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SELF-REGULATION AND E-LEARNING

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Abstract

E-learning is a rapidly growing form of organizational learning and is being widely used to train and educate employees. However, the specific learner characteristics that lead to performance in an e-learning environment are unclear. This study investigated this problem in corporate e-learning environments from an academic self-regulated learning (SRL) perspective. A causal model was introduced, highlighting dimensions of self-regulation hypothesized to be predictors of perceived e-learning performance, in terms of mastery, retention and job performance. The eight dimensions of academic self-regulation considered are intrinsic goal orientation, extrinsic goal orientation, self-efficacy for SRL, computer self-efficacy, e-learning self-efficacy, time management, environment management, and help seeking. Quantitative data was gathered using an online questionnaire which was administered to employees at four major organizations and a group of students undertaking a postgraduate Information Technology course at the University of New South Wales, who are also full-time employees at various organizations. Statistical analyses performed using the Partial Least Squares (PLS) technique demonstrated that e-learners with higher levels of intrinsic goal orientation, self-efficacy for SRL, e-learning self-efficacy, and environment management are likely to have better e-learning course performance. This study has both theoretical and practical implications for researchers, organizations and learners.

Keywords: e-learning, self-regulation, corporate learning, performance.

1 INTRODUCTION

As e-learning courses proliferate, there are increasing levels of individual learner autonomy and control in such contexts. While the importance of academic self-regulation has been widely demonstrated in traditional face-to-face learning contexts, it is necessary now to assess the relevance of self-regulation to e-learning environments (Zariski & Styles 2000, Whipp & Chiarelli 2001).

There is extensive research looking at the benefits of e-learning for organizations, educational institutions and government. Although research has established the effectiveness of e-learning, the specific learner characteristics leading to performance in e-learning environments is unclear. As such, there is a need to truly understand learners and design quality e-learning environments conducive to e-learning. Although concepts of self-regulated learning (SRL) have been around for many years, their application to e-learning has received little attention. Additionally, there is a lack of research looking at SRL in a corporate e-learning environment (Lynch & Dembo 2004, Zhang & Nunamaker 2003). Organisations are increasingly adopting e-learning as a preferred form of training and education for employees, but despite the importance of e-learning to organizations, research on adult work populations is limited.

2 BACKGROUND

2.1 Overview of E-learning

In today's knowledge-based economy, characterized by globalization, increased competition, and knowledge sharing and transfer, increasing emphasis is being placed on learning (Zhang et al. 2003, Urdan & Weggen 2000). E-learning has grown rapidly in all educational areas (e.g. primary/high schools, traditional/online universities, government, and organizations. Course offerings generally include business and soft skills (e.g. communication, leadership, sales and marketing, professional development) and information technology (i.e. these are technical IT courses) (Urdan et al. 2000).

This study employs a broad definition of e-learning: "*instructional content or learning experiences delivered or enabled by electronic technology*". (Commission on Adult Learning and Technology cited in Gallaher 2002, p. 13, American Society for Trainers and Development (ASTD) cited in IsoDynamic 2001, p. 1). Electronic technology includes the Internet, intranet/extranet (LAN/WAN), audio and videotape, satellite broadcast, interactive TV, and CD-ROM (ASTD, Gallaher 2002).

2.2 Overview of Self-Regulated Learning (SRL)

SRL theory perceives learning as "*an activity that students do for themselves in a proactive way*" (Zimmerman & Schunk 1989, p. 1) rather than something that happens to students. Self-regulated learners are those who "*direct their learning processes and attainments by setting challenging goals for themselves..., by applying appropriate strategies to achieve their goals...and by enlisting self-regulative influences that motivate and guide their efforts*" (Zimmerman & Bandura & Martinez Pons 1992, p. 664). Thus, they are active participants in the learning process and are generally more effective learners.

Many researchers have identified the importance of self-regulation as a predictor of academic success in traditional classrooms (Miltiadou & Savenye 2003, Zimmerman 1986, Zimmerman & Martinez Pons 1986). By adopting a SLR perspective to understand e-learning, researchers "*may help explain why learners invest their time, talent, and energy in e-learning educational and training opportunities*" (Maehr and Braskamp 1986, p. 17 cited in Reynolds 2002, p. 7). Research has identified numerous self-regulatory attributes that may be potential contributors to performance. The

self-regulatory attributes selected for investigation in this study have been chosen for their prominence in the literature and relevance to corporate e-learning environments. These attributes will be discussed in the following section.

2.3 E-learners and Self-Regulatory Attributes

SRL theory implies that learners must possess certain self-regulatory attributes to succeed in their learning environment. Although e-learning environments may differ from traditional learning environments, for computer-based learning environments to be effective, learners must be self-regulated (Lee 2004). One of the key differences between e-learning and face-to-face is the removal of the traditional classroom. Along with this, a number of motivating and supporting factors are also removed such as group pressure, familiar learning situation, and social factors (Zvacek 1991 cited in Hodges 2005, p. 376). There is usually no direct interaction between instructors and learners and often, an instructor may not be involved. Thus, e-learners may experience a sense of isolation. Consequently, in order to be successful learners, e-learners must rely on their individual abilities to direct their learning, that is, employ SRL strategies.

Research and practitioner literature, as outlined in the following paragraphs, on both traditional face-to-face and distance learning environments identifies that learners should possess the following key self-regulatory attributes: 1) motivation in terms of goal orientation and self-efficacy, 2) time and environment management, and 3) help seeking.

Research suggests that goal orientations are tied to learning outcomes, primarily through the effect of goal setting on “*one’s intentions regarding effort and persistence*” (Winters & Latham 1996, p. 237). McWhaw and Abrami (2001, p. 313) defined goal orientation as “*the reasons or goals students/[learners] have for engaging in learning tasks*”. In other words, “*the way in which [they] approach a task*” (Zweig & Webster 2004, p. 232). Goal orientation can be perceived as consisting of intrinsic goal orientation and extrinsic goal orientation. These goal orientations are not mutually exclusive (Lin & McKeachie 1999, McWhaw et al. 2001).

Intrinsic goal orientation refers to “*the degree to which a learner participates in a learning task in order to meet a personal challenge, satisfy personal curiosity, and/or attain personal mastery over the elements of the task*” (Lynch et al. 2004). Thus engaging in a task is perceived as an end in itself and not a means to an end. **Extrinsic goal orientation** is the degree to which a learner participates in an e-learning course for the reason that it is a means to an end such as performance, rewards, promotion, and approval from others (Lynch et al. 2004, McWhaw et al. 2001, p. 315). Studies indicate the importance of intrinsic and extrinsic goal orientation (Lin et al. 1999, Niemczyk & Savenya 2001). Generally, researchers agree that an intrinsic goal orientation leads to better performance than an extrinsic goal orientation (Miltiadou et al. 2003). However, Hidi and Harackiewicz (2000) suggest that positive consequences of performance goals have been underestimated and the possibility that they “*can promoter adaptive achievement behaviour in some educational contexts*” (p. 164) should be considered.

The most widely adopted definition of self-efficacy is Bandura’s (1997, p. 3 cited in Hodges 2005, p. 377), who defined self-efficacy as “*beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments*”. Bandura’s social cognitive theory suggests that an individual’s self-efficacy beliefs influence the choices made and the courses of action pursued (Pajares 1996). As such, individuals are more likely to engage in tasks which they feel competent and confident about and avoid tasks where they do not. Researchers have suggested that high self-efficacy has positive effects on effort, persistence, and achievement (Bandura 1977, Pajares & Schunk 2001, Miltiadou et al. 2003). Bandura (1977) and Pajares et al. (2001) argue that self-efficacy should not be assessed globally, but rather domain-specific and even task-specific measures may have greater validity and predictive relevance. As such, this study looks at three measures of self-efficacy: self-efficacy for SRL, computer self-efficacy and e-learning self-efficacy.

Self-efficacy for SRL is defined here as “*learners’ beliefs about their effectiveness in regulating their own learning*” (Morris 1997, p. 15). Often, people’s behaviour can be better predicted by beliefs that people hold about their capabilities, that is self-efficacy, rather than their actual capabilities as “*these self-perceptions help determine what individuals do with the knowledge and skills they have*” (Pajares et al. 2001). Thus assessing a learner’s belief in their ability to regulate their learning may be just as important as assessing their level of self-regulation.

In Lynch et al.’s (2004) study, of the five self-regulatory attributes assessed to predict performance in a blended learning course (part online, part face-to-face), self-efficacy for learning performance and verbal ability were the best predictors of course grades. Self-efficacy for learning and performance alone was found to account for 7 percent of the variance in performance.

Learners who feel uncomfortable using computers may experience difficulty undertaking courses and may experience more frustrations or anxiety with e-learning courses than learners who are more comfortable with computers (Hong & Lai & Holton 2003). Furthermore, as learners focus on using the technology, they may ignore important self-regulation strategies, which may have a detrimental impact on performance levels (Zariski et al. 2000). Thus, in an e-learning context, **computer self-efficacy** which is an “*individuals’ beliefs in their ability to use computers*” (Spence 2004, p. 18), may be a key predictor of their learning outcomes. Furthermore, a learner’s confidence in their ability to learn with e-learning, that is, **e-learning self-efficacy**, may be a key predictor of performance.

Joo, Bong and Choi (2000), Wang and Newlin (2002) and Bates and Khasawneh (2004) all had findings indicating online learning self-efficacy has a direct influence on outcomes. As the definition of e-learning adopted in this study is broader than purely learning via Internet technology, computer self-efficacy and e-learning self-efficacy may be more suitable variables to assess than Internet self-efficacy. In a corporate e-learning environment, computer self-efficacy may be a bigger issue as research (see Whisler 2004) has often found that older learners (i.e. adults) may have lower computer and Internet self-efficacy than younger learners (i.e. college students).

Much research has emphasized learners’ ability to manage their time and environment and agree this is predictive of or is correlated with learning achievement (Zimmerman et al. 1986, Lee 2004, Macan & Shahani & Dipboye & Phillips 1990, Britton & Tesser 1991, Trueman & Hartely 1996, Wolters 1998, Whipp et al. 2001). **Time management** is concerned with the ability of a learner to manage their time, through scheduling, planning, goal-setting, and prioritizing (Miltiadou et al. 2003, Lynch et al. 2004). Of importance, it is not simply the amount of time spent, but rather the effective use and management of time (Whisler 2004). **Environment management** is concerned with controlling and avoiding possible distractions which may arise during learning.

Time and environment management is especially important for corporate e-learners as they often do not study in a structured and controlled environment (like a classroom). One of the benefits of e-learning is time and location flexibility. Thus, e-learners are able to undertake courses at any time and/or from any location, not just in training rooms or during set hours. Consequently, corporate e-learners are often required to coordinate their e-learning with other demands, including work, family and other social activities and commitments. Thus, corporate e-learners may be susceptible to distractions which may “*hinder the e-learning effort because they force the e-learner to allocate time, energy, and attention towards things not related to completing the course at hand*” (Reynolds 2002, p. 11). E-learners must manage their time and environment to minimize distractions and allocate effort towards e-learning courses.

Although self-regulation emphasizes individuals’ ability to manage their own learning, a key part of this is awareness of the significant role others can play in one’s learning. Distance learning research suggests that “*help seekers*” may be more likely to achieve learning outcomes (Wang et al. 2002, Whipp et al. 2001, Zariski et al. 2000). As mentioned earlier, e-learners may experience social isolation. In such situations, learners who do not employ **help seeking** strategies may become frustrated with e-learning courses which impact negatively on their performance.

Newman (2002) suggests that the teacher-student interaction may be a significant factor in a students' help seeking behaviour. In a corporate e-learning there may not be an instructor, however learners will have access to various colleagues who may provide assistance. It is important for the learner not to feel threatened by asking for help from these people. By providing multiple avenues to seek help and ensuring these are communicated to learners, organisations can create a learning environment which encourages learners to seek help when needed.

This study addresses the following research question:

How do intrinsic goal orientation, extrinsic goal orientation, self-efficacy for SRL, computer self-efficacy, e-learning self-efficacy, time management, environment management, and help seeking impact performance in corporate e-learning courses?

3 METHODOLOGY

To address the research question, employees at four major organizations and a group of students undertaking a postgraduate Information Technology course at the University of New South Wales, who are also full-time employees at various organizations, were asked to complete an online questionnaire intended to collect demographics and measure learners' self-regulatory attributes and performance. The companies involved in this study are mainly multinational organizations representing diverse industries (e.g. fast-moving consumer goods, Information Technology consulting, and banking/insurance); most have well established employee learning and development programmes.

Certain specific self-regulatory attributes have been modelled as constructs with formative indicators. Formative indicators measure the different aspects that form the particular self-regulatory attribute. Reflective indicators, on the other hand, measure the same underlying concept and have been used to model the constructs representing the overall self-regulatory attributes (Chin 1998). When modelled, the formative constructs are linked to their corresponding reflective constructs, which are then linked to performance. Including formative and reflective measures allows evaluation of both overall self-regulatory attributes as well as specific underlying causes of the self-regulatory attributes that learners believe are essential in forming their overall level of a particular attribute of self-regulation (Mathieson & Peacock & Chin 2001, p. 86).

Performance and environment management have been modelled as second order factors (representing constructs at a higher level of abstraction), made up by a number of first-order factors or dimensions. Mastery, retention and job performance reflect performance. Controlling and avoiding form environment management. Performance has been modelled as a molecular second order factor, as a change in one of the first order factors was considered to result in similar changes in the other factors (Chin & Gopal 1995). Environment management has been modelled as a molar second order factor as a change in one of the first order factors may not necessarily result in a similar change in other first order factors. Second order factors have been measured using the repeated indicators approach, in which the second order factor is directly measured using all the indicators for each of the first order factors (Wold cf. Lohmöller 1989, pp. 130-133 cited in Chin, Marcolin & Newsted 1996).

3.1 Instruments

To validate the instrument, the questionnaire was pre-tested with a small academic staff and then piloted. The pilot study provided preliminary support for the research model and assessed reliability of instruments (Sharma et al. 2006). Based on the results of the pilot, minor revisions were made to address instrument validity issues, including rewording of questions and adding or removing questionnaire items. The Motivated Strategies for Learning Questionnaire (MSLQ) was used as the main basis for questionnaire items for this study to assess the specific self-regulatory attributes (formative items) of intrinsic goal orientation, extrinsic goal orientation, and help seeking. The MSLQ has been validated through factor analyses, reliability analyses, and correlations with measures of

achievement (Pintrich & Smith & Garcia & McKeachie 1991 cited in Lynch et al. 2004). Other instruments employed to measure specific self-regulatory attributes in this study are the computer self-efficacy scale (Murphy & Coover & Owen 1989 cited in Spence 2004), the self-efficacy for SRL scale (Gredler & Schwartz 1996 cited in Morris 1997), and the time management behaviour scale (Trueman et al. 1996). Questions designed to measure the overall self-regulatory attributes (reflective items) and performance, were newly created by authors, based on construct definitions identified in the literature.

3.2 Data Analysis

Statistical data analysis techniques were performed using the structural equation modelling (SEM) technique Partial Least Squares (PLS). PLS was selected as: a) this study focuses on causal-predictive analysis, b) formative measures have been used, c) the sample size is relatively small (96), and d) its ability to simultaneously model the structural paths (i.e., relationships among constructs) and measurement paths (i.e., relationships between a construct and its indicators). Once data was collected, incomplete responses were removed and negatively worded questions were re-coded. The following steps were then used for analysis: 1) SPSS descriptive analysis for demographics, 2) SPSS analysis to compute Cronbach's Alpha coefficients, 3) SPSS multicollinearity tests, 4) PLS analysis to assess the redundancy model (path between the construct with formative and the respective construct with reflective indicators), 5) PLS analysis to assess the measurement and structural model. PLSGraph Version 3.00 and SPSS V14.0 were utilized. Bootstrapping with 500 samples was used to assess the significance of all estimates and blindfolding was used to assess the model's predictive relevance.

4 RESULTS

4.1 Summary of Participants' Background

Of the 96 responses received (a 15% response rate, low but not unusual for online studies), 65 (67.7%) were male and 31 (32.3%) were female. The majority of participants were married (65.6%) while 31.3% were single and 3.1% were widowed/divorced/separated. Additionally 34.4% indicated that they had children still living with them while 59.4% had no children and 6.3% had children who were not living with them. These figures suggest that many corporate learners may have family commitments which may affect a number of self-regulatory attributes. For example, learners may not be able to undertake e-learning work outside of normal business hours. As such, they must manage their time across their work, e-learning and family commitments. Additionally, if these learners are able to undertake e-learning work at home, they may be required to engage in environment management to deal with distractions that may arise at home. Participants represent various functional areas, including finance, business, marketing, sales, banking and Information Technology (IT) and various hierarchy levels including assistants, analysts, consultants, managers, directors and partners/senior executives. E-learning courses taken include software development related courses, project management, Six Sigma, and business training such as ergonomics, safety and ethics. Participants' ages were spread across the following groups: less than 21 years (2.1%), 21 – 30 years (38.5%), 31 – 40 years (33.3%), 41 – 50 years (20.8%) and greater than 51 years (5.2%). Participants' highest level of education attained was spread across the following groups: high school/TAFE (19.8%), partly completed university (17.7%), graduate (40.6%), and postgraduate (21.9%).

4.2 The Measurement Model

As Chin (1998) identifies, composite reliability is a closer approximation than Cronbach's alpha since composite reliability does not assume equal weighting for indicators. Internal consistency reliability or examination of correlations is irrelevant to constructs with formative measures as each formative indicator causally impacts the latent variable. Thus the construct can be viewed as an effect rather than

a cause of the item responses and no interdependencies among items can be assumed (Mathieson et al. 2001, p. 94). With the exception of overall extrinsic goal orientation, all Cronbach's alphas were in the acceptable to excellent range (above 0.80) indicating good internal consistency reliability. For overall extrinsic goal orientation, although Cronbach's alpha was low, composite reliability was acceptable. Composite reliability was above 0.70 and average variance extracted (AVE) was above the acceptable 0.50 for all constructs with reflective indicators, indicating high convergent validity. Results also indicated minimal collinearity for items. Discriminant validity was assessed as adequate for constructs with reflective items by examining intercorrelations and AVE and cross loadings.

All loadings for reflective items are significant at the 0.01 level (T-stat > 1.96) and in the acceptable to excellent range with the majority above 0.9. Overall, the high loadings suggest that the items tend to strongly reflect their respective constructs. One item for measuring overall extrinsic goal orientation reported significance at 0.01, however had a loading of 0.55, the lowest reported. If questions are to be used in future research, it may be beneficial to consider the wording of the questions which reported low loading to determine any potential problems. For formative indicators, the weights rather than loadings are examined (Chin 1998). All indicators had significant weights (at 0.1 significance level or better), with the exceptions of 1) 4 items (out of 8) for self-efficacy for SRL; 2) 5 items (out of 6) for computer self-efficacy; 3) 7 items (out of 12) for time management.

4.3 The Structural Model

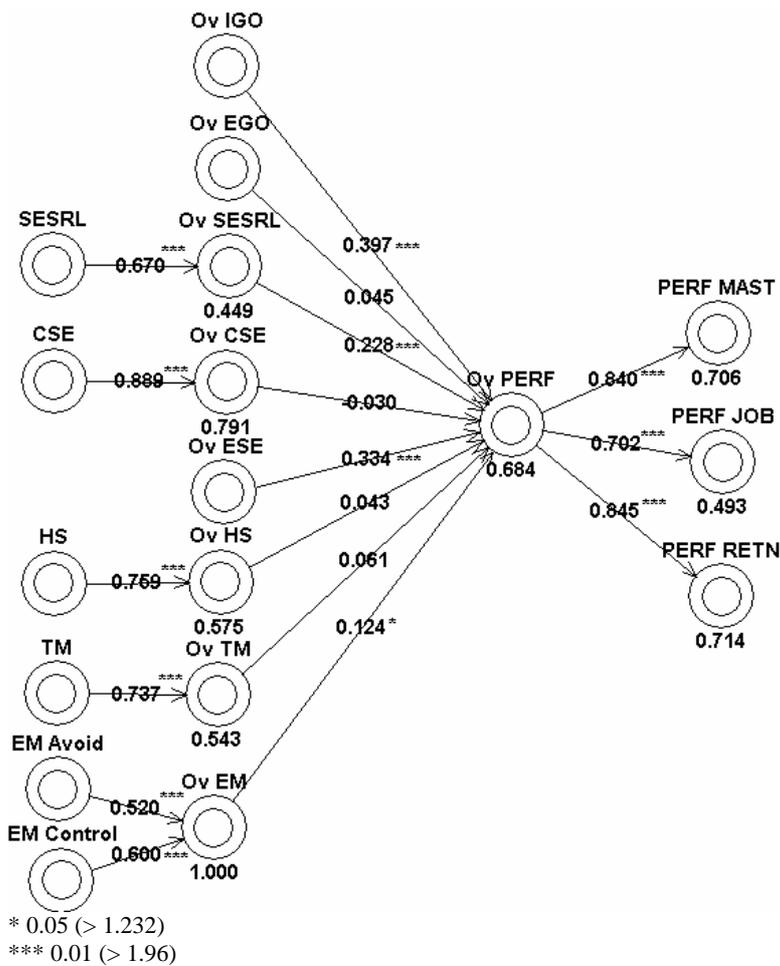


Figure 1. PLS Model

Figure 1 illustrates the overall results from PLS with bootstrapping. The results indicate considerable support of the model with an adjusted R-Square value of 0.684 for performance and the influence of certain key factors, represented by the path values. A number of significant paths were found in this study. Additionally, blindfolding using cross-validated redundancy with an omission distance of 25 was run. A Q^2 above 0 implies the model has predictive relevance (Chin 1998). The results confirm that the structural model has satisfactory predictive relevance, with all Q^2 values above 0.25.

5 DISCUSSION AND CONCLUSION

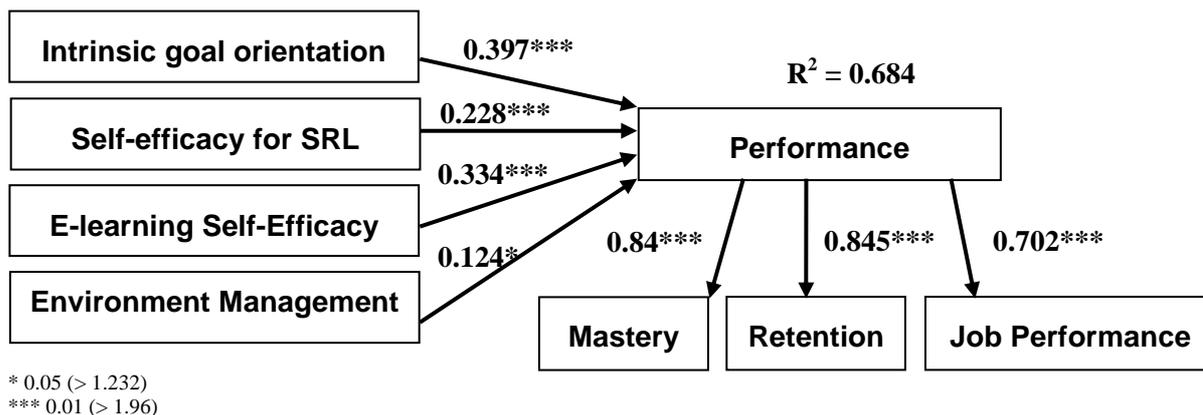


Figure 2. Research Model with Significant Paths

Figure 2 illustrates the significant paths found in this study. The eight self-regulatory attributes accounted for 68% of the variance in performance. Four self-regulatory attributes – intrinsic goal orientation, self-efficacy for SRL, e-learning self-efficacy, and environment management – had a significant positive impact on performance. Additionally, the results indicated that three dimensions - job performance, retention and mastery – all strongly reflected the overall measure of Performance. The most important dimension identified is retention, closely followed by mastery and then job performance. The lower importance of Job Performance may be because many courses taken by corporate e-learners are not directly related to their job such as courses on ethics, safety. As such, this dimension may not be as important as the others in reflecting a learner's overall performance.

As suggested by previous research, there is a strong relationship between intrinsic goal orientation and performance. This is not surprising as two of the dimensions of performance are retention and mastery. These are concerned with learning the actual e-learning course content and materials taught. This definition of intrinsic goal orientation emphasizes the learning process rather than the end result from undertaking e-learning courses. Additionally, learners were asked to identify their top three reasons for taking e-learning courses. The most frequent response (52.6%) identified as the top reason was because the e-learning course was a job requirement or was mandatory while the next most frequent (20.6%) response for the top reason was to gain knowledge. Additionally, the most frequently identified response for the second reason and third reason was to gain knowledge, at 36.1% and 20.6% respectively. This emphasis on gaining knowledge further supports that e-learners may have intrinsic goal orientation. This strong motivation may then allow the learner to perform better with e-learning courses as they are more engaged in the course and allocating effort towards learning the e-learning course material may then lead better retention and mastery of the materials and subsequent job performance.

The corporate e-learning environment is often not structured or controlled. Corporate e-learners are susceptible to distractions from both their work and social surroundings which can reduce effort allocated to the task at hand. Thus managing one's environment may be key attribute contributing to a learner's performance with e-learning courses as suggested by previous research. A learner's

confidence in their ability to learn is highly likely to affect their actual ability to learn. Learners who are not confident may not feel they are capable of learning and this negative motivation may discourage them from allocating effort towards learning and subsequently performing with e-learning courses. Similarly, a learner's belief in their ability to self-regulate may suggest that they believe they are active learners who believe they are able to take control of their learning. As such, they have greater *perceived* performance.

The non-significant relationship between extrinsic goal orientation and performance, however, is surprising. The definition adopted refers to outcomes such as rewards, promotion, and approval from others as well as performance. Although one of the dimensions of performance identified is job performance, these other outcomes are not recognized as items reflecting performance. It is possible that including these dimensions may provide more information.

5.1 Specific Self-Regulatory Attributes

All specific items used to assess self-efficacy for SRL contributed to 44% of the variance in a learner's overall level of self-efficacy for SRL. These items, in order of importance, are item 1 confidence in minimising the disruption if distractions occur while undertaking e-learning courses, item 2 confidence in finishing e-learning course work by deadlines, and item 3 confidence in planning e-learning course work. Item 1 clearly stood out as forming overall self-efficacy for SRL, while items 2 and 3 were very close in importance. Items concerned with confidence in: using appropriate resources for e-learning course work, scheduling e-learning course work, selecting places to minimize distractions and motivating oneself were not significant items in forming the learner's self-efficacy for SRL. It should be noted however, that it is likely there are other specific items that form a learner's overall self-efficacy for SRL as the path between the specific items and the general is 0.67 which is suggestive that there is not adequate coverage of all specific items.

The results indicated that two dimensions identified - avoiding distractions and controlling distractions - were both significant (at the 0.01 level) in forming the overall measure of environment management. The lower importance of avoiding distractions may be because corporate e-learners often cannot avoid distractions given the workplace environment. Courses may be undertaken during work hours, where the learner may not have the ability choose locations that allow them to avoid distractions. Learners may be distracted by emails, phone calls, or any other interruptions. Additionally, many learners were married or had children living with them. As such, e-learning courses undertaken in the home environment may also be susceptible to distractions from family situations. Thus, a learner may find it more effective to control distractions rather than attempt to avoid them.

5.2 Limitations

A number of factors could be considered as limitations of this study. A low response rate and small sample size were attained for this study which may limit reliability of findings. "*Self-report measures of used strategies can suffer from confounds due to subject needs, self-concepts, memory capacity, task characteristics, or knowledge of results*" (Winters et al. 1996, p. 240). However, self-reports are prominent in the literature and were considered suitable for this study due to their convenience for gathering large amounts of data and suitability for obtaining global measures of self-regulation. Unlike experimental manipulations conducted in a laboratory setting, control over background sources of variance is limited in this study as it involves a real-life setting (Zimmerman et al. 1992, p. 672). Conclusions drawn from this study must take the demographics of the sample into account as results and conclusions may not be immediately applicable to other groups, populations or instructional settings. However, this does not diminish the quality of the study. Further generalisations can only be made confidently through replications and extensions of the study.

5.3 Outcomes of the Study

Although the limitations indicate that results should be examined with caution, the results still provide valuable insight for understanding the corporate e-learning environment. This study has both theoretical and practical implications for researchers, organizations and e-learners.

A number of positive relationships between self-regulatory attributes and performance were identified in this study. Thus, this study extends existing research on SRL to a newer form of learning – e-learning. Furthermore, this study has contributed to literature on e-learning in corporations. As organisations continue to adopt e-learning as a form of training and development for their employees, empirically validated research may assist organisations to maximise the potential of e-learning. This study encourages a shift in e-learning literature to focus more on the learner and not just the technology itself. It is hoped that this study will encourage further research in e-learning environments, which may 1) verify findings in this study, 2) investigate how to improve self-regulation in e-learning environments, and 3) identify predictors of SRL attributes which may provide a theoretical foundation for organizations and learners looking for methods to improve SRL attributes.

Future research should examine the robustness of these results with larger and more disparate sample sizes. Results may also be compared across organisations to examine if there may be any contextual differences. It may be beneficial to replicate the results found with other behavioural measures in addition to self-reporting. Additionally, future research may be strengthened with the inclusion of qualitative aspects, such as follow-up interviews and/or focus groups with learners who believe they performed well and did not perform well in e-learning courses. Before organisations implement methods to increase learners' self-regulation, research should provide evidence through experimental studies that such methods will be successful, otherwise the time and effort to implement the methods may not be appropriately guided. Research on training in self-regulation may also be useful to determine whether teaching learners to self-regulate can promote self-regulatory attributes, with the aim to produce better performance. Researchers will need to collaborate with organisations to implement such interventions and determine their effectiveness in the corporate e-learning environment. The nature of the course may be important for identifying different self-regulatory attributes. For example, courses which are more relevant to a learner's job may have a more direct effect on their job, and thus may show stronger links. This study did not differentiate between different types of courses, and as such the results may be slightly confounded.

By measuring learners' self-regulation, organisations may be able to identify "at-risk" learners who may have difficulty succeeding in e-learning. At-risk learners are those learners who may not engage in SRL and would report low scores in questionnaires assessing the degree of self-regulation. By identifying these learners, organisations may target such learners and encourage them to make use of self-regulation. Learners who are aware of the various self-regulatory attributes that lead to better performance may take remedial steps to ensure they employ required SRL strategies. Furthermore, e-learners should recognise that self-regulation in traditional face-to-face learning can be adapted to e-learning.

References

- Bandura, A. (1977). Self-efficacy: Toward a Unifying Theory of Behavioral Change. *Psychological Review*, 84 (2), 191-215.
- Bates, R and Khasawneh, S. (2004). Organizational learning culture, learning transfer climate and perceived innovation in Jordanian organizations. *International Journal of Training and Development*, 9 (2), 96-109.
- Britton, B. K., and Tesser, A. (1991). Effects of time management practices on college grades. *Journal of Educational Psychology*, 83 (3), 405-410.

- Chin, W. W. (1998). The partial least squares approach for structural equation modeling. In G. A. Marcoulides (Ed.), *Modern methods for business research*. Mahwah, NJ: Lawrence Erlbaum Associates, 295–336.
- Chin, W. W., and Gopal, A. (1995). Adoption Intention in GSS: Importance of Beliefs. *Data Base Advances*, 26 (2 & 3), 42-64.
- Chin, W.W., Marcolin, B.L. and Newsted, P.R. (1996). A Partial Least Squares Latent Variable Modeling Approach for Measuring Interaction Effects: Results From A Monte Carlo Simulation Study And Voice Mail Emotion/Adoption Study. In the Seventeenth International Conference on Information Systems, Cleveland, Ohio (December 16-18, 1996).
- Gallaher, J.M. (2002). The adoption of e-learning across professional groups in a Fortune 500 company. Doctoral dissertation, University of Illinois at Urbana-Champaign, 128 pages
- Hidi, S. and Harackiewicz, J.M. (2000). Motivating the academically unmotivated: A critical issue for the 21st century. *Review of Educational Research*, 70 (2), 151-179.
- Hodges, C.B. (2005). Self-Regulation in Web-based Courses: A Review and the Need for Research. *Quarterly Review of Distance Education*, 6 (4), 375-428.
- Hong, K., Lai, K. and Holton, D. (2003). Students' Satisfaction and Perceived Learning with a Web-based Course. *Educational Technology & Society*, 6 (1), 116-124.
- IsoDynamic (2001). E-Learning: A White Paper. http://www.isodynamic.com/web/pdf/IsoDynamic_elearning_white_paper.pdf, Date accessed: 01/06/06
- Joo, Y., Bong, M. and Choi, H. (2000). Self-efficacy for Self-regulated Learning, Academic Self-efficacy, and Internet Self-efficacy in Web-based Instruction. *Educational Technology, Research and Development*, 48 (2), 5-17.
- Lee, I. (2004). Searching for new meanings of self-regulated learning in e-learning environments. http://dasan.sejong.ac.kr/~inlee/set/articles/searching_040426.pdf, Date Accessed: 27/01/06
- Lin, Y. and McKeachie, W.J. (1999). College Student Intrinsic and/or Extrinsic Motivation and Learning. In the Annual Conference of the American Psychological Association (107th, Boston, MA, August 20-24, 1999)
- Lynch, R. and Dembo, M. (2004). The Relationship Between Self-Regulation and Online Learning in a Blended Learning Context. *International Review of Research in Open and Distance Learning*, <http://www.irrodl.org/content/v5.2/lynch-dembo.html>, Data Accessed: 28/02/06.
- Macan, T. H. Shahani, C., Dipboye, R. L., & Phillips, A. P. (1990). College students' time management: correlations with academic performance & stress. *Journal of Educational Psychology*, 82 (4), 760-768.
- Mathieson, K., Peacock, E. & Chin, W.W. (2001). Extending the Technology Acceptance Model: The Influence of Perceived User Resources. *The DATA BASE for Advances in Information Systems*, 32 (3), 86-112.
- McWhaw, K. and Abrami, P.C. (2001). Student Goal Orientation and Interest: Effects on Students' Use of Self-Regulated Learning Strategies. *Contemporary Educational Psychology* 26 (3), 311-329.
- Miltiadou, M. and Savenye, W.C. (2003). Applying Social Cognitive Constructs of Motivation to Enhance Student Success in Online Distance Education. *Educational Technology Review*, 11 (1)
- Morris, D.R. (1997). A study of self-regulated learning in a nuclear power plant setting. Doctoral dissertation, University of South Carolina, 87 pages.
- Niemczyk, M.C., Savenya, W.C. (2001). The Relationship of Student Motivation and Self-Regulated Learning Strategies to Performance in an Undergraduate Computer Literacy Course. In Annual Proceedings of Selected Research and Development Papers Presented at the National Convention of the Association for Educational Communications and Technology (24th), Atlanta, Georgia, (November 8-12, 2001)
- Newman, R.S. (2002). How self-regulated learners cope with academic difficulty: The role of adaptive help seeking. *Theory into Practice*, 41 (2), 132-138.
- Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research*, 66 (4), 543-578.

- Pajares, F. and Schunk, D.H. (2001). Self-Beliefs and School Success: Self-efficacy, Self-concept, and School Achievement. Chapter in R. Riding & S. Rayner (Eds.), *Perception* (pp. 239-266). London: Ablex Publishing. <http://www.des.emory.edu/mfp/PajaresSchunk2001.PDF>, Date Accessed: 28/02/06
- Reynolds, K.A. (2002). Going the Distance with Distance Learning: An Analysis of Motivational Factors That Influence E-Learning Course Completion Rates. Thesis, Wright-Patterson AFB, OH, Air Force Institute of Technology, 131 pages
- Sharma, S., Land, L. and Dick, G.N. (2006) What makes a good e-learner? A preliminary study of the effects of self-regulation on e-learning outcomes in an organizational context. *Proceedings of the International Conference on Informatics Education Research*,
- Spence, D.J. (2004). Engagement with Mathematics Courseware in Traditional and Online Learning Environments: Relationship to Motivation, Achievement, Gender and Gender Orientation. Doctoral dissertation, Georgia State University, 139 pages
- Trueman, M. and Hartley, J. (1996). A Comparison between the Time-Management Skills and Academic Performance of Mature and Traditional-Entry University Students. *Higher Education*, 32 (2), 199-215.
- Urduan, T. A., & Weggen, C. C. (2000). Corporate e-learning: Exploring a new frontier. WR Hambrecht + Co. <http://www.spectrainteractive.com/pdfs/CorporateELearningHamrecht.pdf>, Date Accessed: 17/09/06.
- Wang, A.Y. and Newlin, M.H. (2002). Predictors of web-student performance: the role of self-efficacy and reasons for taking an on-line class. *Computers in Human Behavior*, 18 (2), 151-163.
- Whipp, J. L., and Chiarelli, S. (2001). Proposal: Self-regulation in web-based courses for teachers. Submitted to: Division K:Section1d: Teaching, Teacher Education with and for Students and Teacher Learning in Technology. <http://edtech.connect.msu.edu/Searchaera2002/viewproposaltext.asp?propID=1696>, Date Accessed: 24/04/06
- Whisler, V.R. (2004). Learner Self-efficacy and Interaction During the Implementation of Accelerated Online College Courses: A Mixed Methodology Evaluative Intrinsic Case Study. Doctoral dissertation, Capella University, 202 pages
- Winters, D. and Latham, G.P. (1996). The effect of learning versus outcome goals on a simple versus a complex task. *Group & Organization Management*, 21 (2), 236-250.
- Wolters, C.A. (1998). Self-regulated learning and college students' regulation of motivation. *Journal of Educational Psychology*, 90 (2), 224-235.
- Zariski, A. and Styles, I. (2000). Enhancing student strategies for online learning. In A. Herrmann and M.M. Kulski (Eds), *Flexible Futures in Tertiary Teaching*. Proceedings of the 9th Annual Teaching Learning Forum, 2-4 February 2000. Perth: Curtin University of Technology. <http://lsn.curtin.edu.au/tlf/tlf2000/zariski.html>, Date Accessed: 28/02/06
- Zimmerman, B.J. (1986). Becoming a Self-Regulated Learner: Which Are the Key Subprocesses? *Contemporary Educational Psychology*, 11 (4), 307-313.
- Zimmerman, B.J. and Martinez Pons, M. (1986). Development of a Structured Interview for Assessing Student Use of Self-Regulated Learning Strategies. *American Educational Research Journal*, 23 (4), 614-628.
- Zimmerman, B. J., & Schunk, D. H. (Eds.). (1989). *Self-regulated learning and academic achievement: Theory, research, and practice*. New York: Springer-Verlag.
- Zimmerman, B.J., Bandura, A. and Martinez Pons, M. (1992). Self-Motivation for Academic Attainment: The Role of Self-Efficacy Beliefs and Personal Goal Setting. *American Educational Research Journal*, 29 (3), 663-676.
- Zhang, D. and Nunamaker, J.F. (2003). Powering E-Learning In the New Millennium: An Overview of E-Learning and Enabling Technology. *Information Systems Frontiers*, 5 (2), 207-2002.
- Zweig, D and Webster (2004). Validation of a Multidimensional Measure of Goal Orientation. *Canadian Journal of Behavioural Science*, 36 (3), 232-243.