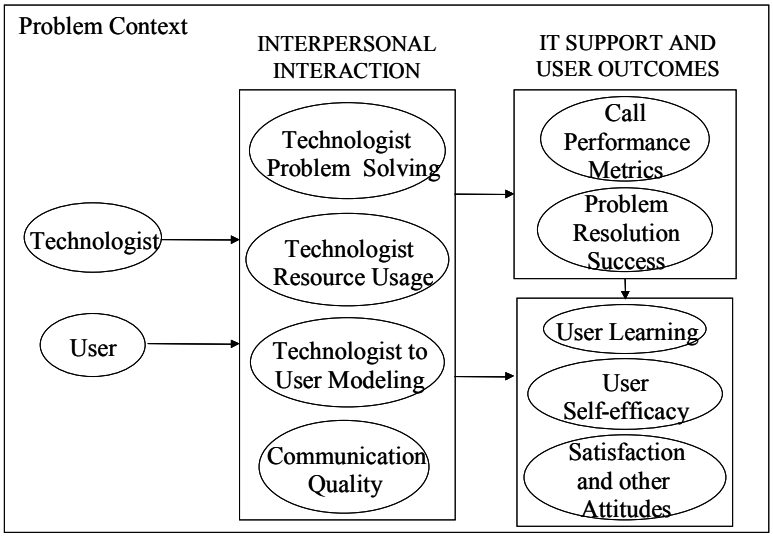

Figure 2. Framework of Technologist-User Interactions and Outcomes

Figure 2 considers one of the manifestations of user interpersonal help seeking in more detail. Specifically, and as per our focus, when the user turns to the help desk technologist, behaviors of the technologist are critical to outcomes that can be experienced by users. Whereas Figure 1 is situated in the context of the organization, in this figure we are situated within the context of the problem. Within this context, technologists are faced with the challenge of making sense of vague and equivocal user descriptions of the situation, depending on the ability of the user. While some user problems will be easily resolvable because they are routine, there will also be many times in which the technologist must engage in important cognitive processes for sense-making and problem solving, in order to analyze the situation, determine the problem and decide on how to resolve it. We use theories of

analogical cognition to explain these processes and predict their outcome (Anderson 1990; Holyoak and Thagard 1995). In addition to their own resources, technologists rely on user reports, problem tracking and retrieval software and their help desk peers. During or after the resolution of problems, technologists are increasingly called upon to document the situation in a database to permit the storing and distribution of problem solutions and to enable learning by other technologists via these shared knowledge bases. The goals of providing this support are generally to maximize user satisfaction (Ives et al. 1983), minimize time spent, achieve the performance goals of the support function, and ideally, educate the user to the extent that the next time they encounter the problem they can resolve it on their own (Bandura 1986; Nambisan et al. 2000). The following paragraphs outline the elements of the framework in more detail, beginning with the outcomes. The framework includes two primary outcomes of the problem resolution process: IT support outcomes (i.e., Was the problem solved efficiently?) and user outcomes (i.e., Has the individual learned from the process? Have his or her beliefs and attitudes changed?)

IT Support Outcomes: Previous research has provided various macro ways of conceptualizing the effectiveness of the IT support function. In our framework, we focus on two types of IT support outcomes. The first is the performance metrics of the support event which will be influenced by the problem solving interactions between the user, technologist and the resources the technologist uses. The second is the degree to which the problem that initiated the contact event was resolved in the interaction between the user and the technologist. We view these as defining the applicable outcomes of the support event and which overtime will ultimately influence the performance of the IT support function in terms of the users perception of IT support effectiveness and quality (Mirani and King 1994; Bergeron et al. 1990; Kettinger and Lee 1994). In the short term, we see these support outcomes as also influencing the outcomes experienced by the user because the efficiency of the call and the degree to which the problem is resolved are likely to influence user outcomes such as learning, satisfaction and self efficacy.

User Outcomes: Based on our view of the technical problem evoking situated problem solving and help seeking behaviors in users we see three important user outcomes based on the above theory-based processes. Using the theory of situated problem solving and learning through social cognitive theory, we view learning as an important outcome for the user (Anderson 1990; Bandura 1986). We characterize the learning outcome of users along three dimensions – cognitive development (declarative and procedural), and learning effects on the user's self-efficacy and satisfaction (Anderson 1990; Kraiger et al. 1993). These three variables reflect the intended outcomes of the provision of support as conceived within the situated learning-based theoretical frameworks presented here.

Technologist Problem Solving and Modeling and Help Giving Quality: One of the challenges of everyday problem solving is that problems are not always well defined. Therefore, when a user contacts the technologist, a series of interactions are set in motion that influence potential outcomes for both parties. As outlined above, theories of problem solving (Newell and Simon 1972) advance that individuals proceed to solve problems by initiating a series of steps to define the problem, search for solutions and select and apply a solution and repeat that process until the problem is solved. Of particular interest in the case of technologists is analogical problem solving tactics (Anderson 1990; Holyoak and Thagard 1995). This is a specific type of cognition that includes the use of analogies, metaphors, similes and case based reasoning (Holyoak and Thagard 1995) as problem solving tactics used for novel or ill structured problems that some have argued are the only means of solving novel problems. It relies on the technologist's ability to draw on previous experience (the source) and apply it successfully to the novel problem (the target) presented by the user (Holyoak and Thagard 1995). Further, based on the theory of situated problem solving (Sinnott 1989), their problem solving activities will be influenced by their interactions (as the help giver) with the user (as the help seeker). Specifically, given the technologist's skills and experience, they initiate a set of interactions with the user. Their first task is to appropriately assess and diagnose the user's problem so that they can begin the task of identifying possible solutions. Based on the user's explanations, we expect one of two things to occur. First, if the user is able to articulate the problem clearly (including prior remedies they have already attempted), then the technologist can begin to search for solutions relatively quickly and their problem solving behaviors will be directed to the level of difficulty of the problem. However, if the user is unable to articulate the problem clearly to the technologist, then the technologist must first attempt to negotiate and agree with the user on the nature of the problem and expected goals of the solution. Subsequently, in both cases, the more novel the problem identified, the more likely the technologist will need to apply analogical reasoning skills to search for appropriate solutions. This process will depend on the user's attributes, the technologist's attributes and the nature of the problem. For example assume that a novice user contacts the technologist about a spreadsheet software problem and the technologist is not familiar with that specific product, but has knowledge of other spreadsheet software. The technologist's intra-personal problem solving process will depend on three inputs. First, the technologist's behavior will depend on the user's knowledge and ability – the greater the ambiguity of the user's explanation, the more diagnosis and sense-making the technologist will need to undertake to identify the problem. Second, the more novel the problem (vs. routine) the more the technologist will need to draw on analogies and recall of similar problems in the known spreadsheet software domain to solve the problem in the unknown domain. Third, the technologist's own knowledge and experience will influence their ability to successfully undertake this problem solving process.

Further, based on the theory of situated problem solving (Sinnott 1989), as the technologist acts to solve the user's problem, they will draw on the social and situated resources that they have available to them. In other words, the help givers seek help themselves during this process. In the context of the help desk these resources are two-fold – problem tracking and resolution software and nearby peers. In this way, technologists expand their own abilities and resources to provide assistance to users. The degree to which they use them will again depend on the user, the problem and the technologist themselves. Continuing from the above example, the lower the user's technical skills and knowledge, the more novel the problem, and the lower the technologists own skills and knowledge, the more the technologist will use external support resources to supplement their intra-personal efforts to diagnose, identify possible solutions and ultimately solve the problem. These resources include the support software that provides both the user's support history and a search mechanism to identify similar cases and solutions in the support database. Further, technologists can turn to close peers to request assistance, advice and information.

Within the process of the interactions themselves, certain actions can be taken to maximize learning outcomes of the user. Specifically, social cognitive theory provides a basis for understanding how individuals learn from others (Bandura 1986; Compeau and Higgins 1995). In contrast to earlier models of learning emphasizing punishment and reinforcement in the behaviorist tradition, according to Bandura (1986), learners need not experience either in order to learn, rather, individuals can learn by watching others model a behavior or performance. According to Bandura (1986), there are two modes of learning – enactive mastery in which the learner learns by performing the behavior and vicarious learning, in which the learner learns from the performance of others. In our view, the interactions occurring between the technologist and the user are an example of vicarious learning during which the user can 'observe' the technologist problem solving techniques and later apply them to future problems. Further, this type of learning can be manifested in the way the technologist enacts the role of a model and therefore models the appropriate problem solving steps and solutions for the user. Finally, analogical problem solving provides another avenue through which the user can learn (Thompson et al. 2000). While the technologists use of analogical reasoning to support their own problem solving can be important, it is also true that the degree to which they can express the solution using analogical reasoning to the user will improve the knowledge transfer to the user (Thompson et al. 2000). Thus the technologist's ability to model successful problem solving behavior and use analogical explanations in the interactions with users will influence the degree of knowledge transfer and learning on the part of the user.

Finally, we consider the communication skills of the technologist to have an important influence on the outcomes of the user-technologist interaction process. Research on the factors associated with the success of IT support have investigated and found links between the quality of the users interactions with IT support staff (SERVQUAL) and user satisfaction (Ives et al. 1983; Bergeron et al. 1990; Kettinger and Lee 1994). Thus we include in our model of the phenomenon, a role for the technologist's communication quality as a key behavior that influences user outcomes. Examples of the technologist's communications quality are reflected in the SERVQUAL measures of responsiveness (willingness to help the user and provide prompt service), assurance (knowledge and courtesy of the technologist and their ability to convey trust and confidence) and empathy (the provision of caring, individual attention) (Kettinger and Lee 1994).

Implications for Future Research

"Give a man a fish and he'll eat for a day. Teach a man to fish and he'll eat forever." (Chinese Proverb)

In the ideal world, organizations would prefer to have well-trained, self-sufficient users who are independent and productive with their technology. Unfortunately, in the 'real' world, many aspects of the organization, the technology and the user combine to provide great complexity in the user's assimilation and use of technology. This explains the continuing growth and importance of the IT support organization for users outlined in research findings to date. But understanding the key success factors of the IT support organization (the current focus of research) only goes part way to enhancing our understanding of the direct influence that IT support has on users. To fill in this gap, we have developed and presented a two level framework that examines how users faced with technical problems can learn from their own problem solving behaviors and how technologists interacting with users can have a significant influence on user learning, user self efficacy and user satisfaction. We see these frameworks as providing three key insights. First they highlight a potential tension between the two types of support outcomes. Secondly they provide a connection to the long-term outcomes associated with IT support. Finally they provide a connection to individual models of IT attitudes, beliefs and usage. We explore each of these below.

First, in examining the frameworks we note a potential paradox exists between IT support outcomes and user outcomes. This paradox involves the tension between an IT support focus which is efficiency oriented (i.e. solve the problem quickly with a minimum of resources) and the user's focus, which is oriented towards learning and which necessarily requires time for knowledge transfer. These two outcomes may be in conflict and this may explain the consistent theoretical view of support as an important contextual factor in the face of the inconsistent empirical findings when measuring users' perceptions of support in

practice. Recognizing the paradox and designing research to explicitly consider both elements of support outcomes will aid us in resolving the inconsistencies.

Second, the theoretical frameworks presented in this paper suggest how the micro processes associated with providing support can be the mechanisms that lead to user evaluations of the effectiveness of the IT support function over the long term. We have argued that the way in which support is provided has important outcomes for the user and therefore influences their evaluations of IT support. Given the increasing use of IT support, the help desk can serve as a major instrument on which users base their evaluations of satisfaction (as well as on learning as proposed here). Since satisfaction is generally used as a proxy for other measures of IT success (such as 'IT effectiveness', 'individual usage' and 'individual performance with IT') it is important to understand the practices associated with providing effective help desk support and the impact that has on individual reactions to computing technology.

Finally, our frameworks provide the linking mechanism between the role of support and the development of user learning and attitudes that then flow into models of individual usage. In theoretical models offering insight into an individual's decision to use information technology a relationship between user support and individual usage has been included. This relationship is captured by notions of perceived behavioral control in the theory of planned behavior (perception of the availability of resources to support a behavior) (Mathieson 1991), social factors in Davis' technology acceptance model (Venkatesh 2000), facilitating conditions in Triandis' theory of behavior as used in predicting IT acceptance/usage (Thompson et al. 1991) and, the role of support in facilitating observational learning in Compeau and Higgins' (1995) model of computer self efficacy and computer use. In each of these models of individual computer behavior (i.e. behavior conceived as intention to use or use), the availability of support is expected to create a favorable context for positive individual belief formation around IT. In this way, the availability of support is predicted to influence the user's formation of attitudes and beliefs towards using a technology – a proposition that seems to have high face validity. However, despite these common expectations across theories, empirical results have not been consistent as noted earlier. We have suggested that this is because we do not yet understand how IT support influences users and/or how to measure this element of the phenomenon of individual behaviors with IT. Our frameworks explain this linkage.

To advance our knowledge in the area, the theoretical relationships and propositions developed in this paper should be developed into a series of specific research models and tested. Given the situated nature of the problem solving of both parties, the best test of the frameworks will come from examining the phenomenon of interest within its everyday context. Figure 1 proposes a framework that would best be tested by examining the day to day experiences of users with their technology. Figure 2 proposes a framework that would best be tested by examining the support events that occur in an organization between users and technologists. The complexity of the combined frameworks suggests a rich program of research offering insight into the situated learning of users about their technology and about how the performance of IT support personnel influences users.

From a managerial perspective, the frameworks highlight the complex and dynamic nature of user and technologist behavior surrounding the use and support of technology. Findings from the completion of research that confirm, or more clearly delineate the relationships proposed would offer managers new insights into the value of support, a new way of examining the costs and benefits of providing support and greater clarity about the types of skills, abilities and training that should be directed at the IT support function.

In conclusion, as long as organizations expect their knowledge workers and users to be effective and even creative users of technology, there will an ongoing need to understand how to most efficiently and effectively train and support these individuals. Our goal in this paper has been to address this need by contributing a complimentary perspective to our current knowledge about IT support and user learning through the two level, theoretical framework presented.

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