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102. The Role of Achievement Goal Orientation in the development of Self Efficacy during Computer Training

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Abstract

Computer self-efficacy (CSE) is a key factor that is related to performance in computer training. A study was conducted to understand the effects of achievement goal orientation on computer self efficacy development with 166 trainees using a database application. Results show that trainees with different achievement motivation dispositions have affects on CSE development through different paths. Individuals with high mastery approach and performance approach dispositions have positive effects on pre training CSE. Mastery avoidance disposition increases Computer Anxiety (CA), this is not seen with performance avoidance. Performance approach affects CSE development by increasing effort. The study provides initial evidence for the need for targeted interventions on CSE and CA, based on trainees' goal orientation as a personality trait.

Keywords: Computer Self -efficacy, Achievement Goal Orientation, Computer Anxiety

Introduction

Most organizations have adopted computerized information systems for many of their functions. Training staff in application software is increasingly becoming a significant cost. It was estimated that organizations would spend almost $30 billion on information technology training skills annually by 2006 (IDC, 2002). Research has shown that personality factors are related to confidence in the ability to learn and desire to learn (Colquitt and Simmering, 1998). Goal orientation has been identified as a personality factor that requires further research (Colquitt et al., 2000).

Goals are outcomes one wants or are striving for, and personal goals are direct antecedents of behavioural intentions and action. Self-efficacy has a direct effect on performance as well as an effect on one's personal goals (Locke and Latham ,1990). Goal setting theory also identifies that there are other variables that are more "distal" that can influence self-efficacy and personal goals as well as performance. Goal orientation has been identified as one of these distal variables (Mitchell et al., 2000). In a study of goal setting process, Phillip and Gully (1997) found that self-efficacy and personal goals mediated the role of personality traits on task performance of undergraduate students. One of the personality traits considered was goal orientation.

Learning results in cognitive, skill-based and affective outcomes (Kraiger, Ford and Salas, 1993). In the workplace training literature, post training self-efficacy is recognized as a measure of motivational outcome (Machin and Forgarty, 2003). While much of the literature on training has concentrated on antecedents to pre-training self-efficacy, the role of post training self-efficacy has been neglected.

The aim of this study is to improve our understanding of the role of achievement motivation on self-efficacy development in end user training. We test the pathways by which achievement goal orientation affects computer self-efficacy development.

Theoretical framing of research

Competence is at the conceptual core of the achievement goal construct. Individuals possess (after the age of 7 years) and use different standards to define competence (Elliot & McGregor, 2001). The mastery –performance dichotomy of achievement goal disposition is recognized (Elliot and Trash, 2001). People with learning (mastery) orientation believe their abilities are malleable, approach tasks with an intention of developing their skills and abilities, prefer goals , seek out challenging tasks and persist in the face of obstacles. In contrast, performance oriented individuals believe that their capabilities are fixed, approach tasks with the sole intention of performing well, tend to avoid challenging tasks and resist in the face of obstacles. Research has demonstrated that individuals with a learning (mastery) orientation have increased motivation to learn and learn more than individuals who are performance oriented (Colquitt & Simmering, 1998; Phillips & Gully, 1997).

Competence can also be either positive and desirable, or negative and undesirable. Research identified that performance oriented individuals may either have an approach or avoidance basis, leading to a triad of mastery approach, performance approach and performance avoidance (Vandewalle, 1997; Elliot & Church, 1997). More recently, Elliot and McGregor (2001) proposed a 2 x 2 achievement goal framework based on goal definition and valence. In this categorization, individuals define goals in either intrapersonal terms aiming at task mastery, or in normative terms, focusing on task performance. In terms of valence, individuals exhibit either a positive (approaching success) or negative (avoiding failure) approach to mastery and performance orientations (Elliot & McGregor, 2001). This 2 x 2 achievement goal framework has not been applied to predict computer user training outcomes.

Research on the attributes of Computer Anxiety (CA) has shown that high levels of arousal adversely affect computer task performance. In performance situations, this generates further arousal leading to increasing avoidance and fear related to computer usage (Marakas et al. 1998). CA was found to predict computer self-efficacy (CSE) (Thatcher and Perrewe, 2002). General self efficacy and learning goal orientation are conceptualized as achievement oriented motivational traits, whereas performance goal orientation may be conceptualized as an anxiety oriented motivational trait (Kanfer & Heggestad, 1997). Individuals with high performance avoidance disposition seek to avoid failure and hence are prone to higher levels of anxiety.

The role of effort has not been researched in the computer training literature. However, drawing on Johnson's (2005) findings on the role of commitment, it is postulated that effort will result in higher levels of self efficacy and performance. Those with a high disposition for performance approach, when faced with situations that are threatening, will expend additional effort to overcome the threat.

The model to be tested in this study integrates the theory given above to identify pathways in which goal orientation will effect computer self efficacy development. Personal goals, effort and baseline CSE are modelled as proximal factors that effect post training CSE (Figure 1).

Method

Participants and Procedure

The participants were Australian undergraduate University students studying an introductory Information Systems subject. They completed self administered surveys with measures of goal orientation (GO), computer self efficacy (CSE), computer anxiety (CA) and personal goals (marks for a test) before they were introduced to the application package. Participants were then provided training in a database application (MS Access), which included demonstrations in tutorial time (behavioural modelling), and practice examples (mastery enhancement), including further practice tests using online material for three weeks. They took a tutorial test in the fourth week. After answering their test, participants completed the CSE measure and a measure of their Effort (EFF). The marks from the tutorial test were obtained with their consent. Participation in this study was voluntary. The protocol was approved by the University Ethics Committee. From a class of 330 students, 166 completed all three phases of the study. The analysis is based on this group. There were 89 (53.6%) males and 77 females (45.8%). The mean age was 20.8 years (SD= 3.7 years).

Measures

Computer Anxiety was measured with four items drawn from the *Computer Anxiety Rating Scale (CA)* by Heinssen, Glass, and Knight, (1987). These four items capture the apprehension associated with computer usage (Compeau and Higgins, 1995). The items the wording for each items was changed from "Computers" to "MS Access" for the scale to be specific to the application.

An application specific Computer Self-efficacy Scale (CSE) was developed based on Markas et al (1998). It consists of task focused measures that assess individuals' perceptions of their ability to perform specific activities with MS Access. The scale consisted of nine items. An example is "I believe I have the ability to use MS Access to create a query that uses two or more linked tables". The scale used a response format of 0 (no) -100 (very confident) in increments of 10. Three items from this scale were selected (on the basis of no difference in mean score between participants who stated their experience with MS Access was "novice" or "casual" user with those who stated "expert") for use before and after training. Achievement Goal Orientation (GO) was measured using the instrument developed by Elliot and McGregor (2001). The 2 x 2 dimensions measure positive (approaching success) or negative (avoiding failure) approaches to mastery and performance orientations (Elliot & McGregor, 2001). Factor analysis of the 12 item scale revealed that one item did not load on the identified factor (performance avoidance) and was therefore dropped. The resultant eleven item scale was used to measure the four dimensions of goal orientation.

Personal Goal (PG) was measured using a single item where the participants reported their anticipated percentage mark for their upcoming final exam following Microsoft Access training.

Effort (EFF) was measured using a single item, namely, " How much effort did you actually put into preparing for this test". Participants responded using a 5 point Likert type scale from "no effort at all" to "extreme effort". Performance (PERF) was the mark (ranging from 0-5) participants obtained at their tutorial test.

Results
The proposed model and hypotheses were tested using the partial least squares (PLS) analysis program PLS-Graph (Chin and Frye, 2003). The PLS approach allows the simultaneous assessment of both measurement and structural models (Barclay et al., 1995). The measurement model in PLS was assessed for internal consistency, convergent validity and discriminant validity following the criteria set out in Barclay et al., (1995).

Measurement model
The reliability of the research variables was assessed in terms of composite reliabilities and average variances extracted. The composite reliabilities are all over 0.80 and as such acceptable. Average variances extracted were high (over .80). The factor structure and matrix of the study variables, factor loadings and cross loadings for each item were examined. All items loaded above 0.7 on the primary factor. All items loaded higher on their respective constructs than others (results are available from the authors). The correlation of all measures are given in Table 1. The diagonal elements are greater than their corresponding off-diagonal elements, indicating adequate discriminate validity. Overall, the psychometric properties of the constructs were excellent.4.2 Structural model

Structural Model

The structural model was assessed by examining the path coefficients and bootstrapping results (Figure 1). Mastery Approach and Performance Approach were positively related to pre training CSE. Mastery Avoidance was positively related to Computer Anxiety but not to pre training CSE. Performance Approach was not related to Computer anxiety. Although the relationship of Mastery approach with Personal goals was significant, Personal goals did not relate to post-training CSE. Post-training CSE was positively related to Effort were positively and negatively related to Computer Anxiety. Three paths (Effort, Computer anxiety and pre-training CSE) predicted 17% of the variation in post training CSE.

Table 1. Correlations and discriminant validity of variables.

	MApp	PApp	MAv	PAv	CSE (pre)	CSE (post)	CA	PG	EFF

Mastery Approach	**0.83**								
Performance Approach	0.31	**0.90**							
Mastery Avoidance	0.38	0.22	**0.83**						
Performance Avoidance	0.09	0.12	0.37	**0.89**					
CSE (pre –training)	0.29	0.24	0.05	-0.20	**0.89**				
CSE (post –training)	0.12	0.12	-0.16	-0.02	0.19	**0.90**			
Computer Anxiety	-0.08	0.00	0.32	0.26	-0.20	-0.02	**0.84**		
Personal Goal	0.36	0.16	-0.05	0.02	0.11	0.04	-0.15	-	
Effort	0.16	0.25	0.16	0.15	0.01	0.27	0.27	-0.03	-
Performance	-0.01	0.03	-0.10	-0.10	-0.10	0.21	-0.04	0.04	0.13

Elements along the diagonal (in bold) are the square root of variance shared.

Performance approach was positively related to Effort. Computer anxiety and Performance approach explained 14% of the variance in Effort. The path from post-training CSE to performance was significant, but only 4% of the variation in performance was explained.
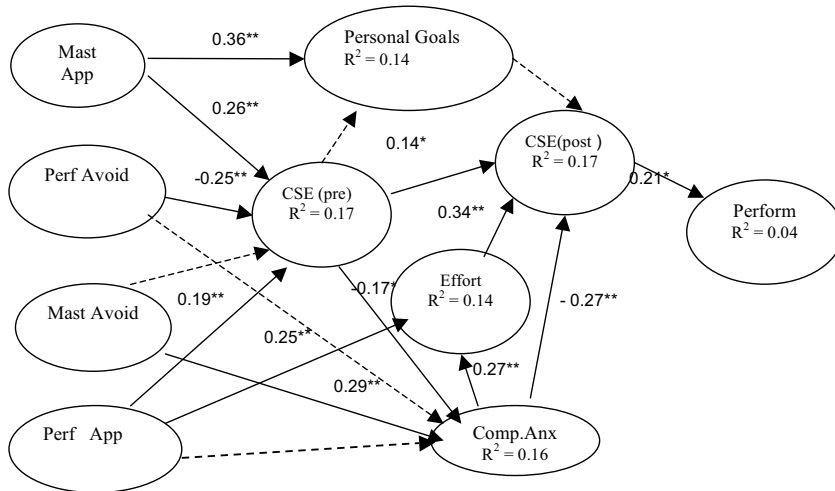
* = P <0.05; ** = P<0.01; non significant paths are in broken lines
Mast App = mastery approach; Perf App = Performance Approach; Mast Avoid = Mastery Avoidance; Perf Avoid =Performance Avoidance; CSE (Pre)= Computer Self Efficacy (pre training) ; CSE (post)= Computer Self Efficacy (post training); Comp. Anx. = Computer Anxiety.

Figure 1 . Structural Model

Discussion

The aim of the research was to test a model that included achievement goal orientation as a distal factor, and Personal goals (PG), Effort (EFF) and CA as proximal factors to predict

CSE development as an outcome of IT training. This study makes a contribution to our understanding of the role of approach and avoidance achievement motivation in the domain of computer training.

This is the first study to look at the 2x 2 achievement goal framework in the context of IT training. The results show that participants with high dispositions to mastery approach goal orientation will have a high level of pre-training CSE and set higher personal goals. This finding is congruent with theory. Individuals with high performance approach dispositions increase their effort directly (as they fear failure in the eyes of peers) and indirectly through a positive influence on pre training CSE. Both paths (through EFF and through CSE) lead to an increase in post-training CSE. Performance avoidance dispositions, as a motive disposition towards failure, had a negative effect on pre-training CSE but did not influence CA. This may indicate that participants with higher levels of performance avoidance would benefit from training intervention that would enhance their self-efficacy. This finding needs to be verified using intervention studies. On the other hand, mastery avoidance has a strong positive effect on CA. These individuals would benefit from interventions to decrease CA.

The main paths through which proximal variables affect post training CSE (as an outcome of the training) were effort , computer anxiety and pre training CSE (baseline level of confidence). The finding that personal goals did not affect the outcome (CSE) is contrary to the theoretical position of Marakas et al. (1998) and findings in the goal setting literature in other domains (Locke & Latham, 1990). Johnson (2005) and Yi and Im (2003) found positive relationships between CSE and personal goals and personal goals and performance. One explanation could be that, in the presence of a path from pre training CSE the effect of personal goals on post training CSE may have been subdued. Also, direct relationships between PG and CSE and Performance were not seen in the bivariate correlations. Goal setting as a motivational method in IT training was suggested by Johnson (2005). Findings from this study did not show evidence of an effect of personal goal setting on self efficacy development, nor increase in performance. This requires further research.

Limitations

This study was conducted with undergraduate students learning introductory computer applications. Though the training intervention replicates techniques used in IT training in the workplace (demonstration of the use of application, practice examples and on line learning material), the findings cannot be generalized to workplace settings. The application used (Microsoft Access) is frequently used in research in IT training, but research using other applications are warranted. The performance measure was based on a skills based test given during tutorial time. Most students performed very well (mean 4.2 out of 5). Therefore the outcome measure was limited in measuring variance in performance; this may have subdued relationships with personal goals and effort in this study.

Conclusions

Results from this study confirm the effects of achievement motivation dispositions on CSE development during IT training. A possible implication for IT training, based on findings of this study, is that achievement motivational dispositions can differentiate trainees and their needs of types of training interventions. Their reactions to and subsequent effort and performance during training are related to personality traits of achievement motivation.

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