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The Social Science Journal 46 (2009) 787–799

The
SOCIAL
SCIENCE
JOURNAL

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Understanding learning behavior using location and prior performance as moderators

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Received 2 December 2008; received in revised form 13 May 2009; accepted 21 June 2009

Abstract

This study proposes and validates a research model that examines individuals' learning behavior. Drawing on social cognitive theory (SCT), this study postulates self-efficacy, outcome expectations, social influence, and facilitating conditions as the key drivers of individuals' learning behavior. Learners' residential location and prior performance are also considered as moderators in the proposed model. This study contributes to the education literature by extending traditional SCT models to examine the previously unexplored area of environmental factors containing social influence and facilitating conditions, by validating idiosyncratic drivers of learning behavior and by presenting an operationalization of location and prior performance as two moderators in the learning behavioral formation. Finally, implications and limitations of the research are also provided.

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1. Introduction

Learning is important because such learning facilitates the capability of individuals to effectively deal with the global issues in a knowledge-based world. In other words, individuals' learning behavior can provide useful information as to their ability to successfully cope with future challenges (Schaefer, 2004). Bandura's (1986) social cognitive theory (SCT) is a theory that effectively brings about an insight into an individual's learning. According to SCT,

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individuals possess a learning system that enables them to exercise a measure of control over their thoughts, feelings, and actions. This system provides reference mechanisms and a set of subfunctions for perceiving, regulating, and evaluating learning behavior, which results from the interplay between the system and environmental sources of influence (Pajares, 1997).

SCT has been widely applied in a variety of disciplines and settings and has received support from a growing body of findings from numerous academic areas. For instance, self-efficacy, an important component of SCT, has been found to be related to clinical problems such as addictive behavior, social skills and behavior, smoking behavior, athletic behavior, technology usage behavior (Compeau & Higgins, 1995a, 1995b), consumer behavior (Young, Lipowski, & Cline, 2005) and learning performance.

Researchers have mostly examined the issues related to second language acquisition from a cognitive perspective, ignoring their social and socio-cognitive aspects. In fact, the combination of the individual and environmental (or social) aspect is best expressed by social constructivism for understanding individuals' second language acquisition (Simina & Hamel, 2005), suggesting the unique application of social cognitive theory herein. In fact, SCT has drew some scholars' attention in their research related to language acquisition (e.g., Mills, Pajares, & Herron, 2006, 2007), suggesting that the assumptions and the empirical testing of this study based on SCT are quite essential. Nevertheless, previous empirical research based on SCT has only focused on personal factors (e.g., self-efficacy), but ignored environmental factors and potential moderators in the entire social cognitive process. In fact, the foundation of Bandura's (1986) conception of reciprocal determinism in SCT suggests the view that (a) personal factors in the form of cognition, affect, and biological events, (b) behavior, and (c) environmental influences create interactions that result in a triadic reciprocity (Pajares, 1997). In light of the aforementioned gap in the learning behavior literature, the two research questions of interest to this study are derived below:

- (1) What personal and environmental factors drive one's learning behavior and how?
- (2) To what extent and in what way is individuals' learning affected by their prior performance or location?

Exploring or answering these research questions is important because an improved understanding of the key determinants of individual learning behavior may help educators effectively motivate individuals' learning behavior. This research is different from previous research in two critical ways. First, previous research examining individual learning based on SCT emphasizes the influence of personal factors (e.g., self-efficacy) on their learning behavior, but overlooks that of environmental factors (e.g., facilitating conditions) on the behavior. By including both personal and environmental factors, this study can obtain a thorough understanding in more depth than previous research in terms of learning behavior. Second, this study tests location and prior performance which have not been examined as moderators in previous research. SCT does not suggest that individuals can achieve effective learning behavior beyond their capabilities simply by believing that they can. Instead, SCT indicates that competent functioning requires harmony between self-beliefs on the one hand and prior skills and knowledge (performance) on the other (Pajares, 1997), suggesting a potential moderating role of prior performance in learning behavioral formation.

2. Theory and research model

To build a model of learning behavior, this study draws upon key postulates and findings in SCT which accords a central role to cognitive vicarious, self-regulatory, and self-reflective processes (Bandura, 2001). Bandura's (1986) social cognitive theory (SCT) is a widely accepted theory that provides a critical perspective in depth for learning behavior because it examines the reasons why individuals adopt certain behaviors. SCT explains psychological functioning in terms of triadic reciprocal causation in which behavior, cognitive, personal and environmental factors operate as interacting determinants to individuals' learning. SCT postulates that an individual's behavior is the joint outcome of his or her self-efficacy and expectations of the outcomes (i.e., benefits) of the behavior. SCT gives prominence to the concept of self-efficacy, defined as one's belief in a personal ability to perform a specific behavior (Skaalvik & Skaalvik, 2007). In a learning context, self-efficacy can be defined as users' beliefs in their personal ability for learning a given course, skill, or thing. The notion of self-efficacy in learning suggests that our expectations of the positive outcomes of learning behaviors may not necessarily motivate our learning, unless we also believe in our ability to learn few things or skills appropriately.

SCT suggests that individuals possess a system of self-beliefs that enables them to exercise control over their thoughts, feelings, and actions (Mills et al., 2006). That is, how people behave is affected by what they think, believe, and feel (Bandura, 1986). Although individual success in learning may help boost their confidence in a long run, they are unlikely to obtain such success if their lack of self-efficacy discourages their first shot in the learning. That is the reason why self-efficacy has been confirmed across many studies to be a better predictor of learning success than prior accomplishments, skills, or knowledge, but not vice versa (Mills et al., 2006). At any rate, self-efficacy in SCT plays an important role in shaping individual learners' behaviors. Self-efficacy is based on an individual's self-reflective capabilities, and strong beliefs in one's ability to learn a course or skill may thus lead to great levels of learning behavior (Bandura, 1986). Learners revealing weaker self-efficacy beliefs are also expected to relate to a lesser degrees of learning behavior. This expectation leads to the first hypothesis below.

H1: Self-efficacy is positively related to learning behavior.

Outcome expectations are judgments of or beliefs about the likely consequences of enacting specific behaviors (Bandura, 1986). In a learning context, outcome expectations can be defined as learners' judgments in the potential outcomes of their learning a given lesson, course, or skill. These judgments are important, because people generally do not perform specific learning behavior unless an interesting outcome or incentive consequence is expected from such behavior (Bandura, 2001). Behavior is best predicted by not only self-efficacy, but also outcome expectations. This is particularly relevant when individuals' confidence does not guarantee good outcomes. Many studies related to education have overlooked the outcome expectations while examining self-efficacy (e.g., Shim & Ryan, 2005). Thus, the value of including outcome expectations measures in learning practices requires further testing. Collectively, the understanding of learning behavior may be effectively enhanced by our assessing the joint contribution of self-efficacy and outcome expectations in learning contexts. The second hypothesis is consequently proposed below.

H2: Outcome expectations are positively related to learning behavior.

SCT postulates the influence of environment on individuals' behavior, including social influence and facilitating conditions. Specifically, since social influence is the degree to which an individual perceives that important others believe he or she should perform specific learning behavior, it gives certain pressure that consequently affects his or her learning behavior. The strength of social influence is positively related to individuals' subsequent learning behavior, because individuals who are influenced by their friends or relatives regarding the importance of learning are likely to perform the learning behavior. Consequently, the hypothesis is derived as follows.

H3: Social influence is positively related to learning behavior.

Facilitating conditions are defined herein as the extent to which the individuals perceive that environmental elements or events exist to prop their learning behavior. Facilitating conditions are strongly perceived when individuals' external resources (e.g., support or assistance by hardware, software and/or instructors) facilitating their learning are available easily. Learners are likely to have a difficulty performing their learning behavior due to physical barriers that prevent the behavior from being realized (e.g., Cheung, Chang, & Lai, 2000), suggesting that facilitating conditions are critical in performing learning behavior. Thus, the hypothesis is derived below.

H4: Facilitating conditions are positively related to learning behavior.

The learner's residential location is important in moderating the relationship between the environmental factors and learning behavior, because different locations (e.g., urban versus rural areas) reflect different regional socioeconomics (e.g., Nichols, Rupley, Rickelman, & Algozzine, 2004) that weaken or strengthen their learning (Larsen, 1999). Previous research has indicated that learners' location is related to academic learning achievement (Schroeder & Griffin, 1976). For example, previous research has found that school demographics (staff size, rural or urban location, and district poverty level) significantly influenced student learning outcomes (Wheelan & Kesselring, 2005). It has been also speculated that rural students' motivation may differ from that of their urban and suburban counterparts (Hardré, Crowson, Debacker, & White, 2007). There is no single definition of location that impacts individuals' learning, though the concept about the learning location draws on theories about innovation and systems that promote innovation (Larsen, 1999). Individuals or educational institutions are likely clustered in the same location and have greater opportunities to, for example, share a learning culture and understanding that facilitate the process of social interaction and learning (e.g., Flanagan, Cumsille, Gill, & Gallay, 2007), suggesting a potential moderating role of location between environmental factors (e.g., facilitating conditions) and learning behavior.

This study categorizes the location of the subjects' residence into two classes, including the location inside a metropolitan city ("a city" for short) and the location outside a metropolitan city ("a county" for short). In comparison with those in a county, individuals in a city with better socioeconomic status often brings on critical advantages for individuals' learning, leading to better intellectual growth in knowledge capability (Howe & McWilliam, 2001). The phenomenon about different proficiency or efficiency of learning across different locations is not exceptional in previous research. People with high levels of education and high-wage

jobs reside in very different locations from those with low levels of education and low-wage jobs. This social polarization (e.g., socioeconomic segregations) reflected by locations seems to have become more acute in recent years, implying that individuals' learning behavior differs across different locations. Compared to those who live in a city, learners living in a county reflecting weaker learning inspiration are less sensitively motivated by their social influence and/or facilitating conditions to effectively perform specific learning behavior. This study does not assert the location alone for completely explaining individuals' success or failure in their learning. More specifically, it is important to note that the location is only hypothesized as a moderator herein rather than an independent variable. Collectively, the hypotheses are derived as follows:

H5: The relationship between social influence and learning behavior is moderated by location, and the relationship is stronger among learners in a city than among those in a county.

H6: The relationship between facilitating conditions and learning behavior is moderated by location, and the relationship is stronger among learners in a city than among those in a county.

Support for introducing a moderator into the social cognitive paradigm lies in the malleability of the personal factors. Previous research has revealed that some personal factors such as self-efficacy and outcome expectations in a learning context may be interfered by other social cognitive factors, particularly an individual's prior performance. For example, it has been indicated that when people are uncertain about their own abilities or have limited prior experience, they become more sensitive to self-efficacy (Pajares, 1997).

Compeau and Higgins (1995a) proposed a model based on SCT to examine the effects of learning behavior modeling on computer skills in which prior performance was hypothesized to indirectly influence performance on learning computer tasks. However, their research was confounded by the use of two different tasks (Lotus and WordPerfect), which were not incorporated into their research design. In fact, they reported the results that did not apply equally to the two different learning tasks, which indicated the presence of potential moderating variables (Bolt, Killough, & Koh, 2001). Indeed, the decision-making literature stresses that behavioral decision processes are a function of multiple criteria highly related to the decision makers themselves (Bolt et al., 2001), and therefore individuals' prior performance is hypothesized as an important criteria moderating their learning behavioral processes given stable outcome expectations and self-efficacy. In other words, learners who have experienced or enjoyed satisfactory performance previously are more likely driven by their outcome expectations to subsequently perform a specific learning behavior than those who have had unsatisfactory performance previously. Hence, the hypotheses are derived as follows:

H7: The relationship between outcome expectations and learning behavior is moderated by prior performance, and the relationship is stronger among learners with high prior performance than among those with low prior performance.

H8: The relationship between self-efficacy and learning behavior is moderated by prior performance, and the relationship is stronger among learners with high prior performance than among those with low prior performance.

3. Method

3.1. Subjects and procedures

The research hypotheses described above were empirically tested using a survey of English Language Learners (ELLs) among student subjects in a public senior high school in Taipei, Taiwan. English was chosen for this study, because it is an important and compulsory subject for students during their study in a senior high school. Of the 811 questionnaires distributed to subjects, 759 usable questionnaires were returned for an effective response rate of 93.6%. The sample characteristics are described in Table 1.

The constructs in this study were measured using five-point Likert scales drawn and modified from previous literature, and four steps were employed to refine the measurement items. Learning behavior with four items is modified from Cheung et al. (2000). Social influence with four items is drawn and modified from Thompson, Higgins, and Howell (1991) and Ajzen (1991). Facilitating conditions with four items is modified from Venkatesh, Morris, Davis, and Davis (2003). Self-efficacy with four items was modified from Shim and Ryan (2005). Finally, outcome expectations with six items were drawn and modified from Compeau and Higgins (1995a, 1995b). A pilot test with 66 student subjects was conducted to refine the measurement scales (i.e., improve item readability and clarity) before the actual survey.

Table 1
Sample characteristics.

Characteristic	<i>N</i> = 759
Gender	
Male	408 (53.75%)
Female	351 (46.25%)
Age	
16	158 (20.58%)
17	231 (33.91%)
18	257 (30.47%)
19	111 (14.64%)
20	1 (0.13%)
After school tutor ^a	
No	360 (47.62%)
Yes	396 (52.38%)
Prior performance ^b	
No pass (low prior performance)	586 (77.31%)
Pass (high prior performance)	173 (22.69%)
Location ^c	
City	514 (67.72%)
County	245 (32.28%)

^a After school tutor (a dummy variable) represents the subjects' participation in supplementary education or cram school for the past one year.

^b Prior performance (a dummy variable) represents the subjects' pass on the General English Proficiency Test that is held by official organizations in Taiwan.

^c Location (a dummy variable) represents the subjects' residence located in either a city or a county.

3.2. *Confirmatory factor analysis (CFA)*

The final survey data with a sample size of 759 responses were analyzed via two stages using SAS software. In the first stage, confirmatory factor analysis (CFA) was performed on all data collected to assess scale reliability and validity. In the second stage, construct relationships and significances in the proposed hypotheses were examined by hierarchical regressions. Empirical results from each stage of analysis are presented next.

CFA analysis was done on all items corresponding to the five constructs measured in Likert-type scales. The goodness-of-fit of the CFA model was assessed using a variety of fit metrics. Particularly, the root mean square residual (RMR) was smaller than 0.05 and the root mean square error of approximation (RMSEA) was smaller than 0.08. Meanwhile, the comparative fit index (CFI), the normed fit index (NFI), the nonnormed fit index (NNFI), and goodness-of-fit index (GFI) all exceeded 0.90. These figures suggest that the hypothesized CFA model in this study fits well with the empirical data. Convergent validity was assessed using three criteria recommended by [Fornell and Larcker \(1981\)](#). First, as evident from the *t*-statistics in the above CFA analysis, all factor loadings were statistically significant at $p < .001$ to assure convergent validity of construct. Second, the average variance extracted (AVE) for four constructs exceeds 0.50 except one construct (outcome expectations) at slightly lower than 0.5, suggesting that the overall hypothesized items capture more variance in the underlying construct than that attributable to measurement error ([Fornell & Larcker, 1981](#)). Third, the reliabilities for each construct exceeded 0.70, satisfying the general requirement of reliability for research instruments. Hence, the empirical data collected by this study met all three criteria required to assure convergent validity.

Discriminant validity was evaluated by chi-square difference tests between an unconstrained model, where all constructs in the CFA model were allowed to covary freely, and constrained models, where covariance between each pair of constructs is fixed at one. Chi-square difference statistics for all pairs of constructs in this study exceeded this critical value of 10.83 (the overall significance level of 0.01), thereby assuring discriminant validity for the data sample of this study. In summary, the above test results show that instruments used for measuring the constructs of interest in this study were statistically adequate.

4. Results

Based on the above CFA model, this study performs a hierarchical regression analysis to reflect the proposed associations in our hypotheses. [Table 2](#) presents the results of this analysis.

Step 1 includes five variables such as gender, age, prior performance, etc. in a regression model in [Table 2](#). These variables are considered control variables using the application of dummy variables in this study so as to reduce experimental errors and to avoid making improper inferences. The model in this step reveals only 6.6% of the explained variance in learning behavior. Step 2 adds personal factors including self-efficacy and outcome expectations into

Table 2
Coefficients and *t* value based on Hierarchical Regression Models.

	β	<i>t</i>	β	<i>t</i>	β	<i>t</i>	β	<i>t</i>	β	<i>t</i>
Learning behavior										
Step 1										
Gender	0.23**	3.52	0.11	1.87	0.04	0.78	0.04	0.66	0.04	0.78
Age	-0.04	-1.30	-0.02	-0.59	-0.01	-0.51	-0.02	-0.59	-0.02	-0.72
Prior performance	0.32**	4.15	0.04	0.51	0.03	0.47	0.03	0.42	-0.64	-1.18
After school tutor	0.28**	4.28	0.17**	2.94	0.13**	2.48	0.14**	2.55	0.13**	2.46
Location	-0.13	-1.82	-0.05	-0.81	0.01	0.08	0.20	0.56	0.28	0.79
Step 2										
Self-efficacy (SE)			0.61**	16.01	0.48**	12.33	0.48**	12.42	0.51**	11.69
Outcome expectations (OE)			0.06	1.36	-0.08	1.57	-0.09	-1.68	-0.14**	-2.33
Step 3										
Social influence (SI)					0.15**	3.09	0.12**	2.05	0.13*	2.17
Facilitating condition (FC)					0.27**	7.27	0.32**	7.15	0.32**	7.06
Step 4										
Location \times SI							0.08	0.97	0.06	0.74
Location \times FC							-0.15*	-2.08	-0.15*	-2.10
Step 5										
Prior performance \times SE									-0.10	-1.02
Prior performance \times OE									0.23*	2.02
Adj R^2	0.066	0.317	0.376	0.378	0.380					

* $p < .05$.

** $p < .01$

Table 3

Coefficients and *t* value based on multiple regression models across three learners' groups, respectively.

	Learning behavior (high prior performance)		Learning behavior (low prior performance)		Learning behavior (total sample = high + low)	
	β	<i>t</i>	β	<i>t</i>	β	<i>t</i>
Self-efficacy	0.50**	5.07	0.67**	16.80	0.64**	17.67
Outcome expectations	0.27*	2.22	0.02	0.31	0.07	1.41

* $p < .05$.** $p < .01$

a model, revealing 31.7% of the explained variance in learning behavior. Self-efficacy had a significant effect on learning behavior (H1 is supported) with a standardized coefficient of 0.61 ($p < .01$), while outcome expectations had an insignificant effect on learning behavior (H2 is not supported). Step 3 further adds environmental factors including social influence and facilitating conditions into the model tested in Step 2, revealing 37.6% of the explained variance in learning behavior. Social influence had a significant effect on learning behavior (H3 is supported) with a standardized coefficient of 0.15 ($p < .01$), while facilitating conditions had a significant effect on learning behavior (H4 is supported) with a standardized coefficient of 0.27 ($p < .01$).

Step 4 examines the interaction effects for location and environmental factors. More specifically, location–social influence interaction is insignificant (H5 is not supported), while location–facilitating conditions interaction is significant (H6 is supported) at the 0.05 significant level. This empirical result suggests that the relationship between facilitating conditions and learning behavior is moderated by location. The example plot for the supported hypothesis, H6, is shown in Appendix A. Finally, Step 5 presents the interaction effects for prior performance and personal factors. Particularly, prior performance–self-efficacy interaction is insignificant (H7 is not supported), while prior performance–outcome expectations interaction is significant (H8 is supported) at the 0.05 significant level. This empirical result suggests that the relationship between outcome expectations and learning behavior is moderated by prior performance. The example plot for the supported hypothesis 8 (H8) is shown in Appendix A.

Given an insignificant relationship between outcome expectations and learning behavior (see Steps 2–4 in Table 2), the test results of this study show a significant moderating effect of prior performance on the relationship between outcome expectations and learning behavior (see Step 5 in Table 2). To explore this phenomenon in depth, this study further performs a multiple regression analysis in Table 3 across three sample groups, respectively, including a low prior performance group, high prior performance group, and total sample group (contains both high and low prior performance groups). The analytical results reveal that the relationship between outcome expectations and learning behavior is significant in the high prior performance group with a standardized coefficient of 0.27 ($p < .05$), whereas the relationship is insignificant in the low prior performance group. These results explain why the relationship is insignificant in the total sample group that includes both high and low prior performance groups. At any rate, the hypothesized relationship between outcome expectations and learning behavior exists

significantly only among learners with high prior performance rather than those with low prior performance.

5. Discussion

This study reports several findings of potential interest for future research of individual learning. First, this study demonstrates that SCT is applicable to understand learning behavior, just as it supports understanding individual behavior such as buying behavior or computer usage behavior in previous research. Given that environmental factors including social influence and facilitating conditions have received lesser interest among previous research of learning behavior compared to more popular factors such as self-efficacy and outcome expectations, this study provides an additional validation of this theory as a powerful model of learning behavior and suggests that it can be generalized across different types of learning student subjects such as mathematics and foreign languages to occupational subjects such as business trading practices and organizational training courses. Second, this study has provided an illustrative example of how a research model of learning behavior may be extended to study its moderators. Particularly, most prior models of learning behavior stop at learning behavior or performance as the dependent variable of interest without examining their potential moderators. This study examines two types of moderating impact rarely examined in previously research—namely, location and prior performance.

This study finds that learning is influenced by self-efficacy, social influence, and facilitating conditions, which suggest that educators should not only focus on curriculum design strategies to promote individuals' learning behavior, but also provide learners in need with educational consultation that helps improve their self-efficacy. Additionally, of the two personal predictors of learning behavior, self-efficacy seems to be the primary influence driving learning behavior, which suggests that if educators are faced with resource constraints and have to prioritize their limited teaching resources, then educational programs geared at increasing learners' self-efficacy should come before the programs targeting learners' expectations. Given the significant influence of self-efficacy on learning behavior, it is also possible that learners may realize the benefits of learning behavior even without explicit educational programs, once they gain proficiency and confidence in their ability to learn specific skills or subjects.

For learners, this study suggests that their learning behavior is not entirely linked to their own self-efficacy, but also corresponds to extraneous factors such as their social influence and facilitating conditions. If learners' social influence and facilitating conditions are not positive, then their learning behavior may be limited or suppressed, eventually hurting the learners' perception and the teaching efforts of their educators. In other words, learners should not only enhance their confidence in learning new things, but also cultivate the learning conditions that can be effective in providing the level of facilitating support that they desire. For example, students may be encouraged to make it a rule to be immersed in a school library after school so that they can make good use of the facilitating software or hardware in the library, leading to active learning behavior in the long run.

With regard to the significant moderating effect of location on the relationship between learning behavior and facilitating conditions, instructors should guide learners to make good use of learning resources that are not bounded by individuals' geographical locations so as to reduce the impact of the location during their learning or knowledge acquisition. This perspective has been less stressed by traditional research in which ubiquitous learning resources such as, for example, online consultation and e-learning courses were not prevailing before. Educators should recognize that the negative impact of the geographical location could be more serious if they exclude the ubiquitous resources (that go beyond the location) in their teaching processes (e.g., Kiernan & Aizawa, 2004; Young & Ku, 2008). Particularly, instructors can guide learners by utilizing such free resources as website courses on Internet so that their learning behavior would not be substantially confined or limited by their location.

Finally, the significant moderating effect of prior performance on the relationship between learning behavior and outcome expectations implies that learners' first-step success (or their prior success story) in their learning process is important in subsequently stimulating the influence of their outcome expectations on learning behavior. A crucial implication based on this finding is that educators should take learners' prior performance into consideration during the entire process of their teaching so that different students can effectively achieve their own ultimate attainment in boosting their learning constrained by their prior performance. Indeed, many teachers have been too busy to keep an eye on students' prior performance during their teaching, and thus they provide same instructions to all the students in their classroom, which often discourages those students with poor prior performance.

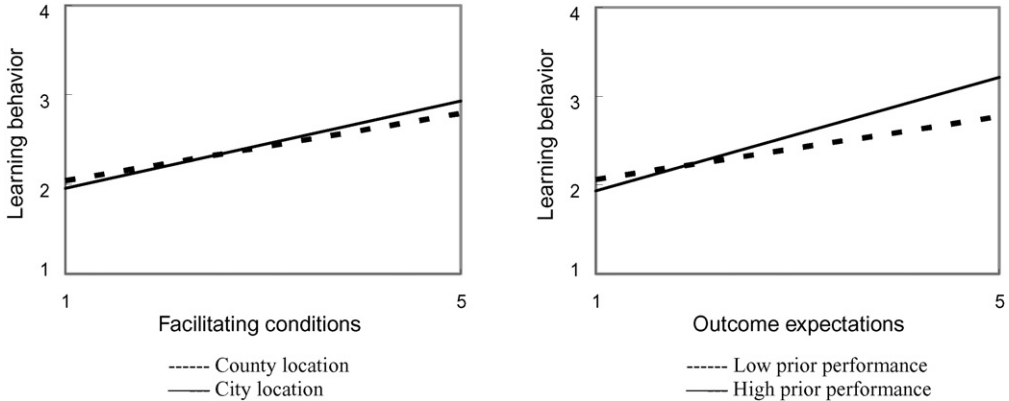
5.1. *Limitations*

The results of our study should be interpreted in light of their limitations. The first limitation of our study is the possibility of common method bias, given that several of our study's constructs were measured perceptually using Likert scales. Second, since our study employed a student sample, its findings may not precisely reflect the perceptions of professional groups such as the learners of business organizations. The restricted nature of our sample suggests that any generalization of our findings to other contexts should be made with caution. Third, given the data are collected from only one culture, they are certainly generalizable within that culture. Thus, generalizations to other cultures may be limited. Finally, there may be several other predictors of learning behavior beyond the four antecedents that were examined in this study. Given our theoretical focus on SCT, we have limited our consideration of learning predictors to those suggested by SCT, but future researchers are advised to consider additional predictors of learning behavior and compare their explanatory ability to those examined in this study.

Acknowledgment

This work was financially supported by the National Science Council of the Republic of China, Taiwan [NSC 98-2410-H-142-004-MY2]. The authors wish to thank Ms. Ching-Yun Hsiao for helping our data collection.

Appendix A. Learning behavior scores regressed on facilitating conditions scores and outcome expectations scores



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