WAITING TO LEARN A NEW USE OF TECHNOLOGY: MOTIVATION SOURCE AND ITS IMPACT ON ANTICIPATED AFFECT, TIME PRESSURE AND SUBJECTIVE NORMS

A Dissertation

by

TINA MARIE LORAAS

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2004

Major Subject: Accounting

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Approved as to style and content by:

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ABSTRACT

Waiting to Learn a New Use of Technology: Motivation Source and Its Impact on Anticipated Affect, Time Pressure and Subjective Norms. (August 2004)

Tina Marie Loraas, B.S., Auburn University; M.A.S., Auburn University

Chair of Advisory Committee: Dr. Christopher J. Wolfe

This research investigated the decision process surrounding the self-regulated learning of new uses of existing technology. With firms investing up to 50% of their capital budgets on information technology (in excess of 1 trillion dollars in aggregate), understanding what factors motivate or inhibit more encompassing use of technology is of practical concern (Bowen 1986; Nambisan et al. 1999; Mahmood et a. 2001). I introduced a dynamic element to the technology adoption/acceptance literature by using a framework based upon deferral option theory. This framework allows for the decision to learn a new use of technology to occur over time. I found that potential users chose to defer learning new uses of technology even when usefulness was evident and ease of learning was not prohibitive. Further, an additional benefit to using the deferral option framework was its inclusion of both rewards and penalties; I found that not only do potential users consider what can be gained by learning, but also what can be lost by trying to learn and failing.

In addition to using a framework premised on deferral option theory, I investigated the properties of time pressure and subjective norms on the decision to learn new uses of technology. As time pressure offered a possible alternate explanation for

why potential users defer learning, I controlled for it experimentally and determined that time pressure did affect deferral choice. Further, as subjective norms have had limited success as a predictor of intent to use technology in prior literature, I investigated the separate pieces of the theoretical construct, referent group perceptions and the motivation to comply with those perceptions. By manipulating environment between work and play settings, different motivational sources were enacted by the potential users. Specifically, I found that when potential users were externally motivated subjective norms did influence deferral, and when internally motivated, subjective norms did not influence a potential user's decision to defer learning a new use of technology.

DEDICATION

I wish to dedicate my dissertation to my family. To my husband, Kevin, whose support and encouragement let me believe this was possible. To my children, Meaghan and Brett, who understood that education gave me purpose, and did not complain when it took over their lives as well as my own. To my sister, Tracy, who listened without complaint as I sometimes struggled through this process.

I love you.

ACKNOWLEDGEMENTS

I want to thank my chairman, Dr. Christopher Wolfe. From my first seminar through the completion of this dissertation, he has offered assistance on every aspect of this process, which I gladly took and deeply appreciate. I want to thank the other members of my committee, Uday Murthy, Mike Kinney and Laura Koehly who offered insights that have proved invaluable. Finally, I want to thank my fellow Texas A&M University Ph.D. students, especially Michelle Diaz, for everything you have done for and with me during my stay at Texas A&M. I thank you all for making this dissertation possible.

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CHAPTER I

INTRODUCTION

This research investigates established, yet underutilized information systems. I study the decision to learn to use resources within an existing information system in order to complete tasks ordinarily completed in a less efficient manner. With firms investing up to 50% of their capital budgets on information technology (in excess of 1 trillion dollars in aggregate), determining how to encourage more encompassing use of technology is of practical concern (Bowen 1986; Nambisan et al. 1999; Mahmood et al. 2001). There is a long stream of literature indicating that when a potential user recognizes that there is sufficient value in learning a new use of the system and the level of difficulty is not exorbitant, intent to implement will follow (e.g. Technology Acceptance Model (TAM) studies, see Legris et al. 2003 for a review).

This extant literature on technology acceptance characterizes the decision to implement technology as a "one-shot" choice made at a particular point in time. In a review of the judgment and decision making literature, Hastie (2001) states that equating a major decision (even one that occurs almost daily) to standing at a fork in the road and choosing a singular direction is not appropriate, and goes further to indicate that the decision process is more like a boat navigating a rough sea meandering towards the ultimate goal (Hogarth 1981). Hastie (2001) suggests that a useful endeavor would be to redefine a theoretically sound, one-shot decision theory [such as technology acceptance] into a dynamic process that incorporates the concept of time. Taking Hastie's

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This dissertation follows the style and format of *The Accounting Review*.

suggestion, I study the decision process regarding *when* a potential user intends to implement a new use of technology, rather than *if* a potential user intends to implement a new use of an existing system. Deferral option theory (e.g. Dong and Saha 1998, Miller and Folta 2002) provides a framework to illustrate the dynamic decision process when uncertainty exists.

Specifically, when uncertainty may be resolved over time, deferral option theory illustrates the tradeoffs between immediately undertaking the action in question or waiting until some uncertainty has been resolved before acting. By acting immediately, maximum return will be realized, however there is the distinct possibility of failure, which will result in a negative return. By waiting until uncertainty has been resolved, the return, in terms of the benefits to the user will be discounted by the length of deferral, however the probability of failure is diminished (Dong and Saha 1998, Miller and Folta 2002). I apply this theory to an individual's decision to voluntarily learn a new use of technology to demonstrate that even when established parameters of the TAM predict positive intentions to implement technology, waiting to adopt may be the rational choice. Thus, beyond intent, I consider the temporal component to the technology adoption decision.

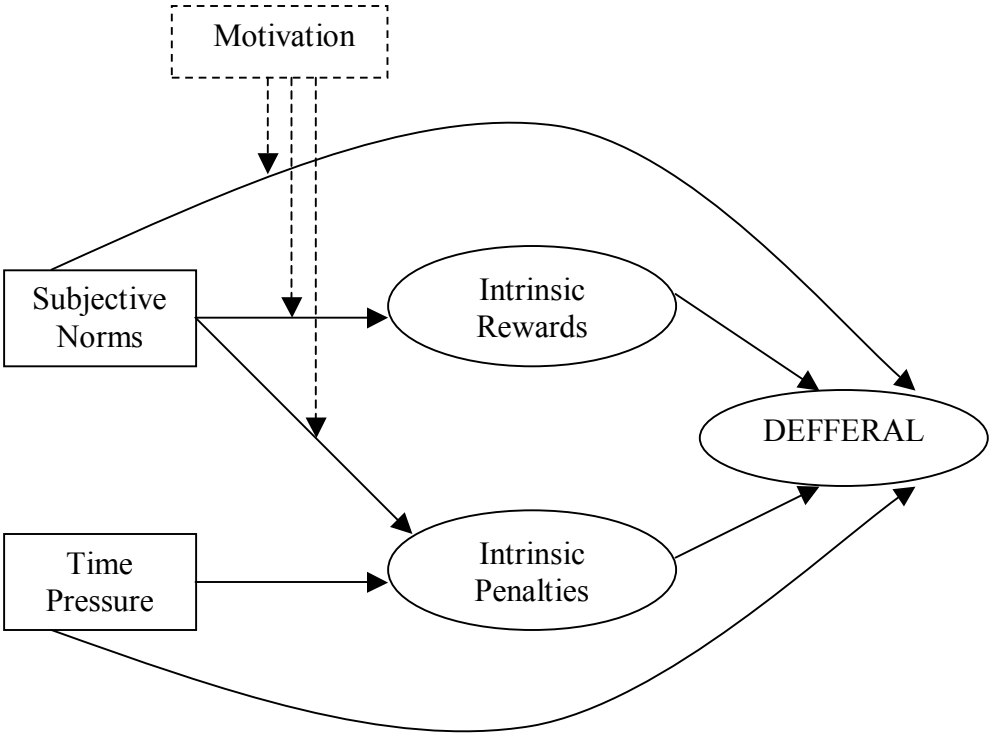
As in the TAM, the deferral option model predicts relationships between perceived ease of use and perceived usefulness. In addition, deferral option theory offers two additional parameters--failure penalties and costs of waiting that have not been previously modeled in an individual decision context. By including these additional parameters, deferral option theory specifies a more comprehensive model in that it

portrays both the benefits and risks of learning technology that could be borne by a potential user. As these parameters are both subjective and anticipatory at the decision point, I use counterfactual reasoning as the basis for generating these intrinsic rewards and penalties earned as a result of attempting to learn a new use of technology (See Figure 1). Counterfactual reasoning is a thought process that people use to attempt to determine how they would feel contingent upon different circumstances. In the context of this study, potential users anticipate their responses to various outcomes. For example, "How would I feel if I tried to learn the technology and was successful" or "How would I feel if I tried to learn and failed?" These anticipated feelings provide the source for internally generated rewards and penalties.

In addition to studying the intrinsic properties of a technology learning decision, I investigate a common workplace phenomenon, time pressure, and its effects on the penalties estimated by the potential user, as well as its direct effects on length of deferral. Time pressure is a control device imposed by management to increase efficiencies, and time pressure is most commonly created via time budgets (e.g. Pachella 1974; Ben Zur and Breznitz 1981; McDaniel 1990; Asare et al. 2000). When faced with time pressure, potential users may become faced with a cognitive discrepancy between the time available and the time required to perform a given task (Hornik 1984). This discrepancy results in additional stress to the potential user and exacerbates their worry over evaluation (Eysenck and Calvo 1992; Saranson 1988). Worry has been documented as a motivation for avoidance behavior (Humphreys and Revelle, 1984), in

this case the voluntary learning of technology when failure is a possibility. Thus, I investigate the effects of time pressure on intrinsic penalties and on length of deferral.

FIGURE 1
Basic Research Model



Finally, I investigate subjective norms and how these perceptions influence the length of time a potential user is willing to wait to learn a new use of technology. Subjective norms is the belief that other people find a particular behavior to be (un) important, and since its introduction, there has been no consensus of the effects of

subjective norms on the decision to adopt technology (e.g. Davis et al. 1989; Mathieson 1991; Taylor and Todd 1995; Karahanna et al 1999; Lucas and Spitler 1999; Venkatesh and Davis 2000; Venkatesh and Morris 2000). I propose that the results have not been conclusive because of methodological deficiencies and the use of an incomplete theoretical framework.

Methodologically, the measure of subjective norms has been vague and, thus, not comparable across studies. For example, most studies employ the commonly used wording of "People who influence my behavior think that I should use the system. People who are important to me think that I should use the system" (e.g. Taylor and Todd 1995; Karahanna et al. 1999; Venkatesh and Davis 2000; Venkatesh and Morris 2000). This wording is ambiguous and leaves room for interpretation, i.e. each potential user may think of varying "people", i.e. secretary, spouse, friends, supervisors, etc. when making their judgments.

From a theoretical standpoint, when subjective norms were introduced, the construct consisted of both the belief that referent persons consider a particular behavior important and the motivation of the decision-maker to comply with those beliefs (Fishbein and Ajzen 1975). Motivation has been ignored empirically, yet its effects have been noted in a few studies. Taylor and Todd (1995) assert that early "non-findings" may be a result of no external pressure to use the technology under study. Further, Lewis et al. (2003) attribute their non-findings to their sample, specifically the use of tenured faculty, which are traditionally granted a great deal of autonomy in the work environment. Therefore, I investigate differing sources of motivation and how these

motivations determine the impact of subjective norms on the decision to learn new uses of technology.

Motivation can be attributed to internal or external sources (Amabile 1993; Argyris 1998). The interplay between these motivation types has been studied extensively in both the economics and psychological literatures (e.g. for a meta-analysis of the findings, see Deci et al. 1999). The general conclusion has been that external motivators reduce the effects of internal motivators (e.g. Deci 1971; Deci and Ryan 1985; Lepper et al. 1973; Lepper and Greene 1978). This conclusion may explain the statements made by Taylor and Todd (1995) and Lewis et al. (2003) in that if external motivation is not present, subjective norms (an outside influence) will not be influential. I employ various experimental settings to determine when subjective norms are an effective intervention to promote more timely uses of technology.

In summary, I portray the decision to learn a new use of technology as dynamic by using deferral option theory to characterize the potential users' decision process. Further, I look to internally generated bonuses and penalties as motivators in the decision to learn new uses of technology. I then propose that these intrinsic motivators act as a mediator for time pressure. Finally, I posit that when used in a specific and context appropriate manner, subjective norms inform the decision to voluntarily learn a new use of technology when the potential user is externally motivated.

CHAPTER II

HYPOTHESIS DEVELOPMENT

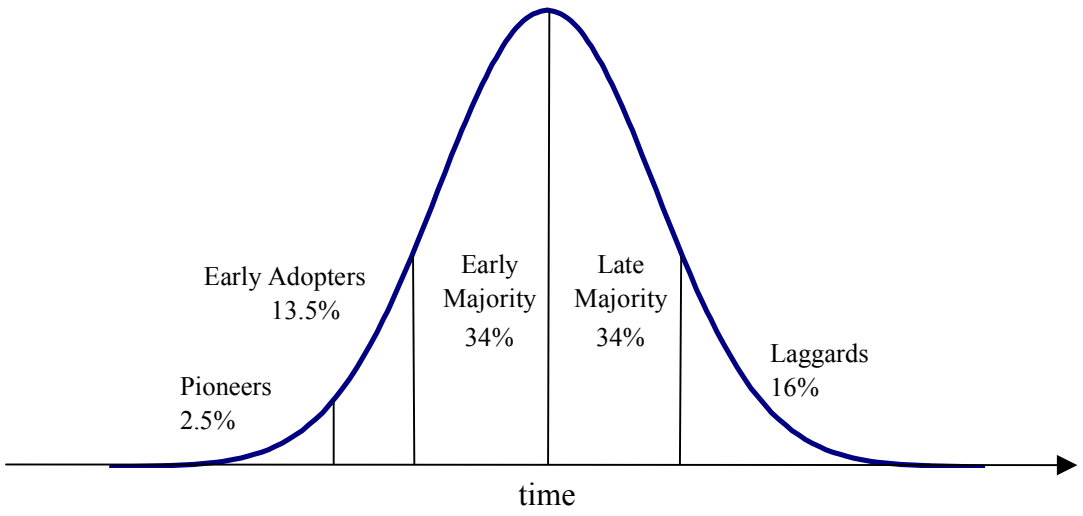
The focus of this study is on unused features within implemented information systems. Firms spend up to 50% of their capital budgets on new information technology, even though existing technology is not being used to capacity (Bowen 1986; Nambisan et al. 1999; Devaraj and Kohli 2003). I investigate the decision process that users undergo regarding these unused tools. More specifically, I study the decision to learn and use technology for task completion.

New uses of existing technologies are often voluntary, thus, not only do potential users choose whether to learn the technology, but also, when to learn it. Most potential users do not make use of a new technology immediately; instead they wait until the technology proves itself successful through other users' successful implementation. (Rogers 1983). Innovation diffusion theory indicates that the distribution of technology adopters over time is driven by uncertainty reduction (Rogers 1983). Potential users look to their environment for additional information (Brancheau and Wetherbe 1990), and over time, new information reduces uncertainty to the point where the user makes the choice to learn the technology.

This pattern of technology adoption was validated in a field study using 18 Fortune 100 companies (Brancheau and Wetherbe 1990). The work of Brancheau and Wetherbe was premised on Rogers' (1983) description of the distribution of technology adopters (see Figure 2). Based upon when they choose to adopt a new technology, adopters fall into one of five categories; pioneers, early adopters, early majority, late

majority or laggards. In addition to the different types of adopters, Rogers states that each individual, regardless of category, follows a process during technology adoption. The process begins with acquiring knowledge of the technology, followed by the decision to learn the technology, and is completed with the implementation of the decision to adopt the technology. Rogers indicates that this is not an instantaneous phenomenon, but a process that occurs over time. I add to innovation diffusion theory by defining more precisely an individual's temporal decision to learn a new technology.

FIGURE 2
Innovation Diffusion Curve



I begin my analysis by using deferral option theory to define when potential users choose to learn new uses of technology. Next, I investigate the subjective valuations of the parameters defined by the deferral option model in the form of counterfactual

reasoning to allow for the consideration of affective benefits (penalties)[1] that would be self-assessed as a result of attempting to learn and succeeding (failing) at implementing a new technology to complete a routine task. In addition, as time pressure offers a simple alternative explanation (insufficient time to learn), I investigate its effects on the decision process, more specifically its effect on affective penalties perceived by potential users. Finally, I propose the manipulation of perceptions of management's attitude towards technology as a cost effective and unobtrusive way to promote more timely system adoption when potential users are motivated to follow managements attitudes regarding technology.

Deferring Learning

Deferral option pricing analysis has been used to characterize information technology purchase and adoption decisions made by organizations, where the unit of analysis has been the firm (e.g. Dos Santos 1991; Chalasani et. al 1998; Benaroch and Kaufmann 1999, 2000). The subjective valuation of these options has been shown to increase with the uncertainty regarding the technology (Bjornstad et al. 2001, Sirmans and Yavas 2001), i.e. managers place higher value on waiting when less is known about the technology. The value of waiting is directly influenced by the likelihood that the new technology will not be successful (or will be unprofitable). Therefore, for a firm to

[1] Affective rewards (penalties) are the positive (negative) feelings that arise as a result of trying and learning (failing).

choose to implement immediately, the return on a new technology must be higher than the return from existing technology, and significantly so to outweigh the value of waiting for more information (Dong and Saha 1998, Miller and Folta 2002).

I use deferral option theory to illustrate the structure of an individual's decision to voluntarily learn a new use of technology. This approach allows the decision regarding technology to be an iterative process where potential users who initially choose not to learn technology can choose to learn in later periods, as opposed to a static, binary decision where potential users either accept or reject technology. Consequently, non-adopters need not be labeled as such; rather they are potential users on the path to adoption (Shelton et al. 2002).

When confronted with a means of completing a routine task via new technology, the decision maker must weigh the pros and cons of attempting to learn the new technology immediately against maintaining a task completion status quo. The expected utilities for the choice between learning a new use of technology "now" or deferring until "later" can be modeled mathematically as follows:

EU (Now) = $\boldsymbol{pa} + (1-\boldsymbol{p})(-\boldsymbol{b})$

EU (Defer) = $\boldsymbol{p}(\boldsymbol{a}-\boldsymbol{c}) + (\boldsymbol{1}-\boldsymbol{p})(\boldsymbol{0})$

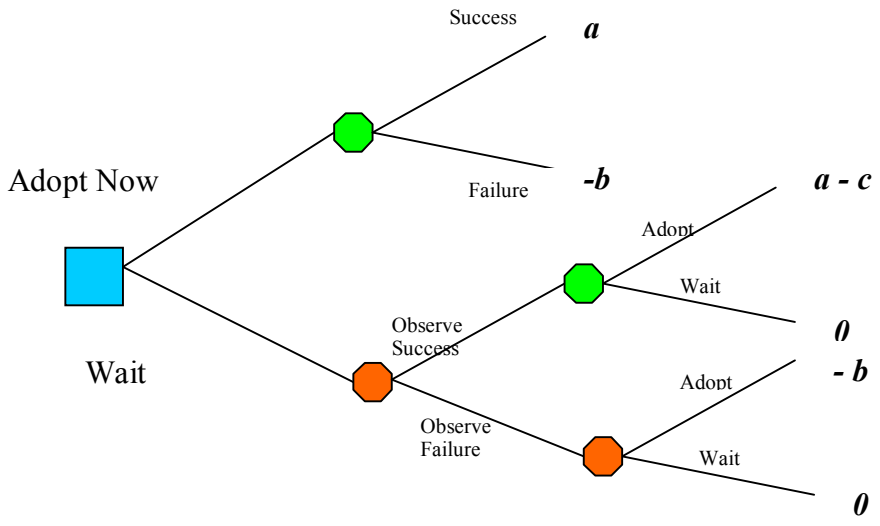
The potential user assesses the likelihood of successfully learning (or failing to learn) the technology as $\boldsymbol{p\ (1-p)}$, the benefits gained by using the technology as $\boldsymbol{a}$, and the potential costs of failing to learn the technology as $\boldsymbol{-b}$. In addition, the potential user considers the cost of retaining the status quo and waiting to implement at a later date as $\boldsymbol{c}$.

The potential user knows that if he defers, the observable outcome of the adopters during the deferral period will determine his implementation strategy in a future period (See Figure 3). He knows that if, on average, early adopters are successful; he will implement, and if, on average, early adopters fail he will continue to defer. Assuming technological ability and self-efficacy are held constant, the likelihood of observing success is ***p***, with related earnings of ***a-c***, and the likelihood of observing failure is ***1-p***, whereby the decision maker will defer again at a cost of ***0***. If the potential user elects to defer learning, the decision process begins again at the start of the next period with the decision maker re-evaluating his perceptions regarding ease of learning, usefulness, failure penalties and the cost of waiting. At such time when his expected utility for immediate learning exceeds his expected utility for waiting, he will attempt to learn the new use of the technology.

While the parameter of usefulness (***a***) and perceived ease of learning (***p***) are similar to elements in the Technology Acceptance Model (TAM) that has been extensively studied in the realm of technology use, failing to learn and the penalty for such (***-b***), in addition to the cost of waiting to learn (***c***), are not part of TAM. (For a description of the TAM literature, see Legris et al. 2003). With failure comes penalties in the form of reduced compensation, poor performance evaluations or lost time. By including ***–b*** in the decision process, the models takes into account that the potential user not only considers what can be gained by attempting to learn a new technology, but also what can be lost. Consideration of the failure penalty is what makes the deferral option model appropriate for this type of choice. Without contemplating the possibility of

failure and the associated penalties, expected utility for learning a new use of technology "now" is always greater than the expected utility for deferring (as ***a*** > ***a-c***), thus system users should be constantly trying new uses of the technology at hand, yet, that does not occur in practice (Nambisan et al. 1999).

FIGURE 3
Decision Tree for Technology Adoption



Decision Point

Perceived outcomes and corresponding choices at t_1

When the probability of success (failure) of a project approaches 100% (0%), the deferral option model predicts immediate action (deferral). Thus ***p*** dominates the model at either end of the continuum. In the individual learning context, when ease of learning is high (approaching 100%), the model predicts the user will attempt to learn immediately, and when ease of learning is low (approaching 0%) the model predicts deferral. However, when ease of learning does not dictate the dominant solution, other aspects of the model hold sway over the decision to learn or defer learning a new technology. These values are the reward earned for immediate and successful implementation (***a***), the penalty suffered as a result of immediate failure (***b***), and the cost of deferral (***c***) ((Bjornstad et al. 2001, Sirmans and Yavas 2001). These values are subjective in an individual decision context. Thus, I investigate the intrinsic valuations of these three components by utilizing counterfactual reasoning as a basis for the generation of self-assessed rewards and penalties, when ease of learning is defined by an expected success rate that lies on the continuum between absolute success and failure.

People employ "what if" analysis with their choices and subsequent outcomes and this behavior is called counterfactual reasoning (Roese and Olson 1995). In the context of this study, potential users consider the new technology, the consequences of learning or failing to learn both "now" and "later" and the corresponding positive or negative emotions that will arise as a result (Perugini and Bagozzi 2001). For example, if a decision maker realizes that the outcome resulting from his choice is less desirable than imagined following an alternative choice, then bad feelings result. While anticipated emotions can be either positive or negative, self-reported fear of failure has

been documented as a barrier that prevents academic achievement (Lay 1988), and it has the potential to explain the motivation of potential users to defer technology use. More simply put, negative affect encourages avoidance behavior (Strack and Neumann 1996).

Further, anticipated negative emotions can arise either as a result of an action (attempt to learn now and fail), or as the result of an inaction (defer and observe others success). Regret theory specifies an omission bias whereby differential levels of regret are dependent on behavior involving an action or inaction (Ritov and Baron 1995). This bias indicates that if an outcome is negative, and the result is due to an action, regret is higher than if it had resulted from inaction. In the context of this study, regret felt as a result of choosing to learn now and failing (hereafter referred to as negative action anticipated emotions) will be perceived as higher than the regret felt due to waiting and observing the success of others (hereafter referred to as negative inaction anticipated emotions), thus in terms of the deferral option model $\boldsymbol{b}>\boldsymbol{c}$. In addition to the omission bias, Kahneman and Miller (1986) suggest it is easier to generate counterfactuals that undo a performed action as opposed to imagining an action that never occurred. Therefore, negative anticipated emotions from imagining deferral are expected to be weaker than negative anticipated emotions from imagining attempting to learn a technology and failing[2]. Hypothesis one states (in the alternative):

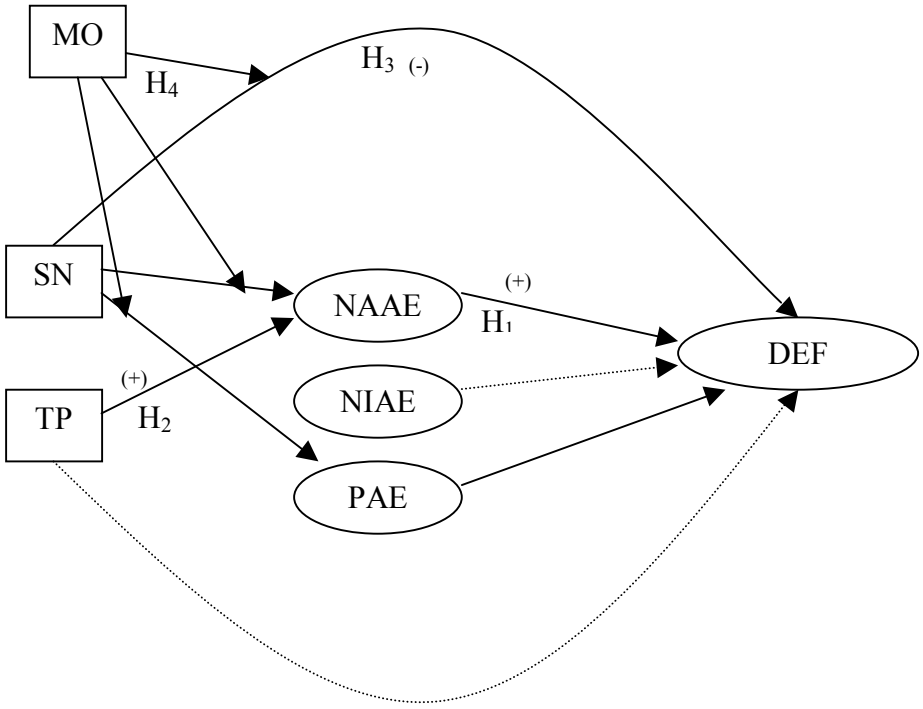
H_1: Negative *action* anticipated emotions are positively related to the length of time a potential user will defer learning a new use of technology.

In this section, I used the deferral option model to identify when potential system

[2] All hypotheses will be tested in the condition where ease of learning is not the dominating factor.

adopters will choose to learn a new use of an information system, when they will wait and when the decision is nebulous. Further, I proposed that the variables identified in Figure 3 are characterized intrinsically in an individual decision context. Specifically, if a potential user imagines a successful experience, good feelings will result (***a***), trying to learn immediately and failing will result in bad feelings (***b***), and finally, by not acting, the potential user realizes he may observe others' successes during the deferral period and feel badly about that, and incur the intrinsic cost of deferral (***c***). Based upon the omission bias in regret theory, I predict that these decisions are driven by the failure penalty in the form of negative anticipated emotions (See Figure 4). In the following section, I investigate a common work condition, time pressure, that likely exacerbates negative emotions, and thus increases the amount of time potential users are willing to wait to learn new systems. Finally, I study the properties of subjective norms to determine both *if* and *when* subjective norms are an effective intervention influencing the decision to learn technology.

FIGURE 4
Hypotheses



DEF:	Length of time potential user is willing to defer learning a new use of technology
ATT:	Attitude
NAAE:	Negative action anticipated emotions
PAE:	Positive anticipated emotions
MO:	Motivation to Comply with SN
SN:	Subjective norms
TP:	Time pressure
H_1:	Negative anticipated emotions have a positive relationship with length of deferral.
H_2:	Time pressure indirectly increases the length of deferral through negative action anticipated emotions.
H_3:	Positive subjective norms decrease the length of deferral when potential users are motivated to comply.
$H_{4a:}$	When externally motivated, subjective norms are influential on the decision to learn new uses of technology.

Time Pressure

Time pressure is a control device imposed by management to increase efficiencies, and time pressure is most commonly created via time budgets (e.g. Pachella 1974; Ben Zur and Breznitz 1981; McDaniel 1990; Asare et al. 2000). Time budgets, especially those created with little slack, potentially offer an alternate explanation for the deferral of learning new uses of technology. Potential users become faced with a cognitive discrepancy between the time available and the time required to perform a given task (Hornik 1984). This discrepancy results in additional stress to the potential user and exacerbates worry over evaluation (Eysenck and Calvo 1992; Saranson 1988). Worry has been documented as a motivation for avoidance behavior (Humphreys and Revelle, 1984), in this case the voluntary learning of technology when failure is a possibility. Further, if the potential user perceives that avoidance behavior will not result in any adverse consequences, (which is the context of voluntary learning,) he is likely to avoid learning (Geen 1987).

Additionally, research has found that when making decisions in time pressure situations, people tend to spend more time considering negative consequences, and weight them more heavily (Wright 1974; Ben Zur and Breznitz 1981). Since time pressure is an additional source of stress (Ben Zur and Breznitz 1981; McDaniel 1990), the effect of negative action anticipated emotions will be exacerbated. These results indicate that time pressure would have an indirect effect on deferral by increasing the intensity of negative anticipated emotions. Accordingly, hypothesis two states (in the alternative):

H_2: Time pressure indirectly increases the length of time a potential user will defer learning a new use of technology by increasing the impact of negative action anticipated emotions.

Although there is reason to believe that time pressure also has a direct effect on length of deferral, I do not hypothesize that relationship. Eliminating "tight" time budgets is not a practical remedy since it is unlikely that firms would be willing to forgo this control device, especially in light of recent events that have made cost savings imperative. Therefore, identifying a possible intervention that will counteract the negative anticipated emotions generated by high time pressure with minimal costs is of interest. I propose changes to the corporate culture via managerial attitudes, or subjective norms as a means of reducing the impact of negative anticipated emotions in the decision to learn or defer learning new uses of technology.

Subjective Norms and Sources of Motivation

Subjective norms are the belief that referent persons consider a particular behavior important and the motivation of the decision maker to comply with those beliefs. Subjective norms were introduced as a predictor of intentions by Fishbein and Ajzen (1975) in the Theory of Reasoned Action (the predecessor of TAM). Since its introduction, the findings with regard to the effect of subjective norms on the decision to implement technology have been inconclusive (e.g. Davis et al. 1989; Mathieson 1991; Taylor and Todd 1995; Karahanna et al. 1999; Lucas and Spitler 1999; Venkatesh and Davis 2000; Venkatesh and Morris 2000; Lewis et al. 2003).

Davis et al. (1989) found that after controlling for perceived ease of use and perceived usefulness that subjective norms did not offer extra explanatory power.

Mathieson (1991) found no significant effect of subjective norms on behavioral intention, yet Taylor and Todd (1995) and Lucas and Spitler (1999) did. Venkatesh and Morris (2000) found that subjective norms mattered in pre-adoption phases for women, but not for men. Venkatesh and Davis (2000) found that subjective norms mattered only when the technology in question was mandatory. The studies that looked at the effect of subjective norms over time found that they influenced intent in pre-adoption phases, but not during periods of continued use (Karahanna et al. 1999; Venkatesh and Morris 2000). Although the application of subjective norms in information systems research has been widespread, there has been no consensus as to why subjective norms influenced intent to use technology in some studies, yet not in others. To provide evidence regarding the conditions whereby subjective norms do impact the decision to use technology, I separately investigate the two components of the theoretical subjective norms construct: perceptions of referent persons' beliefs and the motivation to comply with these beliefs.

First, 'referents' are those persons that are important and influential to the decision maker (Fishbein and Ajzen 1975). One potential reason that prior studies have been inconclusive is due to ambiguous measurement of this parameter. The commonly used measure is vague, and fails the 'principle of correspondence' which states that dispositional measures need to be specific to the target, action, context and time elements of the behavior of interest in order to be predictive of behavior (Ajzen and Fishbein 1977). The instrument used (or a close variation) in many of the aforementioned studies reads, "People who influence my behavior think that I should use

the system. People who are important to me think that I should use the system" (e.g. Taylor and Todd 1995; Karahanna et al. 1999; Venkatesh and Davis 2000; Venkatesh and Morris 2000). The measure's lack of specificity makes it prone to content validity scrutiny in that each potential user can think of varying "people", i.e. secretary, spouse, friends, supervisors, etc. when making judgments. Although Lucas and Spitler (1999) are somewhat more specific in their measure by identifying the target of the perception to be either "others" or "senior management", these titles still leave room for the potential user to 'decide' whom to consider.

When dealing with a work environment, referent parties are the chain of command, yet when asked very generally, those may not be the relationships that potential users initially consider. Karahanna et al. (1999) created a latent subjective norm variable from perceptions regarding specific relationships [top management, friends, supervisor, peers, MIS department, local computer specialists] and found that potential users are most heavily influenced by top management. Thus, it appears that the referent group must be specific and appropriate for the setting where technology use is desired.

Therefore, I propose that when the referent group is explicit and appropriate to the potential user of interest, subjective norms will contribute to the decision to defer learning a new use of technology. In order to assess the validity of this statement, I experimentally manipulate referent attitudes as either positive or negative regarding implementation of new uses of technology to complete routine tasks. This methodology

allows for the control of the elements of specificity and focuses the potential user on the appropriate referent group. Thus, I hypothesize:

H_3: Subjective norms have an inverse relationship with the length of time a potential user will defer learning a new use of technology.

Hypothesis 3 posits that when a potential user perceives their referent group to be supportive regarding implementation of a new use of technology, length of deferral will be shortened, and conversely, if their referent group is not supportive then the length of deferral will be increased. Although this hypothesis defines a necessary condition for subjective norms to be influential, i.e., a specific and appropriate referent group, it does not identify when subjective norms will be influential. In order to evaluate when subjective norms matter, I investigate sources of motivation that then influence a potential user to comply with their referent's beliefs.

The construct, subjective norms, is modeled:

$$SN = \Sigma nb_j mc_j$$

Where *nb* is the individual's normative belief of a particular referent (*j*), weighted by the motivation (*mc*) to follow that particular referent's beliefs (Fishbein and Ajzen 1975). Consider motivation to comply (*mc*) to be constrained to lie between zero and one. As motivation to comply approaches zero, so does the value of that referent's beliefs. The converse is also true--as the motivation to comply approaches one, the value of that referent's beliefs is supported and becomes a more salient influence on the decision to adopt technology. Thus, instead of subjective norms not influencing the decision to learn technology, an alternative explanation for insignificant relationships between subjective norms and behavioral intent can be attributed to motivation to comply (*mc*)

approaching zero. In consideration of this alternative explanation, I examine different sources of motivation and further, how motivation source impacts whether subjective norms influence the decision to learn new uses of technology.

To generate action, i.e. for a potential user to attempt to learn a new use of technology, the user must be motivated to do so, and this motivation can be categorized as either being internal or external (Amabile 1993; Argyris 1998). The distinction between motivational types began with the motivator-hygiene theory (Herzberg 1966). "Motivator" factors are considered to be internal and consist of satisfaction and feeling responsible, whereas "hygiene" factors are considered to be external and include pay and praise (Herzberg 1966). The interplay between factors (internal and external) has been studied extensively in both economic and psychological literature (e.g. for a meta-analysis of the findings, see Deci et al. 1999).

There is a long stream of research that concludes that external motivators reduce the effects of internal motivators (e.g. Deci 1971; Deci and Ryan 1985; Lepper et al. 1973; Greene and Lepper 1974). In particular, researchers have found that subjects who initially completed a task for "free", i.e. solely due to internal motivation, completed the task at a significantly reduced rate once compensation (external motivation) was provided (e.g. Deci 1971; Lepper et al. 1973; Deci and Ryan 1980; 1985). According to cognitive evaluation theory, this occurs as a result of a shift in perceived locus of control (Deci and Ryan 1980). When a particular behavior is enacted due to an outside influence, internal motivation shifts to prevent "over justification of an action" (Rotter

1966, Deci 1975, Osterloh and Frey 2000). Further, this effect is particularly salient when rewards are linked to performance (Deci and Ryan 1985).

In addition to the "crowding out effects", motivation source has been linked to perceived autonomy, as people either feel "like origins of their behavior, or pawns of other people" (deCharms 1968). Specifically autonomy and motivation vary inversely, as autonomy decreases, the influence of external motivators increases and vice versa (Deci and Ryan 1985). More specifically, when potential users either have no control over their actions, or do not perceive that they do, the only motivation that exists is external since all one does is what is expected (Argyris 1998).

Due to both the crowding out effect and perceived autonomy, a potential user's environment influences motivation to complete a task. The notion of work implies an external motivation as work is typically considered to be a "have to," not a "want to" task (Lepper and Green 1975; Ryan and Deci 2000). Further, in a typical work environment, a potential user likely feels as though his supervisor controls his work behavior, thus he will suffer from lack of autonomy. The combination of these factors suggests that an employee is most often externally motivated, and would undertake learning a new use of technology when outside parties' dictate. Yet, in a self-regulated environment, (e.g. home life, tenured faculty, partner in an accounting firm) potential users are not as highly influenced by externalities, as they have a high degree of autonomy and any action they undertake is under their control. Therefore, in this condition, potential users are expected to undertake learning new uses of technology primarily if they are internally motivated to do so.

In order to assess motivation, I manipulate the potential user's environment in an experiment. These manipulations invoke assorted motivational sources, specifically, pure work settings promote external motivations, and pure play settings promote internal motivation. According to the theoretical notation of subjective norms, $SN = \Sigma nb_j mc_j$ (Fishbein and Ajzen 1975), motivation source affects the overall value of the subjective norm construct. I propose that when a potential user is in an environment of high autonomy (i.e., home), motivation to comply with another's perceptions will approach zero, thus subjective norms will be an insignificant influence on the decision to learn a new use of technology. On the contrary, when a potential user is in a setting with considerable external incentives (i.e., employee early in his/her career), motivation to comply will approach one (if motivation to comply is constrained between zero and one) and subjective norms will be influential in the decision to learn new uses of technology, given that the referent group is appropriate. Thus, hypothesis four states (in the alternative):

H_4: When motivation source is external, subjective norms are a significant influence on the decision to defer learning a new use of technology.

By evaluating the separate pieces of the subjective norm construct, I provide evidence for when subjective norms will be part of the technology use decision process, namely when the referent group is specific and appropriate, and motivation to comply with the referent group is sufficiently high. From a research perspective, this conclusion offers possible explanations for insignificant results in prior studies (i.e., unclear referent group, motivation to comply with referent group approaching zero, etc.), and from a

practice-oriented standpoint provides a managerial intervention to promote more timely learning of technology.

Summary

In summary, I portray the decision to learn a new use of technology as dynamic by using deferral option theory to characterize the potential users' decision process. Further, I look to counterfactual thinking to explain internally generated bonuses and penalties that effect the decision to learn a new use of technology. I then propose that these counterfactual thoughts in the form of anticipated emotions act as a mediator for time pressure. Finally, I investigate the subjective norm construct in separate pieces as suggested by the theoretical identification. I experimentally control a potential user's referent group in order to control for specificity issues. In addition, by manipulating motivation source, I study the differential effects of subjective norms in the decision to learn a new use of technology. Figure 4 illustrates the theoretical research model and denotes all hypotheses.

CHAPTER III

RESEARCH METHOD

Experiment Overview

In order to assess the differential effects of varying time pressures, subjective norms and motivations on the decision to defer learning a new use of technology, I conducted an experiment. The experiment consisted of a vignette, or descriptive scenario in which a new use of technology could be used instead of the routine way of completing a task. This tension provided the setting for the choice of when to learn a new use of technology. Three different vignettes were used to set varying motivations (internal, external and moderate), and within each vignette I manipulated time pressure as high or low, and subjective norms as positive or negative. This results in a 3x2x2 experimental design (see Table 1).

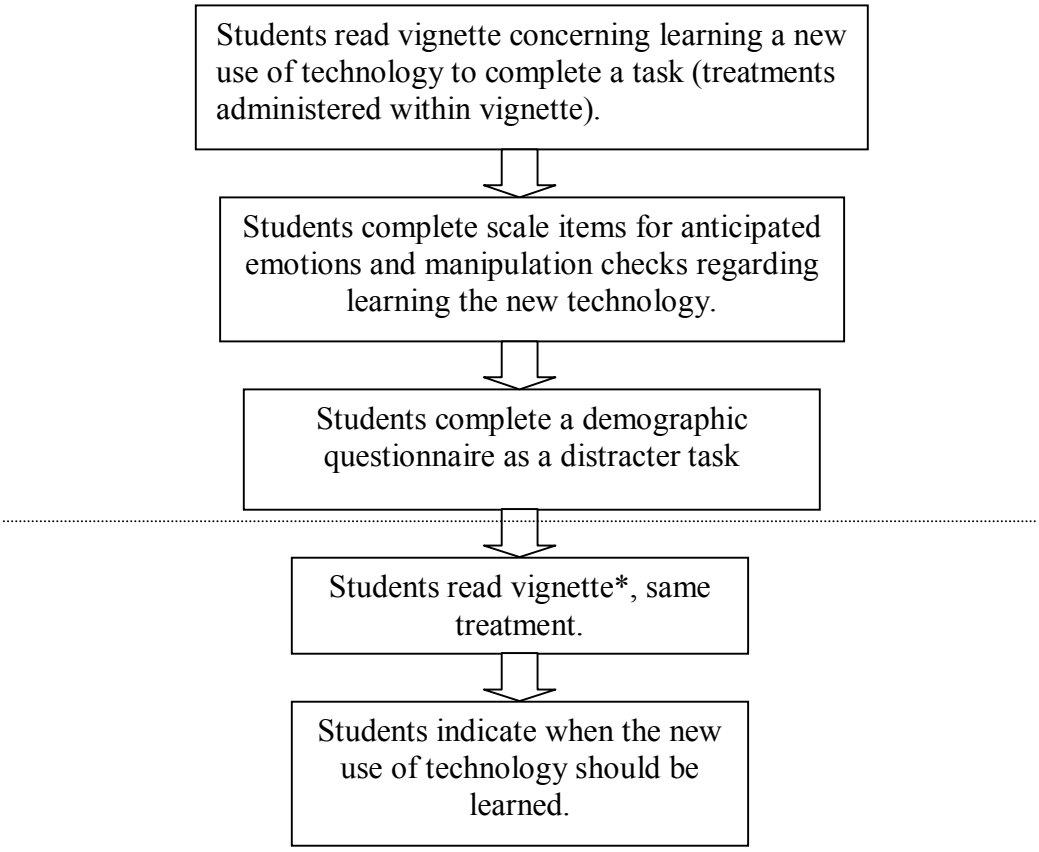
Within each scenario, I manipulated time pressure and subjective norms. To establish the level of time pressure, the scenario indicated that there was either "just enough" or "plenty" of time to complete the task. I term these as "high" or "low" time pressure conditions, respectively. Subjective norms were manipulated within each vignette by indicating that the referent group either supported learning new uses of technology to become more efficient, or that the referent group supported maintaining the status quo in order to ensure the task was completed correctly and on time. These settings are termed, "positive" and "negative" subjective norms, respectively.

TABLE 1
Experimental Design

	External Motivation		**Internal Motivation**		**Moderate Motivation**	
	Time Pressure		Time Pressure		Time Pressure	
Subjective Norms	High	Low	High	Low	High	Low
Positive						
Negative						

A figure outlining the experimental procedures is presented in Figure 5. First, participants read a vignette (with either external, internal or moderate motivations) regarding a situation whereby a new technology could be learned in lieu of the status quo procedure. (Subjective norms and time pressure were embedded within the vignettes.) Second, the participants completed scale items pertaining to both their positive and negative anticipated emotions, in addition to attitudes regarding learning the new use of technology introduced in the vignette. Also within the scale items were questions to ensure the participants understood the parameters pertaining to the various treatments. Third, the participants completed a series of demographic items to be used as covariates, and also as a distracter task. To conclude the experiment, the participants read the vignette again and provided the data regarding when the new use of technology should be learned.

FIGURE 5
Experimental Procedures



*In the experiment utilizing a work environment (external), the second part of the experiment was conducted 1 week following the first part. Further, the vignette read in the first phase was centered on the participant, and in the second phase was centered on a character. In the other two groups (internal and moderate), the vignettes were exactly the same for both readings.

Experimental Participants

The participants consisted of 549 students enrolled in accounting courses at a large university in the American southwest. Students did not receive compensation for their participation. To promote conscientious effort on the task, students were informed as to the importance of their responses, which had been shown to increase cognitive processing when motivation to perform was low (Maheswaran and Chaiken 1991). Twenty-three students did not fully complete the instruments and were not included in the analyses. Four different scale orders were presented to ensure no differences in scores could be attributed to scale ordering. However, one scale order provided significantly higher responses than any other scale ordering within the moderate motivation group, thus those fifty one participants were also dropped from the sample. All analyses were conducted on a final sample of 475 students

External Motivational Source Condition. The external motivation condition was given to fifth-year accounting students enrolled in the Professional Program in Accounting. These participants read a vignette centered on an employment scenario where the technology of interest would be used to create on-the-job efficiencies. These participants were on average 22.5 years old, and had an average GPA of 3.5 (see Table 2). Further, eighty percent of these students had completed accounting internships. As these students had held positions within accounting firms, they were aware of the relationship between supervisors and subordinates in a work environment. Moreover, they were conscious of the necessity of pleasing their superiors for advancement purposes (i.e. required to get a job offer at place of internship). Further, the graduate

program these students were a part of required that they maintain high standards, which in turn, promoted a highly competitive environment. As such, this was an appropriate group to use to invoke external motivation as working for rewards was a familiar part of their regimen as both accounting interns and graduate students.

TABLE 2
Descriptive Statistics by Motivation Source

Variable	External Motivation	Internal Motivation	Moderate Motivation	F Statistic	P value
N	173	175	127		
Age	22.5*	20.89	20.65	113.34	<. 001
Class	5.0*	3.05	3.05	1017.71	<. 001
GPA	3.53	2.85*	3.59	203.37	<. 001

* Significantly different from the other group(s) at p-value < .05

The vignette presented was an employment situation. The situation presented was expected to be external as work is something typically done for external rewards, i.e., work is a "have to" not a "want to" (Lepper and Green 1975; Deci and Ryan 1985). The employment vignette was appropriate for this group as these participants made decisions regarding self-regulated learning of technology on the job within six months and were a reasonable proxy for practicing accountants within the first few years of their careers.

Internal Motivation Source Condition. The internal motivation condition vignette was presented to students enrolled in an undergraduate cost accounting class for non-business majors who were presented with a situation that centered on using a website to download music for their personal enjoyment. These students were on average 20.9 years old, and held an average GPA of 2.8 (see Table 2). As these were junior level students from various non-business majors across the university, they were not expected to be as externally driven as the graduate accounting students.

The vignette supplied to this group was focused on technology use for purely personal reasons, as opposed to the work situation presented to the Master's students. As the situation was one of using technology for personal enjoyment, it was expected to be internal because the enacting of a behavior for enjoyment of personal satisfaction is the definition of internal motivation (Amabile 1993). The students presented with this scenario were all sophisticated enough to be aware of the technology introduced in the vignette, thus deciding when a potential user should learn how to use it is an appropriate question to ask of this level participant.

Moderate Motivation Source Condition. The moderate motivation source condition was presented to junior level students who had just been accepted into the Professional Program of Accounting. This vignette centered on using a technology within a business fraternity. These students were of the approximate age (20.7) and class standing (3.06) of the group used for the internal motivation condition, but the average GPA for this group was more similar to the fifth year students at 3.6 (see Table 2). These students had some characteristics in common with each of the other groups. Although they were

part of a competitive cohort just like the Master's level students, they had only been together for a few months as opposed to two years. Most of these students had not gained any professional work experience, thus an employment task would not be appropriate for this group, however, their educational experiences (business majors, high GPAs) lend them to a more sophisticated scenario than that of using technology for mere personal satisfaction.

Thus, the task for the moderate group fell in between a pure work and a pure play setting. The vignette for this group was based on a technology that could be implemented to increase efficiencies within a business fraternity where the character in the vignette is an officer. As these were junior level business students, they were expected to be familiar with business fraternities as well as the technology in question. Further, the business fraternity provided a setting with both work and social aspects, thus was not expected to be taken as seriously as the employment setting, yet more seriously than the personal enjoyment setting.

Experimental Procedures

Three different vignettes were utilized to invoke motivations from varying sources. Each vignette was presented to the group most appropriate for the technology and setting.

External Motivation Source Condition Vignette. The external motivation source condition vignette was completed in two phases that were two weeks apart. In the first phase I initiated the treatments and collected data representing the independent variables,

covariates and demographics, and in the second phase, I collected the data that served as the dependent variable.

In the first phase, the basic vignette was general to task and specific to each subject:

> Consider that you are a salaried employee of a large, publicly traded company. Further, assume that you have a particular task that you are required to complete on a regular basis (i.e. each month or week). You currently complete the task manually. This manual method takes up a great deal of your time, but that is how you were taught to do it, and you know that you can get it done correctly and on time this way.
>
> You could also complete your task using a computer application in the company's existing information system. If you learn it you will be able to create some slack in your schedule, which will allow you to spend more time on other projects, and you can avoid working overtime (since you are salaried, you don't get overtime pay). Based on your computer experience, you look at the computer application and think that you have an ***average*** chance of learning and implementing the computer application to complete your task.

In the second phase, the vignette was more specific to task to promote external validity, and was ascribed to a character. When presented with a scenario, and asked, "What would you do," participants can respond in such a way that they deem would please the researcher or to make themselves look better, which is called self-presentation bias. However, by introducing a character, participants are less inclined to respond in that manner (Constant et al. 1994).

> Thomas works for a large, publicly traded manufacturing company in the accounting department. One of his job responsibilities is to prepare variance analyses, (actual to budget) on EPS (earnings per share). The report consists of each account that is used in the EPS calculation, and the deviations from budgeted numbers for each line item. In addition, Thomas must include detailed explanations for each variance (e.g. lower demand for product, excessive overtime, unexpected cost overruns, etc.). His current method of compiling these reports involves downloading both

> the budgeted and actual numbers for the time period of interest from the information system into Excel, performing the variance calculations, then sending his findings to the appropriate departments for explanations. After gathering the appropriate documentation, Thomas inputs the cause of the variance into the report, and then formats it so that it can be submitted to upper management. This procedure is extremely time consuming, but Thomas knows he can get it done this way.
>
> The company has a report writer that is embedded in the information system but Thomas doesn't know how to use it. To use the report writer, Thomas would have to become familiar with the different reporting options, learn how to set the parameters for a budget-to-actual report, and then format it to allow additional text input for the explanations required by upper management. If Thomas learns to use the report writer, not only will he have more time to work on other things, but he will also be able to avoid working overtime (which since he is on salary he does not get paid for).
>
> Thomas is not aware of anybody in his department that uses the report writer to complete reports on a regular basis, but has learned that there are a few people currently trying to implement the report writer. At this rate, Thomas concludes that if one or two people in his department successfully learn how to use the report writer each month, that in a matter of 8 months, almost everyone in the department will be using it to complete their reports. Further, Thomas understands that as more and more people know how to use the report writer, the more help he can get from them when he tries to learn it.
>
> After taking a look at the report writer, Thomas assesses his chances of successfully learning and implementing the report writer as ***average***.

Internal Motivation Source Condition Vignette. The internal motivation condition vignette was operationalized in basically the same manner as the external motivation source condition, with two exceptions. First, there was only one session (instead of two), and there was a single character vignette that was presented twice (as opposed to a self-vignette, followed by a character vignette). The vignette read:

> John got a new mp3 player for Christmas, but it is <u>not</u> an Apple iPod. Right now he has the player loaded with songs from CDs that he owns. John loaded all his CD's onto his PC, and then uploaded the songs that he

> liked onto the player using the "manager" software that came with the player. There is plenty of room remaining on the player, and John is considering buying new CD's and loading some of the songs onto his player.
>
> Recently online music purchasing has become popular. Using online music services individual songs can be purchased. Considering John has typically only loaded 3 or 4 songs at most from individual CD's onto his player, buying only the songs he really likes will be cheaper.
>
> In an effort to find out how hard it would be to buy music online, John found several sites for "non-iPod" mp3 players such as his. The sites seem to be pretty easy to use, but their music selection is limited. The best site that he found for purchasing music online is iTunes, which is managed by Apple and built for iPod owners. The iTunes service has a huge library of songs that is updated constantly, it contains all genres of music, and songs are only $.99 each.
>
> For iPod owners, the iTunes site is pretty much 'plug and play', but it is more complicated for non-iPod users. John realizes that before he can use iTunes he will have to download and install the iTunes "jukebox" software, which will require several of his hardware settings to be modified. In addition, he will have to learn how to use the software to convert the song files to be compatible with his player, and it appears to be kind of tricky.
>
> After reading about all this, John thinks that he has an **average** chance of being able to successfully use the iTunes site to buy music for his non-iPod mp3 player.

Moderate Motivation Source Condition Vignette. The moderate motivation source condition was conducted exactly as the internal motivation source condition. The vignette read:

> John is the secretary of his business fraternity. The fraternity fosters ties to business by encouraging scholarship, social activity and a closer affiliation between the commercial world and business students. The fraternity sponsors many guest speakers throughout the semester from local, regional and national firms from various industries. These guest speakers prove to be a valuable resource to fraternity members in search of initial employment.

> One of John's responsibilities as secretary for the fraternity is to keep a record of guest speakers. Information he collects includes the speaker's personal information, when they visited campus, the company they represented, and the topic discussed. Later, if a fraternity member needs contact information, they can look it up in the records that John keeps. These records are currently maintained in an Excel file on the fraternity's computer. Since many members access the Excel file, the file is protected so that no information will be inadvertently changed when a member is accessing information. The "contact" Excel file has been used for quite some time, and John knows all the procedures involved in maintaining and servicing the file.
>
> However, through a class, John has become aware that if he were to import the spreadsheet file into a database application the information would become easier to access for his fellow fraternity members, as well as easier for John to maintain. By using the programming language built into the database application, John could build a password-protected form linked to pre-formatted queries so that members could search the database by contact name, company, or even date-on-campus without the members having access to the "raw" data. In addition, John could create a form to enter the records more efficiently, which then could be used by anyone working in the fraternity office.
>
> After considering the transition from spreadsheet to database, John thinks that he has an **average** chance of being able to successfully convert the contact file from the current spreadsheet application to the database application.

Manipulations

In addition to manipulating motivation source between vignettes, I manipulated time pressure (TP) and subjective norms (SN) within each vignette. In the external motivation source condition, the manipulation for (high/low) time pressure read:

> You typically get this task done with (little/plenty of) time to spare. With the (short/ample) amount of time you have been allotted to finish the task, you feel (extreme/very little) time pressure.

And in Phase II, the manipulation read:

> In the past, Thomas has completed the variance report in an average of 42.5 hours. His supervisor just provided Thomas with the preliminary numbers and gave him the go ahead to begin the report for this time period. As usual, Thomas has (7/25) business days to complete the report. (Even) With his additional job duties, Thomas feels (intense time pressure/he has plenty of time to get everything completed on time).

In the internal motivation source condition, the manipulation for high time pressure read:

> With classes starting, and his part-time job, John feels intense time pressure just getting his day-to-day stuff done.

And for low time pressure:

> Since classes have just started back, even with his part-time job, John feels he has plenty of time to get his day-to-day stuff done.

Finally, in the moderate motivation source condition, the manipulation for high time pressure read:

> However, with it being the end of the semester, John has several projects and exams due, plus his part-time job, so John feels intense time pressure just getting his day-to-day stuff done.

And for low time pressure:

> Since it is toward the end of the semester, John has several projects and exams due. Yet, even with his part-time job, John feels he has plenty of time to get his day-to-day stuff done.

Thus, a participant either believed that there was just enough or plenty of time to complete the task at hand.

Instead of using a scale methodology to gather subjective norms, I manipulated subjective norms to remove measurement error and more fully capture the effect on the

choice to learn or to defer learning a new use of technology. In the external motivation source condition, the manipulation for positive subjective norms in Phase I read:

> You know that your supervisor encourages finding new ways to use the company's information system. He has said to you that increasing efficiencies via the existing information system is a good idea, and he is supportive of employees who try to do so.

And in Phase II read:

> Thomas recently attended a department meeting where his supervisor stressed that implementing new ways to complete the reports using the information system was to be commended. Basically, his supervisor said that the way things are being done now is not good enough. Thus he is confident that his supervisor would approve of his trying to implement the report writer to compile the EPS variance reports.

The manipulation for negative subjective norms (Phase I) read:

> You know that your supervisor stresses getting the task done right and on time. He has said to you that his main concern is making sure that everyone in your department meets established guidelines and work schedules, and is supportive of employees that do so.

For Phase II:

> Thomas recently attended a department meeting where his supervisor stressed that getting the reports done, and done on time, was much more important than trying to invent new ways of doing things. Basically, his supervisor said that the way things are being done now is good enough. Thus he is confident that his supervisor's primary concern is that the EPS variance reports are completed on time.

In the internal motivation vignette, the manipulation for positive subjective norms read:

> Several of John's friends also have mp3 players and seem like they really want to use iTunes. John recognizes that figuring out the iTunes site and helping his friends with configuration expertise would impress them. John likes looking good in front of his friends, and he knows that figuring out iTunes would do that.

And for negative subject norms read:

> Several of John's friends also have mp3 players, but seem like they don't really care about using the iTunes site. John recognizes that figuring out the iTunes site probably would not impress his friends all that much and they might even think it a waste of time and energy.

Lastly, the in the moderate motivation vignette, the manipulation for positive subjective norms read:

> John recently attended an officer's meeting where the other officers stressed that implementing new ways to complete the contact sheets was to be commended. Basically, the other officers said that the way things are being done now is not good enough. Thus John is confident that his fellow officers would approve of his trying to implement the database application to compile the contact information.

And the manipulation for negative subjective norms read:

> John recently attended an officer's meeting where the other officers stressed that getting the contact sheets done, and on a timely basis was much more important that trying to invent new ways of doing things. Basically, they said that the way things are being done now is good enough. Thus John is confident that his fellow officers' primary concern is that the contact sheets are completed on time.

In sum, I manipulate time pressure and subjective norms within the scenario provided. Time pressure was manipulated as either high or low, and subjective norms were manipulated to be either positive or negative.

Variable Operationalization

After having read the initial vignette, participants completed scales that produced the data for the independent variables. I used scales that were based upon Perugini and Bagozzi (2001), but modified to fit this study. The participants were asked to consider the technological situation that was presented in the vignette when answering the scale items.

Attitudes. I used 7-point Likert scales to measure attitudes regarding implementing the suggested technology. The following wording preceded ten semantic differentials: I think that voluntarily attempting to learn [the technology] is…[useless/useful, ineffective/effective, disadvantageous/advantageous, stupid/intelligent, punishing/rewarding, foolish/wise, unpleasant/pleasant, joyless/joyful, boring/exciting, not enjoyable/enjoyable].

Anticipated emotions. I used an 11-point Likert scale with extremes of "not at all" and "very much" to capture positive and both negative action and negative inaction anticipated emotions. The wording for positive anticipated emotions was, "If I succeeded in voluntarily learning [the technology], I would feel [excited, delighted, happy, glad, satisfied, proud, self-assured]. For negative action anticipated emotions (i.e. action resulting in failure) the wording was, "If I were to voluntarily attempt to learn [the technology] and fail, I would feel…" and for negative inaction anticipated emotions the wording was, "If I did not voluntarily attempt to learn the [technology], and realized later that my peers did, I would feel…" The negative emotions I measured were angry, frustrated, guilty, ashamed, sad, disappointed, depressed, worried, uncomfortable and regret. Both Perugini and Bagozzi (2001) and Wolfe et al. (2003a) use fearful, which I replaced with regret.

Deferral. This was measured following the second vignette and read, "When should [character] attempt to learn [the technology]?" with an 11-point scale with endpoints of "this month" and "11 months".

Manipulation Checks

In order to ensure differential perceptions of time pressure and subjective norms, participants completed questions pertaining to the time pressure and subjective norms that were presented in the vignettes. In addition, participants replied to a question pertaining to the ease of learning, to investigate whether perceived ease of learning varied in the range where ease of learning would not dominate the decision to learn a new use of technology. Finally, for the participants in the moderate motivation source condition, I asked how motivated the character should be to comply with the referent group provided. Also, I asked the participants to complete items pertaining to their level of motivation if the scenario were more work centered, and if the scenario were more play centered.

Summary

I conducted an experiment to determine what factors influenced the decision to learn a new use of technology. By experimentally controlling time pressure as high or low, subjective norms as positive or negative, and varying the settings, I isolated if and when these factors inform the decision to learn new uses of technology.

CHAPTER IV

RESULTS

Descriptive Statistics and Manipulation Checks

A total of 549 participants completed the experiment. Twenty-three participants did not fully complete the instruments and were not included in the analyses. Four different scale orders were presented to ensure no differences in scores could be attributed to scale ordering. However, one scale order provided significantly higher responses than any other scale ordering within the moderate motivation group, therefore those fifty-one participants were dropped from the sample. All analyses were conducted on a final sample of 475 students. To ensure that these students were completely randomized across the experimental conditions, I conducted an ANOVA with demographic variables by treatment. None of the demographic variables were significantly different across treatment groups, indicating that the randomization was successful.

All participants answered manipulation check questions to ensure that the manipulations of time pressure and subjective norms were apparent: high and low (time pressure) and positive and negative (subjective norms). Participants presented with positive subjective norms rated their perceptions of referent group support for learning the new use of technology as significantly higher than those presented with negative subjective norms (p-value < .001). I conducted the same analysis on the participants' perception of time pressure and found that participants given the manipulation of "just enough time," rated time pressure as significantly higher than those participants given

the manipulation of "plenty of time" (p-value < .001). The last manipulation check concerned the participants' perceptions of ease of use of the technology in question. The participants were told within the vignette that the character assessed his likelihood of learning as average, and the results indicate that the participants considered the likelihood of the character learning the technology as approximately 63% (6.87 out of 11). Although slightly higher than "average" (50%), ease of use perceptions between groups did not statistically differ, and were within the established parameters for this study (not at an extreme).

In addition to time pressure and subjective norms, motivation source was a primary component of the experimental design. Three vignettes were used to create groups with different motivation sources whereby the decision to learn a new use of technology would have different determinants. In order to assess the efficacy of this design, three questions regarding motivation were asked of the participants in the moderate motivation condition. The participants were asked to assess the importance of following their referent groups' attitudes regarding new uses of technology in each of the three scenarios that were presented (work, play, moderate). The experimental participants indicated on an 11 point scale that it would be most important to follow referents' beliefs in a work situation (8.2), least important to follow referent's beliefs in a play situation (4.2), with the moderate situation falling in between (7.0), and each motivation source was significantly different (p value <. 001) from the others. This finding provides some evidence that the vignettes invoked varying motivational sources.

Finally, I investigated the characteristics of the experimental participants at each level of motivational source. Table 3 presents the descriptive statistics for the full sample (Panel A) and by motivational source (Panel B). The experimental participants used for the external and moderate motivational sources had significantly higher GPA's than the participants in the internal motivation condition, and participants in the external motivation condition were approximately two years older and two years further along in college than participants in the other two motivation conditions. Due to these differences and to provide additional evidence that motivations were enacted through the vignettes, I included all demographics in the final models, and none were significant. This indicates that the individual differences of the participants within the motivational source conditions did not influence the outcomes and differences between the groups could be attributed to the different motivational source manipulations.

TABLE 3
Descriptive Statistics

Panel A: Full Sample

Variable	N	Mean	Deviation	Minimum	Maximum
Age	475	21.41	1.46	18	31
Class	475	3.76	1.04	2	6
GPA	464*	3.3	.498	1.8	4.0

* Eleven participants chose not to answer this demographic item.

Panel B: By Motivational Condition

Variable	External Motivation	Internal Motivation	Moderate Motivation	F Statistic	P value
N	173	175	127		
Age	22.5*	20.89	20.65	113.34	<. 001
Class	5.0*	3.05	3.05	1017.71	<. 001
GPA	3.53	2.85*	3.59	203.37	<. 001

* Significantly different from the other group(s) at p-value < .05

Statistical Procedures

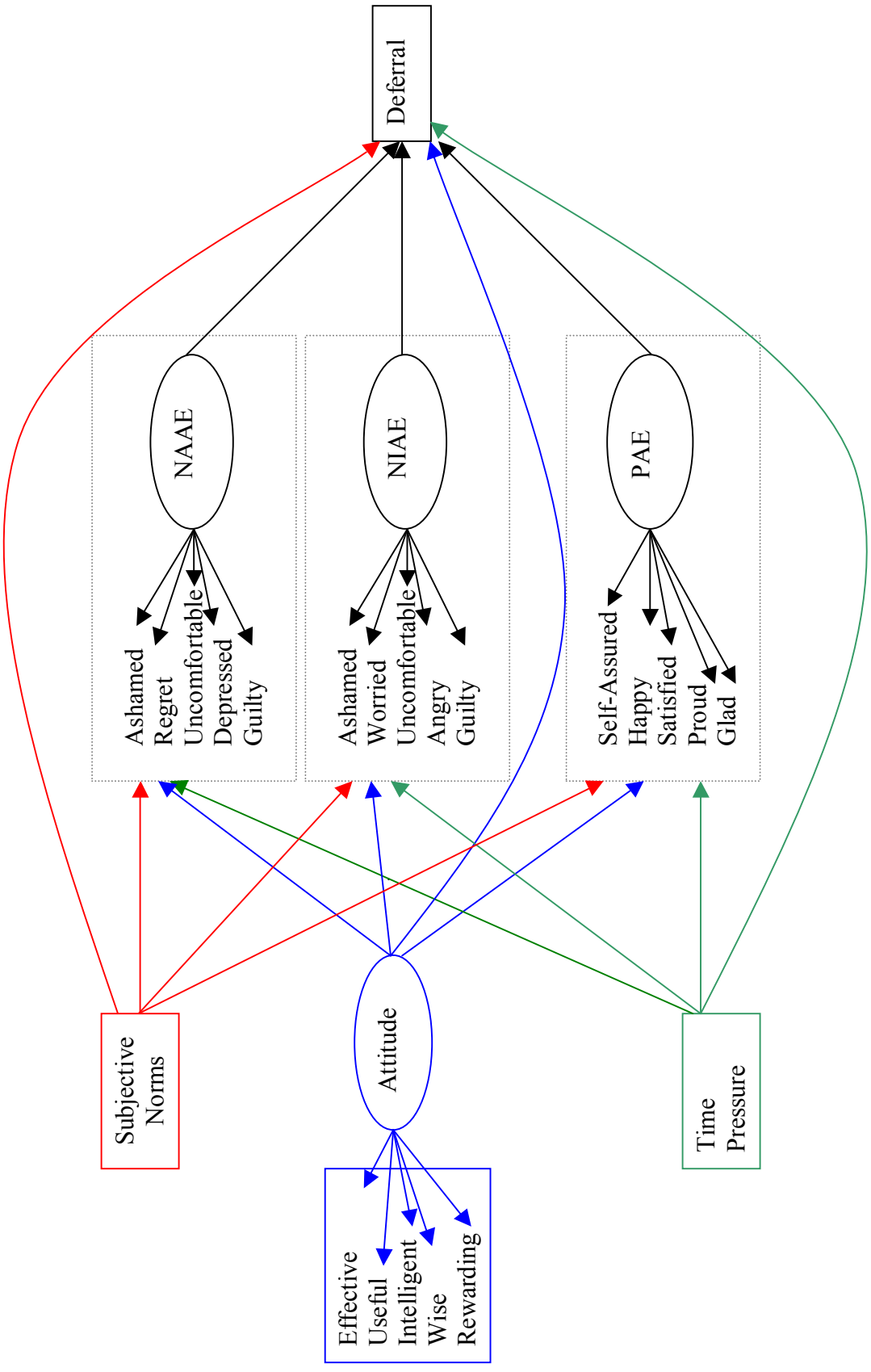
I analyzed the hypothesized model using structural equation modeling (SEM), with AMOS 5.0. The purpose of SEM is to minimize the difference between the sample covariance and the covariances as predicted by the model (Bollen 1989). SEM is an appropriate methodology for this study in that I specified the relationships *a priori*, and SEM is a confirmatory examination of the data. Further, SEM allows for both latent and measured variables. A final advantage in using SEM is its capability to control for measurement error in the latent variables (Byrne 2001; Bollen 1989).

SEM consists of specification, identification, estimation and evaluation of hypothesized models (Anderson and Gerbing 1988). Specification consists of identifying the factor structure of the latent variables as well as determination of the overall structural relationships of the variables. Identification is concerned with data adequacy in addition to construct validity. Estimation involves fitting the data to the proposed model, and evaluation is the determination of the adequacy of the model fit (Bollen 1989).

Specification

The proposed model was developed using theory from economic, psychological, and information systems literature (See Figure 6). The theoretical model indicates that, controlling for attitude, subjective norms and time pressure impact self-assessed rewards and penalties, and these factors all contribute to "deferral", i.e. how long the potential user should wait to learn the new use of technology presented in the vignette. Subjective norms and time pressure were manipulated within the vignette and were included in the model as dummy variables. (Positive subjective norms and high time pressure were set equal to one.) The latent constructs included were attitude, negative action anticipated emotions, negative inaction anticipated emotions and positive anticipated emotions. Attitude was included as a covariate to control for a potential user's predisposition towards learning new uses of technology. Negative action and inaction anticipated emotions were included to proxy for perceived failure penalties and costs of waiting, and positive anticipated emotions proxied for perceived rewards. The scale items used to measure the latent constructs were modified from Perugini and Bagozzi (2001) and were defined in the "Methodology" section of the paper.

FIGURE 6
Structural Equation Model of the Decision to Defer Learning Technology



Identification and Validation

Model identification determines the required indicator variables per latent construct, as well as the factor loadings of such. I analyzed a full measurement model to determine convergent and discriminant validities of the latent variables (Perugini and Bagozzi 2001; Taylor and Todd 1995). The initial measurement model contained four multiple item constructs with thirty-seven indicators (See Figure 7). The model had a Chi-square of 2545, and a Chi-square per degree of freedom of 4.074. Further, the CFI was .86, and RMSEA of .081 (See Table 4 for additional indices). An adequate fit would be indicated by an RMSEA of less than .08 and a CFI greater than .90 (Byrne 2001, Marsh et al. 1996, Bentler 1990). Thus, the indices all indicated a poor model fit. However, the indices measure global fit meaning that each path in the model are weighted equally, including all indicator variable paths. Simply put, when a model is complex, the full model is likely not to represent the data very well, even when the paths of interest are modeled appropriately. Bagozzi and Heatherton (1994) state this threshold to be at approximately four or five indicators per latent construct.

FIGURE 7
Initial Measurement Model

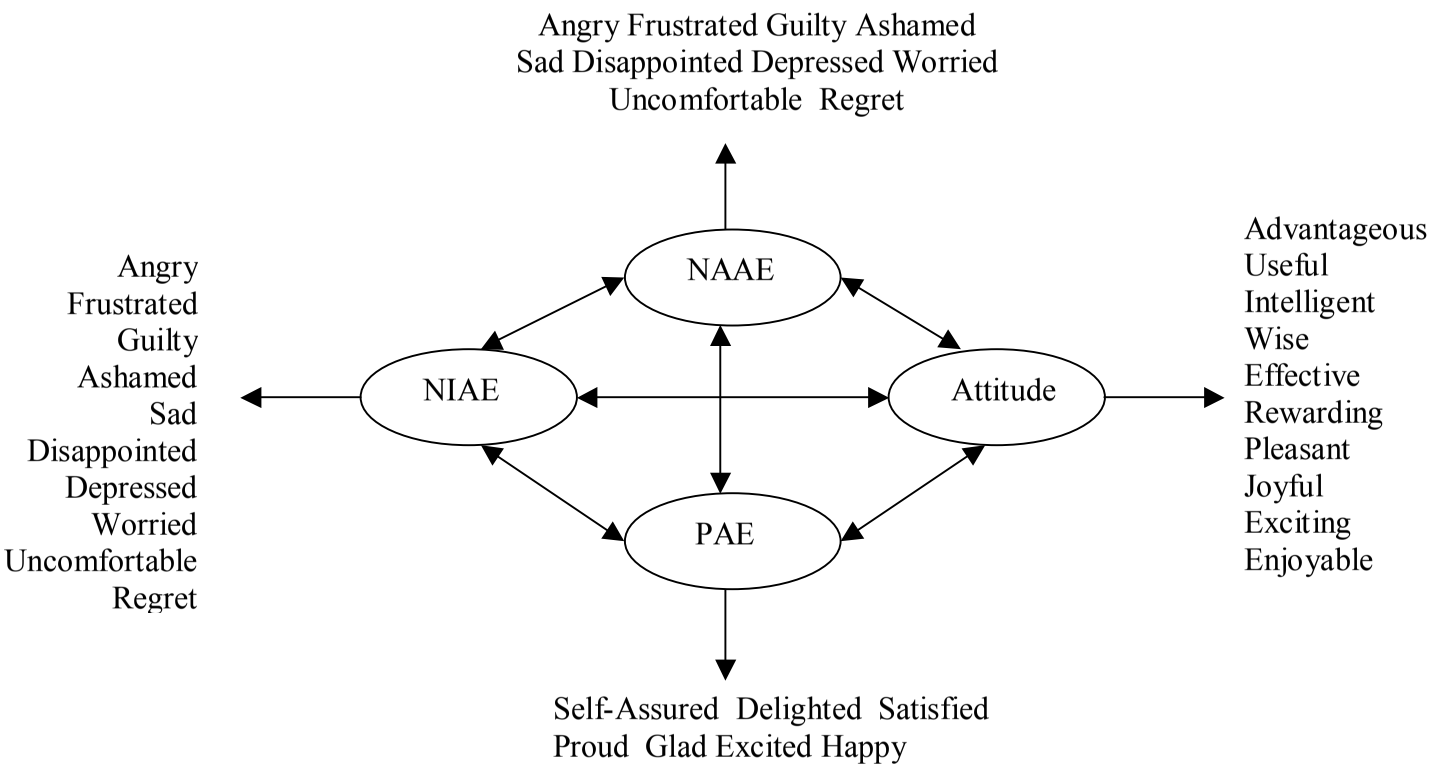


TABLE 4
Goodness of Fit Indices for Measurement Model

Goodness of Fit Indices	Initial Model	Trimmed Model	Desired Levels
X^2	2545	349	Smaller
df	623	164	--
X^2/df	4.074	2.131	< 3.0
GFI	.737	.930	> .90
AGFI	.704	.911	> .80
RMSEA	.081	.049	.05 – .08
NFI	.823	.955	> .90
CFI	.860	.976	> .90
TLI	.850	.972	>.90
Number of Latent Variables	4	4	--
Total Number of Items	37	20	--

Thus, to build a more parsimonious and better fitting model, I followed an iterative procedure, changing one item at a time using the modification indices provided by AMOS 5.0. I eliminated indicators with high cross loadings and correlated error terms (Sweeney and Summers 2002; Teo et al. 2003). The model was reduced by seventeen indicators so that each latent variable was represented by five indicators. The reduced model fit the data better than the full model (see Table 4), with fit indices all within acceptable levels. The Chi-square per degree of freedom was reduced to 2.217, CFI increased to .975, and RMSEA dropped to .049 (additional fit indices are provided in Table 4).

Within the trimmed measurement model, all indicators loaded on their theoretical constructs with corresponding p-values of less than .001 (See Table 5). Further, after examination of the factor loadings, it appeared that each indicator contributed approximately the same amount of information. The squared multiple correlations between each indicator and the constructs provided additional evidence of convergent validity with all but two being above the recommended threshold of .50 (Hair et al. 1998).

TABLE 5
Evidence of Unidimensionality of Latent Constructs

Construct Items	Standardized Parameter Estimate	Critical Ratio	P value
Negative Action Anticipated Emotion (NAAE)			
NAAE 1 - Uncomfortable	.813	19.799	<.001
NAAE 2 - Regret	.692	16.081	<.001
NAAE 4 - Guilty	.746	17.698	<.001
NAAE 8 - Depressed	.766	18.299	<.001
NAAE 10 - Ashamed*	.821		
Negative Inaction Anticipated Emotion (NIAE)			
NIAE 1 - Uncomfortable	.906	27.369	<.001
NIAE 4 - Guilty	.837	23.711	<.001
NIAE 5 - Worried	.842	23.962	<.001
NIAE 9 - Angry	.642	15.745	<.001
NIAE 10 – Ashamed*	.867		
Positive Anticipated Emotion (PAE)			
PAE 1 - Glad	.893	31.946	<.001
PAE 2 – Self-Assured	.863	29.147	<.001
PAE 3 - Happy	.817	25.681	<.001
PAE 6 - Proud	.900	32.580	<.001
PAE 7 - Satisfied*	.924		
Attitudes Towards Learning New Uses of Technology (ATT)			
ATT 1 - Useful	.881	31.946	<.001
ATT 2 - Wise	.862	27.515	<.001
ATT 5 - Rewarding	.758	21.187	<.001
ATT 11 – Effective	.824	24.482	<.001
ATT 10 - Intelligent*	.881		

*Holdout indicator to set scaling, as required in AMOS 5.0

Another aspect of convergent validity is the reliability, or internal consistency, of each construct with I measure with the formula $(\sum\lambda_I)^2/((\sum\lambda_I)^2 + \sum\theta_i))$, where λ_i refers to the i^{th} factor loading and θ_i refers to the i^{th} error variance (Bagozzi and Kimmel 1995, Leone et al. 1999). This reliability coefficient is similar to Cronbach's alpha, but weights each factor by its loading, as opposed to assuming equal weights (Bagozzi and Kimmel 1995). The computed reliabilities using the weighted measure were all above .85, as were Cronbach's alphas (See Table 6).

TABLE 6
Internal Consistency

Construct	Number of Items	Cronbach's Alpha	Internal Consistency
NAAE	5	.877	.878
NIAE	5	.910	.913
PAE	5	.944	.945
ATT	5	.929	.930

In addition to determining that each construct was internally consistent, I assessed the extent to which the latent variables differed from each other. For each pair of latent variables, the correlation between two constructs was constrained to be one in a baseline model, and then was left unconstrained in a comparison model. By setting the

correlation equal to one, the model assumed both variables to be capturing the same construct. If the χ^2- value of the comparison model (unconstrained) is significantly smaller than that of the baseline model (constrained), then the variables are demonstrating discriminant validity (Teo et.al 2003). All pairs of variables demonstrated discriminant validity. In an additional test, the correlations between the latent variables were all under .9 (see Table 7), which provided additional support for the discriminant validity of this study's constructs (Bagozzi et al. 1991).

TABLE 7
Intercorrelations Among Gathered Variables

Variables	NAAE	NIAE	PAE	ATT
NAAE	**1.00**			
NIAE	.725	**1.00**		
PAE	.484	.499	**1.00**	
ATT	.329	.433	.656	**1.00**

Based upon these findings, I concluded the measurement model exhibited both adequate convergent and discriminant validity, and was properly identified.

Estimation and Evaluation

In addition to identifying the model, I also estimated the structural models using AMOS 5.0. The measurement model acted as a confirmatory factor analysis and related the indicator variables to the latent constructs. After the latent structure was validated, the observed (deferral) and manipulated (subjective norms and time pressure) variables

were added to create the structural model (Byrne 2001) (See Figure 6). The final stage in the analysis involved evaluation of the structural models. There are a variety of goodness of fit statistics available for judging the adequacy of models. Absolute goodness of fit statistics such as GFI (Goodness-of-Fit Index), AGFI (Adjusted Goodness-of-Fit Index), and RMSEA (root mean square error of approximation) assess how well the data fit the model. Incremental fits statistics such as NFI (Normed Fit Index), CFI (Bentler's Comparative Fit Index) and TLI (Tucker-Lewis Index) compare the hypothesized model against a null model where all the observed variables are uncorrelated (Hu and Bentler 1999). I present all the aforementioned goodness of fit indices as well as proposed cut-off ranges for all tested models in Table 8, and path coefficients for all models are presented in Table 9.

External Motivational Source. The model for participants in the external motivational source condition exhibited a moderate fit with a RMSEA of .079 and a CFI of .894 (other fit indices provided in Table 8). The significant paths in the external motivation condition are represented in Figure 8, and all path coefficients are presented in Table 9. The participants presented with the employment vignette were expected to be primarily externally motivated and the results supported this expectation.

Attitude, which was included as a covariate, had a significant effect. Namely, as attitude regarding learning new uses of technology increased, potential users indicated that the length of deferral would decrease. In addition, better attitudes led to increases in both positive anticipated emotions and negative inaction anticipated emotions. However, none of the affective measures had an effect on the deferral decision.

TABLE 8
Goodness of Fit Indices Overall and by Motivational Source Condition

Goodness of Fit Indices	Entire Sample	External Motivation	Internal Motivation	Moderate Motivation	Desired Levels
X^2	1207	453	403	351	Smaller
df	654	218	218	218	--
X^2/df	1.846	2.080	1.847	1.611	< 3.0
GFI	.831	.821	.843	.828	> .90
AGFI	.786	.773	.801	.782	> .80
RMSEA	.042	.079	.070	.070	.05 – .08
NFI	.825	.817	.840	.816	> .90
CFI	.910	.894	.919	.920	> .90
TLI	.896	.877	.906	.907	>.90
Number of Latent Variables	4				--
Total Number of Items	20				--

TABLE 9
SEM Results
(Standardized Path Coefficients)

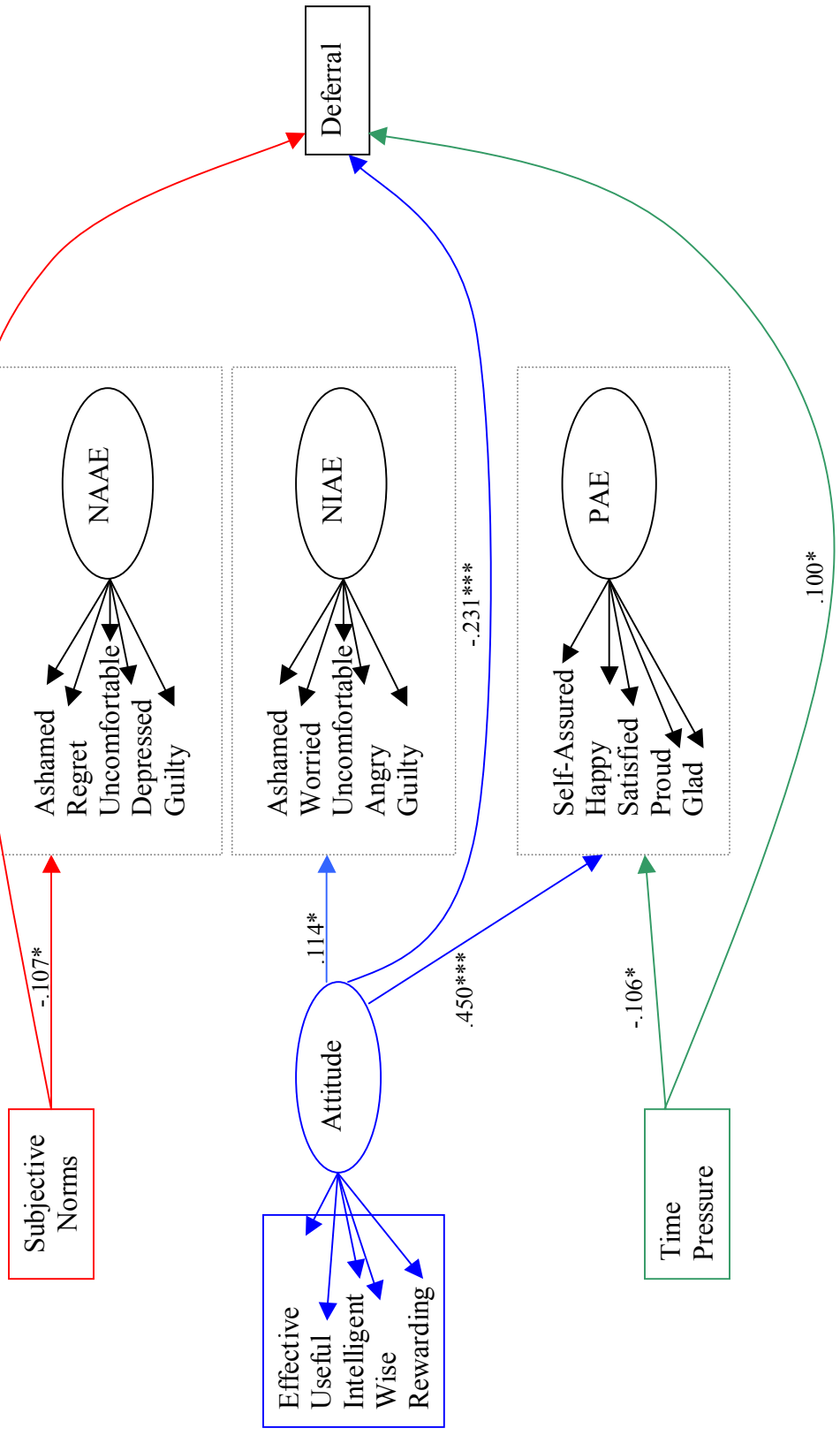
Path	External Motivation	Internal Motivation	Moderate Motivation
NAAE ← SN	-.107*	.022	-.130*
NAAE ← TP	.022	.061	-.204** [a]
NAAE ← ATT	.007	.045	.198*
NIAE ← SN	.008	-.052	.083
NIAE ← TP	.051	.040	.063
NIAE ← ATT	.114*	.211***	.086
PAE ← SN	-.073	.075	.041
PAE ← TP	-.106*	-.051	.094
PAE ← ATT	.450***	.514***	.480***
DEFER ← NAAE	-.002	-.068	.227***
DEFER ← NIAE	-.047	.237** [a]	-.158**
DEFER ← PAE	.078	.006	-.061
DEFER ← ATT	-.231***	-.219***	-.151*
DEFER ← SN	-.360***	-.082	-.086
DEFER ← TP	.100*	.138**	.085
R^2 DEFER	.189	.117	.114

*** p value < .01
** p value < .05
* p value < .10
[a] 2 tailed test, otherwise 1 tailed test

Time pressure decreased positive affect, yet had no effect on either perceived failure penalties or perceived costs of waiting. Thus, it appeared that potential users perceived they would not feel as good about trying to learn the new technology when faced with increased time pressure. In addition to lessening positive affect, time pressure directly lengthened the time potential users were willing to wait to learn a new use of technology.

Finally, subjective norms had a direct and significant effect on deferral. When potential users perceived that their referent group supported learning new uses of technology to increase efficiencies, deferral time was significantly less than when the potential users perceived their referents were focused on "getting the job done." Not only were subjective norms significant, but they also contributed the most explanatory power to deferral as indicated by the standardized path coefficients. Overall, this model explained approximately 19% of the variability in the decision to defer learning a new use of technology.

FIGURE 8
Structural Equation Model of the Decision to Defer Learning Technology
Significant Paths: External Motivation (Standardized Coefficients)



Internal Motivational Source. The model representing the internal motivational source condition exhibited a moderate fit with a CFI of .92 and an RMSEA of .07 (other fit indices provided in Table 8). The significant paths in the internal motivation group are represented in Figure 9 and all path coefficients are presented in Table 9. The participants presented with the personal use vignette were expected to be primarily internally motivated and the results supported this expectation.

Attitude towards learning new uses of technology had both a direct and an indirect relationship with deferral. The better a potential user indicated he felt about learning new uses of technology (attitude), the less he would defer. In addition to the direct effect, increases in attitudes corresponded with increases in perceived costs of deferral and positive anticipated emotions. These changes in affect were complementary; as attitudes regarding learning technology increased, potential users indicated that they would feel worse about not trying to learn and better about trying to learn. In turn, the perceived costs of waiting influenced deferral. As a potential user considered higher costs of waiting, the longer they elected to defer. Further, these perceived costs of waiting were the only affective measure that influenced deferral.

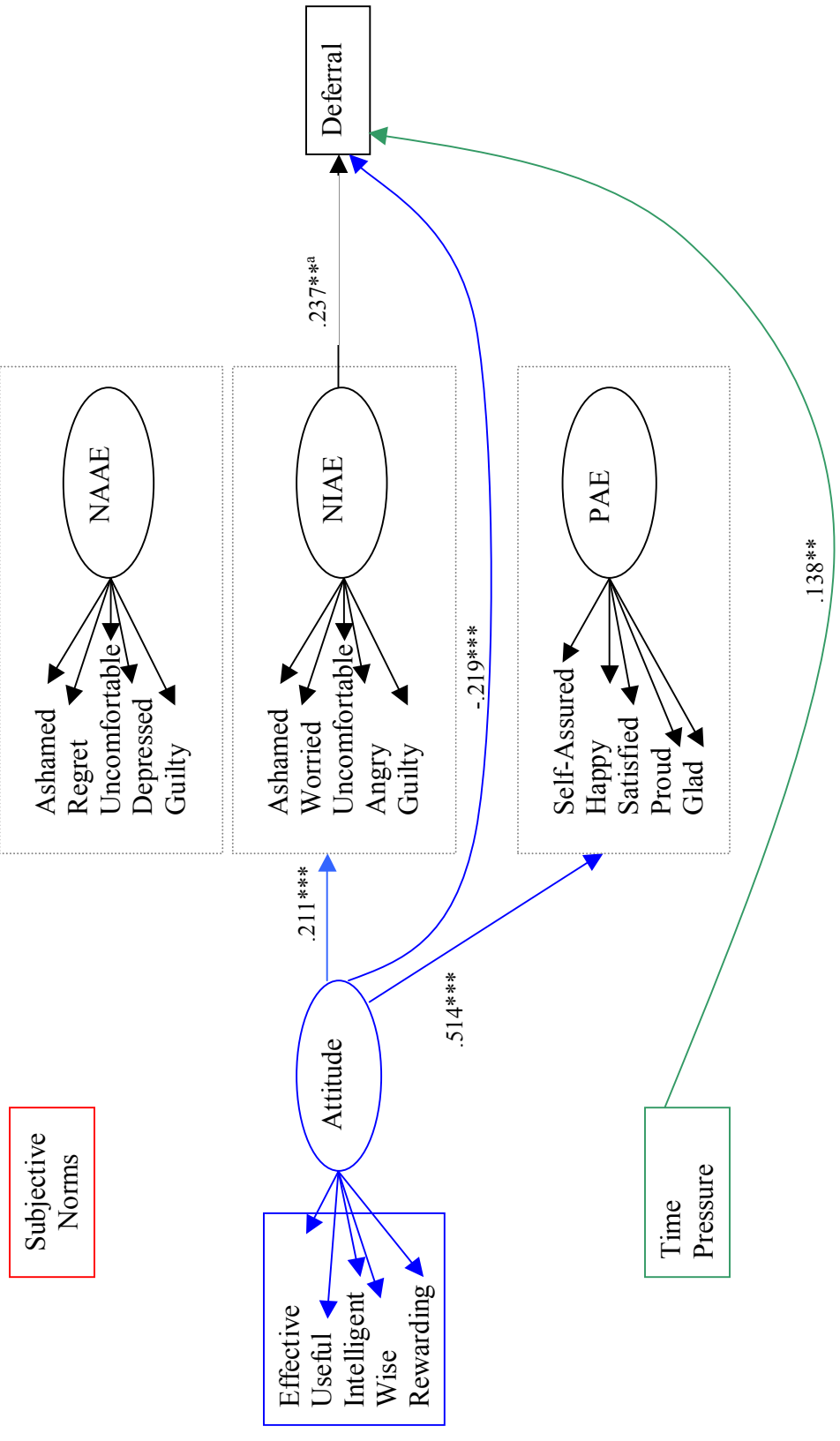
Time pressure had a direct and positive relationship with length of deferral. High time pressure lengthened the amount of time potential users indicated they would wait to learn the new use of technology. Although time pressure offered a direct effect on deferral, time pressure did not influence any of the affective measures in this condition.

Finally, subjective norms were not predictive of deferral in the internal motivational source condition. This finding could be a result of the experimental

participants not being cognizant of the referent group or their perceptions. However, as indicated by the participants' reactions to the manipulation check question regarding the subjective norm manipulation, they were aware of their referent groups' opinions regarding learning the new use of technology. So the non-significance is not due to lack of awareness. Recall the question regarding importance of following referent attitudes. The experimental participants indicated it would be not very important (4.2 on an 11 point scale) to follow the opinions of the referent group when in a situation like the one presented in the internal motivation source condition. Taken in combination with the knowledge that the referent groups' opinions were known, it appears that when internally motivated, subjective norms are not significant predictors of deferral because the potential users are not motivated to comply with the referent perceptions.

Overall, the results lead to the conclusion that self-assessed penalties and rewards were more predictive of deferral when potential users were largely motivated internally. Further, due to this internal motivation, motivation to comply with external parties is lessened which prevents subjective norms from acting upon the decision to learn a new use of technology. The model explained approximately 12% of the variability in deferral for the internal motivational source condition.

FIGURE 9
Structural Equation Model of the Decision to Defer Learning Technology
Significant Paths: Internal Motivation (Standardized Coefficients)



Moderate Motivational Condition. The model fit for the moderate motivational source condition was adequate with an RMSEA of .07 and a CFI of .92 (additional indices provided in Table 8). The significant paths of the structural model for the moderate motivation condition are presented in Figure 10 and all path coefficients are presented in Table 9. Participants in the moderate motivational source condition were presented with a more serious situation than in the internal motivational source condition, yet not as serious as in the external motivational source condition. In the moderate motivation condition, it was expected that the internal factors of anticipated emotion and the external factors of time pressure and subjective norms would jointly determine deferral.

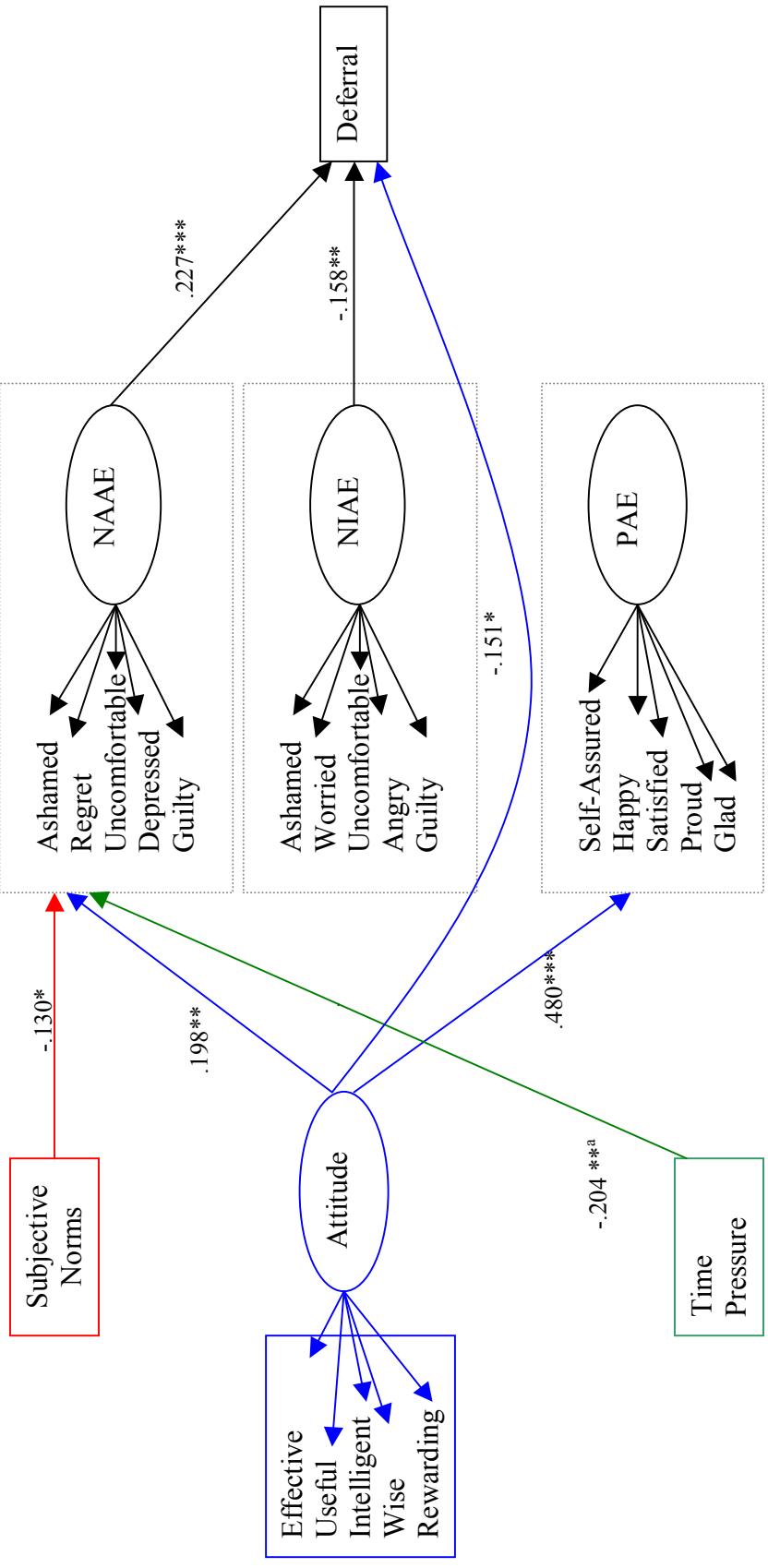
The covariate, attitude, had both direct and indirect influences on deferral. Better attitudes regarding learning new uses of technology led not only to decreased deferral, but also to increased positive anticipated emotion and decreased negative action anticipated emotion. Simply put, better attitudes reduced the perceived failure penalties and increased positive affect. Further, both sources of negative affect influenced the length of deferral; negative action anticipated emotion increased deferral whereas negative inaction anticipated emotion decreased deferral. As perceived failure penalties increased, the potential user would wait longer to learn the new use of technology. Additionally, as perceived costs of waiting increased, the potential user would not wait as long to learn the new use of technology.

In the moderate motivational source condition, time pressure influenced perceived failure penalties. When potential users were faced with high time pressure, perceived failure penalties were not as stark as when faced with lower time pressure. In

other words, trying to learn and failing was not perceived to be as damaging in the situation with barely enough time to complete the task compared to the situation whereby the potential user had plenty of time. Further, time pressure was fully mediated by affect; meaning that the only impact time pressure had on deferral was through negative anticipated action emotion.

Like time pressure, subjective norms did not directly influence deferral but instead worked through negative anticipated action emotions. When potential users perceived that their referent group was supportive of learning new uses of technology, the negativity surrounding trying to learn and failing decreased. In isolation, perceived failure penalties increased deferral. However, by decreasing the magnitude of these penalties, positive subjective norms eventually decreased the deferral period. The full mediation of both time pressure and subjective norms demonstrated the interplay between external and internal motivators when motivational source was not at an extreme. When motivational source was moderate, the model explained approximately 11% of the variability in deferral.

FIGURE 10
Structural Equation Model of the Decision to Defer Learning Technology
Significant Paths: Moderate Motivation (Standardized Coefficients)



Formal Hypothesis Tests

Hypothesis 1. My first hypothesis predicted that failure penalties in the form of negative anticipated emotion predicated by action would significantly increase the length of deferral. This hypothesis was supported in the moderate motivational source condition, yet not in either of the other conditions (see Table 10).

Hypothesis 2. The second hypothesis predicted that time pressure would have an indirect relationship with deferral by increasing perceived failure penalties and decreasing perceived positive affect. This hypothesis was not supported in any of the motivational conditions. In the external motivational source condition, time pressure did decrease positive affect, yet affect did not influence deferral. In the internal motivational source condition, time pressure did not influence any of the affective measures. Finally, in the moderate motivational source condition, time pressure did influence failure penalties, but did not increase them as expected, but instead decreased their impact.

Hypothesis 3. This hypothesis specified that when a potential user's referents were appropriate and their perceptions known, subjective norms would influence the deferral decision. In the external motivational source condition, this hypothesis was supported, yet not when motivational source was primarily internal. Finally, subjective norms had an indirect relationship with deferral in the moderate motivational source condition through perceived failure penalties.

Hypothesis 4. The final hypothesis predicted that motivation source would dictate whether or not subjective norms would influence the deferral decision. Specifically, I predicted that when motivation was external, potential users would be motivated to

comply with perceptions of their referent group. Further, when motivation was internal, potential users would have no reason to comply with their referent group. This hypothesis was supported. When motivation was external, subjective norms was the dominant predictor of deferral. Additionally, when motivation was internal, subjective norms were not significant. However, the non-significance of subjective norms on deferral cannot be the sole determination for the conclusion that subjective norms did not matter when the potential users were internally motivated. In consideration of the evidence that the experimental participants were aware of the referent groups' opinions, in addition to the non-significance of subjective norms, there appears to be sufficient substantiation to conclude that subjective norms did not influence the decision when potential users were primarily internally motivated as a result of motivation source, not lack of power. Further, when motivational source was moderate, subjective norms influenced affect, which in turn determined length of deferral.

TABLE 10
Hypothesis Tests

		Motivation Condition		
H:	**Hypothesis Description**	**External**	**Internal**	**Moderate**
1	NAAE→DEFERRAL	Not Supported	Not Supported	Supported
2	TP→NAAE→DEFERRAL TP→PAE→DEFERRAL	Not Supported	Not Supported	Not Supported
3	SN→DEFERRAL	Supported	Not Supported	Supported
4	MOTIVATION→SN→DEFERRAL	Supported	---	Supported

Summary

Overall, I concluded that the various vignettes invoked expected motivation sources. Further, these motivations dictated what factors influenced the decision to learn new uses of technology to complete tasks. Specifically, when motivations were external, subjective norms were the most influential decision source and conversely, when motivations were internal, internal factors were the most influential. Interestingly, when neither motivation was extreme, external and internal factors worked jointly to determine the length of deferral. Finally, I found that time pressure contributed to the length of deferral in all conditions.

CHAPTER V

SUMMARY

Discussion of Findings

This study is the first to test the concept of why potential users defer learning new uses of technology. Typically the literature in this area has characterized the decision to use technology as occurring simultaneously with intent to use technology (e.g. TAM studies, for a listing see Legris et al. 2003). I proposed that the deferral option model is a more appropriate model for this type of decision in that potential users consider both risks and rewards. Further, waiting to learn to use a technology that has already been deemed worthwhile to learn is a common occurrence (Wolfe et al. 2003b). Consistent with this, I determined that potential users did elect to defer learning technology. I tested three settings, (work, play and mixture), and in each, participants indicated that the character in the vignette should defer learning the technology as opposed to learning it immediately ($t=18.9$, p value $< .001$). This finding indicates that in addition to assessing *whether* a potential user intends to learn a new technology, identifying *when* the potential user will learn it is also essential.

The primary purpose of this study was to identify factors that either deterred or promoted timely learning of technology. To do this, I targeted a broad concept, motivation source, as a variable that would likely interact with user specific factors deemed influential in the decision to defer learning a new use of technology. Before a potential user will attempt to learn a new use of technology, the user must be motivated to do so, and this motivation can be categorized as either being internal or external

(Amabile 1993; Argyris 1998). I proposed motivation source as an important consideration because factors that influence potential users to learn technology will vary contingent upon their motivation source. Specifically, if the potential user is primarily internally motivated, then satisfaction and feeling responsible are examples of what would prompt a potential user to learn. Yet, if the potential user is primarily externally motivated, then rewards in the form of praise or compensation determines whether the potential user will choose to learn. By varying the environment to be either work-related, play-related or a combination of both, I determined that environmental situations did invoke different motivations which in turn influenced what factors affected the decision to defer learning new uses of technology.

External Motivation. When potential users were externally motivated, none of the affective measures impacted the decision to defer learning. This result is consistent with cognitive evaluation theory, which states that internal motivations will be "crowded out" when external motivations dictate behavior (Ryan and Deci 2000). When in a situation with specific guidelines that must be followed, potential users will act accordingly regardless of any intrinsic motivators. As a result, intrinsic motivators will be overshadowed to prevent over-rationalization of the behavior.

Further, when potential users were faced with a work situation with heightened time pressure, they indicated they would defer learning technology longer than if they had lessened time pressure. This suggests that time pressure offers an explanation for why potential users wait. However, even when time pressure was present, positive subjective norms significantly decreased the length of time potential users were willing

to wait to learn the new use of technology. In sum, when potential users were motivated externally, affect did not matter, and subjective norms did. Thus, when faced with potential users who are externally motivated (lower level employees, students, etc.) subjective norms offer a low-cost and unobtrusive managerial intervention. Specifically, if managers express their support for learning new uses of technology for completing routine tasks, potential users will react with more timely learning of technology.

Internal Motivation. On the other end of the motivation continuum were potential users who were principally internally motivated. I expected that in this condition, affect would matter and subjective norms would be less important because there would be no rewards or penalties realized as a result of following others' opinions. True to that expectation, affect was the key predictor of deferral, yet not as anticipated. First, positive affect had no impact. Second, negative affect worked contrary to expectations. More specifically, failure penalties had no impact on deferral, yet costs of waiting did. The *increased* costs of waiting *increased* deferral. Although outwardly counterintuitive, this finding could be due to the specific parameter, costs of waiting, not being construed as a negative when potential users were internally motivated.

Originally, I expected that increased costs of waiting would decrease length of deferral. To operationalize costs of waiting, I used negative affect that would result as a function of the potential user not learning while peers did so successfully. Accordingly, as the potential user fretted about his peers learning while he did not, he would be spurred to learn sooner. This rationale seemingly holds in an employment situation, i.e. if one employee chooses to wait, yet other employees act immediately, the employee

who chose to wait may be thought of as "lazy" or "unambitious". These perceptions would create negative feelings for the employee who waited. However, in a strict personal use situation, having friends learn technology first would not carry the same connotation as in a more formal environment. Although the potential user may perceive that he would be unhappy that his peers learned it and he did not, there are no costly repercussions. Upon feeling badly, the potential user can have someone show him how to use the technology, or learn it himself to "catch up" with no repercussions.

In addition to costs of waiting impacting deferral, increased time pressure lengthened deferral. This suggests that whether motivation was external or internal, time pressure was an alternate rationale for not immediately learning a new use of technology. Contrary to the external motivation group, when the potential users were internally motivated, the referent group's opinions regarding the new technology did not matter. This finding potentially explains the lack of explanatory power of subjective norms on intent to use technology in TAM studies. For example, Lewis et al. (2003) found that subjective norms did not influence "knowledge workers" to use the target technology. These knowledge workers consisted primarily of tenured professors. Due to the autonomy granted to academicians, they are likely internally motivated which would explain why subjective norms did not matter in that study. That is to say, since the target group of users were primarily internally motivated, intrinsic rewards, not subjective norms would prompt the use of technology.

Moderate Motivation. Most situations would not be driven purely by external or internal motivations, but by some combination of such. To gain some insight as to how these

sources interact, I looked at a situation where neither motivation dominated and found that both internal and external constructs influenced deferral. First, anticipated affect was a significant predictor of deferral. Although positive affect did not influence deferral, both derivations of negative affect did. In other words, the worse a potential user felt about failing, the longer he would wait to learn the new technology. Additionally, the worse a potential user felt about his peers succeeding while he waited, the less likely he would be to defer learning the new use of technology.

Moreover, time pressure decreased perceived failure penalties. Although I proposed that time pressure would increase perceived failure penalties as a result of compounding stress, the finding that time pressure reduced perceived failure penalties is supported by the audit and time budget literatures. Several studies have demonstrated that increased time pressure induced efficiencies (e.g., McDaniel 1990; Asare et al. 2000). Accordingly, in this scenario, if the potential user deemed that the new use of technology would increase efficiency, this efficiency would be desired, possibly more so when time was limited. Thus, the perceived penalties for failing would be outweighed by the potential gain of additional efficiencies, which would reduce the effects of future time pressure.

Another interesting finding in the moderate motivation condition pertained to subjective norms. Subjective norms influenced deferral, but not directly as when potential users were externally motivated, but indirectly by decreasing perceived failure penalties. If the potential user perceived that their referent group was supportive of trying to learn, the thought of failing was not as daunting. In turn, as perceived failure

penalties decreased, length of deferral decreased as well. This suggests that when trying to promote more timely learning of technology, even if potential users are not solely externally motivated, subjective norms are influential through their impact on affect.

Summary. Overall, I found that potential users do choose to defer learning new uses of technology even when usefulness is evident and ease of learning is not prohibitive. Further, the results indicate that motivation source is an essential variable to be considered when investigating technology use. Namely, motivation source dictated what factors influenced the decision to learn new uses of technology. When externally motivated, subjective norms were the most indicative of deferral period, whereas affect dictated when motivation was internal. Moreover, when neither motivation was extreme, subjective norms was mediated by affect. Time pressure was also moderated by motivation. At either end of the motivation spectrum time pressure increased deferral directly, yet when motivation was moderate, time pressure reduced deferral by lessening the impact of perceived failure penalties.

Limitations

I did not measure participant intent; instead, I measured how the participants believed a fictional character, should "intend to behave". However, by asking the subjects about another person, I avoided self-presentation biases (Constant et al. 1994). In addition, I did not capture actual behavior; I measured intent to defer. However, intent has been shown to be a good predictor of actual behavior (Dholakia and Bagozzi 2002).

Second, I tested three vignettes on three separate groups. Although, I did test to ensure that individual differences captured by demographics did not influence the dependent variable, I did not capture motivation source within each group. However, the empirical evidence provided in this study supports the notion that the vignettes provoked various motivation sources. Also with respect to the vignettes, the participants may not have ever been in the situation presented in the vignette and therefore might be unable to make a reasonable assessment of the situation. However, care was taken to ensure that the participants had sufficient education and were of sufficient quality to make the decision presented in each setting.

Implications for Theory and Practice

From a perspective of individual decision making regarding learning new uses of technology, I introduce several elements to the literature that have not been previously studied. Specifically, I add to the technology acceptance literature by refining the dependent variable to include not only "if", but "when" a potential user intends to learn a new use of technology. Further, the risks surrounding learning technology, both failure

penalties and costs of waiting, proved to be influential in the decision to defer learning technology. Taken together, these results indicate that potential users consider both risks and rewards when making the decision of *when* to learn a new use of technology.

Perhaps the most important contribution to theory in the information systems literature is the notion of motivation and its determination for when subjective norms will be a salient influence on the decision to learn technology. Specifically, when the referent group was appropriate and the motivation to comply was sufficient, subjective norms influenced the decision to learn technology. Yet even when the referent group was appropriate and their perceptions known to the potential user, subjective norms did not matter if motivation was internal. In future research, care should be taken to ensure that the referents' perceptions are gathered specifically, but also to ensure that the group under study is sufficiently motivated to comply with the referent group.

Practically speaking, when managers want to encourage more timely learning of technology, understanding the motivations of the target users is the first step that should be undertaken. If the employees are of such stature that they are primarily externally motivated, positive managerial attitudes regarding trying to learn technologies to increase efficiencies will promote more timely learning of technology directly. Further, even if the employees are not primarily externally motivated, yet still are inclined to be swayed by managerial perceptions, positive managerial attitudes will reduce their fear of failure, which in turn will promote more timely learning. However, when the target users are not as inclined to follow referent perceptions, i.e., upper level management,

tenured professors, referent perceptions are likely to be ineffective, and would thus constitute a waste of resources.

Conclusion

This research enhances the understanding of how the decision regarding learning new uses of technology is structured and influenced. Overall, the results suggest that motivation source is indicative of what factors promote more timely learning of new uses of technology. Specifically, if the potential user is in a position where he is likely swayed by externalities, then external motivators such as subjective norms are influential, and if internally motivated, then attitudes and affective factors are key. Thus, both researchers and practitioners alike need to be cognizant of the target users and what their likely motivators are in order to promote more timely usage of technology.

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APPENDIX

Experimental Materials

(All materials shown are for the high time pressure, positive subjective norm conditions. Variations for other conditions can be found in Chapter 3).

External Motivation

Phase I

Please read the following scenario carefully.

Consider that you are a salaried employee of a large, publicly traded company. Further, assume that you have a particular task that you are required to complete on a regular basis (i.e. each month or week). You currently complete the task manually. This manual method takes up a great deal of your time, but that is how you were taught to do it, and you know that you can get it done correctly and on time this way.

You could also complete your task using a computer application in the company's existing information system. If you learn it you will be able to create some slack in your schedule, which will allow you to spend more time on other projects, and you can avoid working overtime (since you are salaried, you don't get overtime pay). Based on your computer experience, you look at the computer application and think that you have an ***average*** chance of learning and implementing the computer application to complete your task.

You typically get this task done with little time to spare. With the short amount of time you have been allotted to finish the task, you feel extreme time pressure.

You know that your supervisor encourages finding new ways to use the company's information system. He has said to you that increasing efficiencies via the existing information system is a good idea, and he is supportive of employees who try to do so.

[Next Page]

Consider the work situation you have just read when making your choices and indicate your answer by circling the number on the scale.

1. If I were to voluntarily attempt to learn the new computer application and fail, I would feel sad.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

2. If I were to voluntarily attempt to learn the new computer application and fail, I would feel guilty.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

3. If I were to voluntarily attempt to learn the new computer application and fail, I would feel disappointed.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

4. If I were to voluntarily attempt to learn the new computer application and fail, I would feel worried.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

5. If I were to voluntarily attempt to learn the new computer application and fail, I would feel regret.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

6. If I were to voluntarily attempt to learn the new computer application and fail, I would feel uncomfortable.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

7. If I were to voluntarily attempt to learn the new computer application and fail, I would feel depressed.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

8. If I were to voluntarily attempt to learn the new computer application and fail, I would feel angry.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

9. If I were to voluntarily attempt to learn the new computer application and fail, I would feel frustrated

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

10. If I were to voluntarily attempt to learn the new computer application and fail, I would feel ashamed.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

11. If I did not voluntarily attempt to learn the new computer application, and realized later that my peers did, I would feel angry.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

12. If I did not voluntarily attempt to learn the new computer application, and realized later that my peers did, I would feel disappointed.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

13. If I did not voluntarily attempt to learn the new computer application, and realized later that my peers did, I would feel sad.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

14. If I did not voluntarily attempt to learn the new computer application, and realized later that my peers did, I would feel depressed.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

15. If I did not voluntarily attempt to learn the new computer application, and realized later that my peers did, I would feel frustrated

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

16. If I did not voluntarily attempt to learn the new computer application, and realized later that my peers did, I would feel regret.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

17. If I did not voluntarily attempt to learn the new computer application, and realized later that my peers did, I would feel ashamed.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

18. If I did not voluntarily attempt to learn the new computer application, and realized later that my peers did, I would feel uncomfortable.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

19. If I did not voluntarily attempt to learn the new computer application, and realized later that my peers did, I would feel guilty.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

20. If I did not voluntarily attempt to learn the new computer application, and realized later that my peers did, I would feel worried.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

21. How much time pressure do you face to complete the task?

Very Little										Substantial
1	2	3	4	5	6	7	8	9	10	11

22. How supportive is your supervisor regarding implementing new uses of technology?

Not at all supportive										Very Supportive
1	2	3	4	5	6	7	8	9	10	11

23. What are your chances of successfully learning and implementing the new computer application?

Extremely Low										Extremely High
1	2	3	4	5	6	7	8	9	10	11

24. If I succeeded in voluntarily learning the new computer application, I would feel excited.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

25. If I succeeded in voluntarily learning the new computer application, I would feel glad.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

26. If I succeeded in voluntarily learning the new computer application, I would feel delighted.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

27. If I succeeded in voluntarily learning the new computer application, I would feel proud.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

28. If I succeeded in voluntarily learning the new computer application, I would feel self-assured.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

29. If I succeeded in voluntarily learning the new computer application, I would feel happy.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

30. If I succeeded in voluntarily learning the new computer application, I would feel satisfied.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

31. I think that voluntarily attempting to learn the new computer application is…

Useless						Useful
1	2	3	4	5	6	7

32. I think that voluntarily attempting to learn the new computer application is…

Foolish						Wise
1	2	3	4	5	6	7

33. I think that voluntarily attempting to learn the new computer application is…

Joyless						Joyful
1	2	3	4	5	6	7

34. I think that voluntarily attempting to learn the new computer application is…

Punishing						Rewarding
1	2	3	4	5	6	7

35. I think that voluntarily attempting to learn the new computer application is…

Unpleasant						Pleasant
1	2	3	4	5	6	7

36. I think that voluntarily attempting to learn the new computer application is…

Stupid						Intelligent
1	2	3	4	5	6	7

37. I think that voluntarily attempting to learn the new computer application is…

Disadvantageous						Advantageous
1	2	3	4	5	6	7

38. I think that voluntarily attempting to learn the new computer application is…

Not enjoyable						Enjoyable
1	2	3	4	5	6	7

39. I think that voluntarily attempting to learn the new computer application is…

Boring						Exciting
1	2	3	4	5	6	7

40. I think that voluntarily attempting to learn the new computer application is…

Ineffective						Effective
1	2	3	4	5	6	7

[Next Page]

Please complete the following demographic questionnaire. All responses are anonymous.

1. Age: _____
2. Class: (circle answer)

   sophomore junior senior graduate

3. Track (in PPA): _____
4. Cumulative GPA: _____
5. Gender: _____
6. How many other experiments have you participated in? _____
7. What computer courses have you completed, and your letter grade in each?

   Course: _____ Grade: _____

   Course: _____ Grade: _____

   Course: _____ Grade: _____

8. How much experience do you have using computer applications?

None Substantial

1	2	3	4	5	6	7	8	9	10	11

[Next Page]

Phase II

Thomas works for a large, publicly traded manufacturing company in the accounting department. One of his job responsibilities is to prepare variance analyses, (actual to budget) on EPS (earnings per share). The report consists of each account that is used in the EPS calculation, and the deviations from budgeted numbers for each line item. In addition, Thomas must include detailed explanations for each variance (e.g. lower demand for product, excessive overtime, unexpected cost overruns, etc.). His current method of compiling these reports involves downloading both the budgeted and actual numbers for the time period of interest from the information system into Excel, performing the variance calculations, then sending his findings to the appropriate departments for explanations. After gathering the appropriate documentation, Thomas inputs the cause of the variance into the report, and then formats it so that it can be submitted to upper management. This procedure is extremely time consuming, but Thomas knows he can get it done this way.

The company has a report writer that is embedded in the information system but Thomas doesn't know how to use it. To use the report writer, Thomas would have to become familiar with the different reporting options, learn how to set the parameters for a budget-to-actual report, and then format it to allow additional text input for the explanations required by upper management. If Thomas learns to use the report writer, not only will he have more time to work on other things, but he will also be able to avoid working overtime (which since he is on salary he does not get paid for).

Thomas is not aware of anybody in his department that uses the report writer to complete reports on a regular basis, but has learned that there are a few people currently trying to implement the report writer. At this rate, Thomas concludes that if one or two people in his department successfully learn how to use the report writer each month, that in a matter of 8 months, almost everyone in the department will be using it to complete their reports. Further, Thomas understands that as more and more people know how to use the report writer, the more help he can get from them when he tries to learn it.

After taking a look at the report writer, Thomas assesses his chances of successfully learning and implementing the report writer as ***average***.

In the past, Thomas has completed the variance report in an average of 42.5 hours. His supervisor just provided Thomas with the preliminary numbers and gave him the go ahead to begin the report for this time period. As usual, Thomas has 7 business days to complete the report. With his additional job duties, Thomas feels intense time pressure.

Thomas recently attended a department meeting where his supervisor stressed that implementing new ways to complete the reports using the information system was to be commended. Basically, his supervisor said that the way things are being done now is not

good enough. Thus he is confident that his supervisor would approve of his trying to implement the report writer to compile the EPS variance reports.

Please answer the following questions by circling your answer on the scale.

When should Thomas attempt to learn and use the report-writer to complete the EPS variance report?

This Month			~ 6 Months							~11 Months
1	2	3	4	5	6	7	8	9	10	11

How much time pressure is Thomas under to complete the EPS variance report?

Very Little										Substantial
1	2	3	4	5	6	7	8	9	10	11

How supportive would Thomas's supervisors be regarding implementing the report-writer to complete the EPS variance report?

Not at all supportive										Very Supportive
1	2	3	4	5	6	7	8	9	10	11

What are Thomas's chances of successfully learning and implementing report writer for the EPS variance report?

Extremely Low										Extremely High
1	2	3	4	5	6	7	8	9	10	11

Internal Motivation

Howdy Ags, and welcome back!

Thank you for your assistance, each response is very important to the success of this project. Please read the following scenario, and then answer the questions that follow.

John got a new mp3 player for Christmas, but it is not an Apple iPod. Right now he has the player loaded with songs from CDs that he owns. John loaded all his CD's onto his PC, and then uploaded the songs that he liked onto the player using the "manager" software that came with the player. There is plenty of room remaining on the player, and John is considering buying new CD's and loading some of the songs onto his player.

Recently online music purchasing has become popular. Using online music services individual songs can be purchased. Considering John has typically only loaded 3 or 4 songs at most from individual CD's onto his player, buying only the songs he really likes will be cheaper.

In an effort to find out how hard it would be to buy music online, John found several sites for "non-iPod" mp3 players such as his. The sites seem to be pretty easy to use, but their music selection is limited. The best site that he found for purchasing music online is iTunes, which is managed by Apple and built for iPod owners. The iTunes service has a huge library of songs that is updated constantly, it contains all genres of music, and songs are only $.99 each.

For iPod owners, the iTunes site is pretty much 'plug and play', but it is more complicated for non-iPod users. John realizes that before he can use iTunes he will have to download and install the iTunes "jukebox" software, which will require several of his hardware settings to be modified. In addition, he will have to learn how to use the software to convert the song files to be compatible with his player, and it appears to be kind of tricky.

After reading about all this, John thinks that he has an **average** chance of being able to successfully use the iTunes site to buy music for his non-iPod mp3 player.

Several of John's friends also have mp3 players and seem like they really want to use iTunes. John recognizes that figuring out the iTunes site and helping his friends with configuration expertise would impress them. John likes looking good in front of his friends, and he knows that figuring out iTunes would do that. However, with classes starting, and his part-time job, John feels intense time pressure just getting his day-to-day stuff done.

[Next Page]

Consider John's situation and put yourself in his place when making your choices and indicate your answer by circling the number on the scale.

1. If I were to attempt to learn to download music from iTunes and fail, I would feel sad.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

2. If I were to attempt to learn to download music from iTunes and fail, I would feel guilty.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

3. If I were to attempt to learn to download music from iTunes and fail, I would feel disappointed.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

4. If I were to attempt to learn to download music from iTunes and fail, I would feel worried.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

5. If I were to attempt to learn to download music from iTunes and fail, I would feel regret.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

6. If I were to attempt to learn to download music from iTunes and fail, I would feel uncomfortable.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

7. If I were to attempt to learn to download music from iTunes and fail, I would feel depressed.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

8. If I were to attempt to learn to download music from iTunes and fail, I would feel angry.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

9. If I were to attempt to learn to download music from iTunes and fail, I would feel frustrated

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

10. If I were to attempt to learn to download music from iTunes and fail, I would feel ashamed.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

11. If I did not attempt to learn to download music from iTunes, and realized later that my peers did, I would feel angry.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

12. If I did not attempt to learn to download music from iTunes, and realized later that my peers did, I would feel disappointed.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

13. If I did not attempt to learn to download music from iTunes, and realized later that my peers did, I would feel sad.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

14. If I did not attempt to learn to download music from iTunes, and realized later that my peers did, I would feel depressed.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

15. If I did not attempt to learn to download music from iTunes, and realized later that my peers did, I would feel frustrated

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

16. If I did not attempt to learn to download music from iTunes, and realized later that my peers did, I would feel regret.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

17. If I did not attempt to learn to download music from iTunes, and realized later that my peers did, I would feel ashamed.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

18. If I did not attempt to learn to download music from iTunes, and realized later that my peers did, I would feel uncomfortable.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

19. If I did not attempt to learn to download music from iTunes, and realized later that my peers did, I would feel guilty.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

20. If I did not attempt to learn to download music from iTunes, and realized later that my peers did, I would feel worried.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

21. How much time pressure does John face?

Very Little										Substantial
1	2	3	4	5	6	7	8	9	10	11

22. How supportive are John's friends regarding implementing iTunes?

Not at all supportive										Very Supportive
1	2	3	4	5	6	7	8	9	10	11

23. What are John's chances of successfully learning and implementing iTunes?

Extremely Low										Extremely High
1	2	3	4	5	6	7	8	9	10	11

24. If I succeeded in learning to download music from iTunes, I would feel excited.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

25. If I succeeded in learning to download music from iTunes, I would feel glad.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

26. If I succeeded in learning to download music from iTunes, I would feel delighted.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

27. If I succeeded in learning to download music from iTunes, I would feel proud.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

28. If I succeeded in learning to download music from iTunes, I would feel self-assured.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

29. If I succeeded in learning to download music from iTunes, I would feel happy.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

30. If I succeeded in learning to download music from iTunes, I would feel satisfied.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

31. I think that attempting to learn to download music from iTunes is…

Useless						Useful
1	2	3	4	5	6	7

32. I think that attempting to learn to download music from iTunes is…

Foolish						Wise
1	2	3	4	5	6	7

33. I think that attempting to learn to download music from iTunes is…

Joyless						Joyful
1	2	3	4	5	6	7

34. I think that attempting to learn to download music from iTunes is…

Punishing						Rewarding
1	2	3	4	5	6	7

35. I think that attempting to learn to download music from iTunes is…

Unpleasant						Pleasant
1	2	3	4	5	6	7

36. I think that attempting to learn to download music from iTunes is…

Stupid						Intelligent
1	2	3	4	5	6	7

37. I think that attempting to learn to download music from iTunes is…

Disadvantageous						Advantageous
1	2	3	4	5	6	7

38. I think that attempting to learn to download music from iTunes is…

Not enjoyable						Enjoyable
1	2	3	4	5	6	7

39. I think that attempting to learn to download music from iTunes is…

Boring						Exciting
1	2	3	4	5	6	7

40. I think that attempting to learn to download music from iTunes is…

Ineffective						Effective
1	2	3	4	5	6	7

[Next Page]

Please complete the following demographic questionnaire. All responses are anonymous.

1. Age: _____
2. Class: (circle answer)

   sophomore junior senior graduate

3. Track (in PPA): _____
4. Cumulative GPA: _____
5. Gender: _____
6. How many other experiments have you participated in? _____
7. What computer courses have you completed, and your letter grade in each?

   Course: _____ Grade: _____

   Course: _____ Grade: _____

   Course: _____ Grade: _____

[Next Page]

Please read through the scenario one more time.

John got a new mp3 player for Christmas, but it is not an Apple iPod. Right now he has the player loaded with songs from CDs that he owns. John loaded all his CD's onto his PC, and then uploaded the songs that he liked onto the player using the "manager" software that came with the player. There is plenty of room remaining on the player, and John is considering buying new CD's to add onto the player.

Recently online music purchasing has become more popular. Using online music services individual songs can be purchased. Considering John has typically only loaded 3 or 4 songs at most from individual CD's onto his player, buying only the songs he really likes will be cheaper.

In an effort to find out how hard it would be to buy music online, John found several sites for "non-iPod" mp3 players such as his. The sites seem to be pretty easy to use, but their music selection is pretty limited. The best site that he found for purchasing music online is iTunes, which is managed by Apple and built for iPod owners. The iTunes service has a huge library of songs that is updated constantly, it contains all genres of music, and songs are only $.99 each.

For iPod owners, the iTunes site is pretty much 'plug and play', but it is more complicated for non-iPod users. John realizes that before he can use iTunes he will have to download and install the iTunes "jukebox" software, which will require several of his hardware settings to be modified. In addition, he will have to learn how to use the software to convert the song files to be compatible with his player, and it appears to be kind of tricky.

After reading about all this, John thinks that he has an **average** chance of being able to successfully use the iTunes site to buy music for his non-iPod mp3 player.

Several of John's friends also have mp3 players and seem like they really want to use iTunes. John recognizes that figuring out the iTunes site and helping his friends with configuration expertise would impress them. John likes looking good in front of his friends, and he knows that figuring out iTunes would do that. However, with classes starting, and his part-time job, John feels intense time pressure just getting his day-to-day stuff done.

When should John attempt to learn how to download music from iTunes?

This Month			~ 6 Months							~11 Months
1	2	3	4	5	6	7	8	9	10	11

Have you downloaded music from iTunes?
Yes No

Moderate Motivation

Thank you for your assistance, each response is very important to the success of this project. Please read the following scenario, and then answer the questions that follow.

John just started his yearlong appointment as the secretary of his business fraternity. The fraternity fosters ties to business by encouraging scholarship, social activity and a closer affiliation between the commercial world and business students. The fraternity sponsors many guest speakers throughout the semester from local, regional and national firms from various industries. These guest speakers prove to be a valuable resource to fraternity members in search of initial employment.

One of John's responsibilities as secretary for the fraternity is to keep a record of guest speakers. Information he collects includes the speaker's personal information, when they visited campus, the company they represented, and the topic discussed. Later, if a fraternity member needs contact information, they can look it up in the records that John keeps. These records are currently maintained in an Excel file on the fraternity's computer. Since many members access the Excel file, the file is protected so that no information will be inadvertently changed when a member is accessing information. The "contact" Excel file has been used for quite some time, and John knows all the procedures involved in maintaining and servicing the file.

However, through a class, John has become aware that if he were to import the spreadsheet file into a database application the information would become easier to access for his fellow fraternity members, as well as easier for John to maintain. By using the programming language built into the database application, John could build a password-protected form linked to pre-formatted queries so that members could search the database by contact name, company, or even date-on-campus without the members having access to the "raw" data. In addition, John could create a form to enter the records more efficiently, which then could be used by anyone working in the fraternity office.

After considering the transition from spreadsheet to database, John thinks that he has an **average** chance of being able to successfully convert the contact file from the current spreadsheet application to the database application.

John recently attended an officer's meeting where the other officers stressed that implementing new ways to complete the contact sheets was to be commended. Basically, the other officers said that the way things are being done now is not good enough. Thus John is confident that his fellow officers would approve of his trying to implement the database application to compile the contact information.

However, with it being the end of the semester, John has several projects and exams due, plus his part-time job, so John feels intense time pressure just getting his day-to-day stuff done.

Consider John's situation and put yourself in his place when making your choices and indicate your answer by circling the number on the scale.

1. If I were to attempt to learn to reformat the contact information into a database and fail, I would feel sad.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

2. If I were to attempt to learn to reformat the contact information into a database and fail, I would feel guilty.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

3. If I were to attempt to learn to reformat the contact information into a database and fail, I would feel disappointed.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

4. If I were to attempt to learn to reformat the contact information into a database and fail, I would feel worried.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

5. If I were to attempt to learn to reformat the contact information into a database and fail, I would feel regret.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

6. If I were to attempt to learn to reformat the contact information into a database and fail, I would feel uncomfortable.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

7. If I were to attempt to learn to reformat the contact information into a database and fail, I would feel depressed.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

8. If I were to attempt to learn to reformat the contact information into a database and fail, I would feel angry.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

9. If I were to attempt to learn to reformat the contact information into a database and fail, I would feel frustrated

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

10. If I were to attempt to learn to reformat the contact information into a database and fail, I would feel ashamed.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

11. If I did not attempt to learn to reformat the contact information into a database, and realized later that my peers did, I would feel angry.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

12. If I did not attempt to learn to reformat the contact information into a database, and realized later that my peers did, I would feel disappointed.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

13. If I did not attempt to learn to reformat the contact information into a database, and realized later that my peers did, I would feel sad.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

14. If I did not attempt to learn to reformat the contact information into a database, and realized later that my peers did, I would feel depressed.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

15. If I did not attempt to learn to reformat the contact information into a database, and realized later that my peers did, I would feel frustrated

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

16. If I did not attempt to learn to reformat the contact information into a database, and realized later that my peers did, I would feel regret.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

17. If I did not attempt to learn to reformat the contact information into a database, and realized later that my peers did, I would feel ashamed.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

18. If I did not attempt to learn to reformat the contact information into a database, and realized later that my peers did, I would feel uncomfortable.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

19. If I did not attempt to learn to reformat the contact information into a database, and realized later that my peers did, I would feel guilty.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

20. If I did not attempt to learn to reformat the contact information into a database, and realized later that my peers did, I would feel worried.

Not at all Very Much

1	2	3	4	5	6	7	8	9	10	11

21. How much time pressure does John face?

Very Little										Substantial
1	2	3	4	5	6	7	8	9	10	11

22. How supportive are the other fraternity officers of him attempting to use the database application?

Not at all supportive								Very Supportive		
1	2	3	4	5	6	7	8	9	10	11

23. How important would it be for John to go along with the other fraternity officers' recommendations regarding the contact information?

Not Very Important									Extremely Important	
1	2	3	4	5	6	7	8	9	10	11

24. What are John's chances of successfully learning and implementing the database application?

Extremely Low									Extremely High	
1	2	3	4	5	6	7	8	9	10	11

25. If I succeeded in learning to reformat the contact information into a database, I would feel excited.

Not at all									Very Much	
1	2	3	4	5	6	7	8	9	10	11

26. If I succeeded in learning to reformat the contact information into a database, I would feel glad.

Not at all									Very Much	
1	2	3	4	5	6	7	8	9	10	11

27. If I succeeded in learning to reformat the contact information into a database, I would feel delighted.

Not at all									Very Much	
1	2	3	4	5	6	7	8	9	10	11

28. If I succeeded in learning to reformat the contact information into a database, I would feel proud.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

29. If I succeeded in learning to reformat the contact information into a database, I would feel self-assured.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

30. If I succeeded in learning to reformat the contact information into a database, I would feel happy.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

31. If I succeeded in learning to reformat the contact information into a database, I would feel satisfied.

Not at all										Very Much
1	2	3	4	5	6	7	8	9	10	11

32. I think that attempting to learn to reformat the contact information into a database is…

Useless						Useful
1	2	3	4	5	6	7

33. I think that attempting to learn to reformat the contact information into a database is…

Foolish						Wise
1	2	3	4	5	6	7

34. I think that attempting to learn to reformat the contact information into a database is…

Joyless						Joyful
1	2	3	4	5	6	7

35. I think that attempting to learn to reformat the contact information into a database is…

Punishing						Rewarding
1	2	3	4	5	6	7

36. I think that attempting to learn to reformat the contact information into a database is…

Unpleasant						Pleasant
1	2	3	4	5	6	7

37. I think that attempting to learn to reformat the contact information into a database is…

Stupid						Intelligent
1	2	3	4	5	6	7

38. I think that attempting to learn to reformat the contact information into a database is…

Disadvantageous						Advantageous
1	2	3	4	5	6	7

39. I think that attempting to learn to reformat the contact information into a database is…

Not enjoyable						Enjoyable
1	2	3	4	5	6	7

40. I think that attempting to learn to reformat the contact information into a database is…

Boring						Exciting
1	2	3	4	5	6	7

41. I think that attempting to learn to reformat the contact information into a database is…

Ineffective						Effective
1	2	3	4	5	6	7

[Next Page]

Please complete the following demographic questionnaire. All responses are anonymous.

1. Age: _____
2. Class: (circle answer)

   sophomore junior senior graduate

3. Track (in PPA): _____
4. Cumulative GPA: _____
5. Gender: _____
6. How many other experiments have you participated in? _____
7. What computer courses have you completed, and your letter grade in each?

   Course: _____ Grade: _____

   Course: _____ Grade: _____

   Course: _____ Grade: _____

8. How much experience do you have using computer applications?

None Substantial

1	2	3	4	5	6	7	8	9	10	11

[Next Page]

Please read through the scenario one more time.

John just started his yearlong appointment as the secretary of his business fraternity. The fraternity fosters ties to business by encouraging scholarship, social activity and a closer affiliation between the commercial world and business students. The fraternity sponsors many guest speakers throughout the semester from local, regional and national firms from various industries. These guest speakers prove to be a valuable resource to fraternity members in search of initial employment.

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However, through a class, John has become aware that if he were to import the spreadsheet file into a database application the information would become easier to access for his fellow fraternity members, as well as easier for John to maintain. By using the programming language built into the database application, John could build a password-protected form linked to pre-formatted queries so that members could search the database by contact name, company, or even date-on-campus without the members having access to the "raw" data. In addition, John could create a form to enter the records more efficiently, which then could be used by anyone working in the fraternity office.

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When should John attempt to reformat the contact information into a database?

This Month	~ 6 Months								~11 Months
1	2	3	4	5	6	7	8	9	10	11

VITA

NAME

Tina Marie Loraas

PERMANENT ADDRESS

300 Wimbledon Drive
Enterprise, AL 36330

EDUCATION

Texas A&M University:

Ph.D., 2004	Major Area:	Accounting
	Minor Area:	Psychology

Auburn University:

M.Ac., 1997	Major Area:	Accounting Information Systems
B.S.B.A., 1996	Major Area:	Accountancy

EXPERIENCE

Texas A&M University:

Instructor, 2000-2004. Courses: Principles of Managerial Accounting for Non-Business Majors, Accounting Information Systems

Thomas P. Crowley, CPA PC:

Staff Accountant, 1996-2000.