The Asia-Pacific Education Researcher 19:2 (2010), pp. 357-369

The Motivated Strategies for Learning Questionnaire: A Measure for Students' General Motivational Beliefs and Learning Strategies?

Jerome I. Rotgans*
Republic Polytechnic, Singapore
Jerome_Rotgans@rp.sg

Henk G. Schmidt
Erasmus University Rotterdam, The Netherlands

The *Motivated Strategies for Learning Questionnaire* (MSLQ) is a widely used self-report instrument to measure student motivation and learning strategies at the course-specific level (i.e., an individual course or subject domain). The present study sought to explore the utility of the MSLQ in measuring student motivation and learning strategies pertaining to the general curriculum level (i.e., all courses and subjects taken together) rather than to the course-specific level. To that end, the instrument was slightly modified and administered to recently graduated secondary school students (N = 1,166) in Singapore. The construct and predictive validity of the instrument were determined using confirmatory factor analysis and by correlating the individual subscales of the instrument with the overall semester grades. Results showed that the modified MSLQ is a reliable and valid instrument to determine students' motivational beliefs and learning strategies at the general curriculum level.

Keywords: Confirmatory factor analysis, construct validity, Motivated Strategies for Learning Questionnaire, predictive validity, self-regulated learning, student motivation

Within educational psychology there are two major approaches to study student motivation and learning. On the one hand there is the "student approaches to learning" (SAL) and on the other the "self-regulated learning" (SRL) approach. A central point of debate between SAL and SRL researchers is the matter of appropriate "grain-size" or context specificity of measurement (Pintrich, 2004). The SAL perspective favors a holistic approach to describe general conceptualizations of learning, whereas the SRL perspective focuses on course-specific and context-dependent constructs at a much smaller grain-size (Lonka, Olkinuora, & Mäkinen, 2004). Both approaches have their advantages; the SAL approach has the capacity to provide useful information about student motivation and learning at the general curriculum level and the SRL approach is capable of measuring a large number of complex motivational and cognitive variables at the more detailed course-specific level. With this study we made an attempt to reconcile both approaches by investigating whether it is possible to use the *Motivated Strategies for Learning Questionnaire*,

Copyright © 2010 De La Salle University, Philippines

or MSLQ (Pintrich, Smith, Garcia, & McKeachie, 1991), to measure students' motivational beliefs and self-regulated learning strategies at the general curriculum level (i.e., the whole of studies for graduation, or "school in general").

The development of the SRL and SAL approaches to motivation and learning followed rather different paths in the early stages. SRL models have strong roots in mainstream educational and cognitive psychology and are derived from motivational, cognitive, and metacognitive theories. Thus, the resulting self-report instruments are based on a top-down approach and built on previous theories and empirical research findings (Biggs, 1993; Dyne, Taylor, & Boulton-Lewis, 1994; Entwistle & Waterston, 1988; Pintrich, 2000). The SAL researchers, on the other hand, applied phenomenological studies that used in-depth qualitative interviews with students as a starting point to develop self-report instruments (Biggs, 1993; Dyne et al., 1994). As the various instruments were developed further, the distinction between the SRL and SAL conceptualizations diminished insofar that SAL instruments now also include elements of the SRL subscales, like metacognition and self-regulation (Biggs, 1993; Entwistle & McCune, 2004). Despite these developments, the issue of adequate grain-size of the measurement instrument is still open to debate. The objective of the present study is therefore to investigate whether it is valid and practical to use a course-specific SRL measure, with the benefit of its small gain-size, to measure student motivation and learning at the general curriculum level, traditionally the territory of SAL.

Generally, grain-size refers to the number of constructs an instrument is able to measure (the more constructs, the smaller the grainsize). Related to that, the context of measurement plays an equally important role when considering an instrument to determine student motivation and self-regulated learning. According to Lonka et al. (2004) there are three basic levels of context: (1) the whole of studies for graduation (i.e., general curriculum level), (2) a particular course a student is participating in (i.e., domain- or course-specific level), and (3) a specific situation in which the student is dealing with the subject matter or a learning task (i.e., situational level). The choice of level of context is predominantly related to the research question one peruses. For instance, if the objective is to determine the effects of new pedagogical interventions on a particular course, the analysis should be conducted at a course-specific level (see Trigwell & Prosser, 2004). On the other hand, if the objective is to study general study behaviors at a particular school or college, the appropriate level of measurement is at the general curriculum level (e.g., Mäkinen, Olkinuora, & Lonka, 2002). This classification appears to be self-evident but lack of distinction between the levels of context has caused many kinds of conceptual confusions and methodological difficulties in interpreting empirical data (see Lonka et al., 2004). The key issues of assessment revolve around the matter of construct validity of the instrument, which is not limited to the theoretical and conceptual definitions of the construct but should also include the level of context where it is measured. For instance, a particular self-report instrument can be valid and reliable at one level of context (e.g., the course-specific level), but there are limitations in its use at another level of context (e.g., the general curriculum level). This aspect of validity is central to the SRL and SAL distinction; SRL models provide a larger number of constructs at a smaller grain-size that describe student motivation and cognition in all its complexity, whereas the SAL models focus on a much larger grain-size opting for much larger units of analysis such as general approaches to studying and learning. Pintrich was skeptical about the use of SRL models at the general curriculum level and stated that:

> "These differences in grain-size and domain-specificity assumptions make the SRL and SAL approaches somewhat incommensurable in terms of developing common construct lists or common instruments." (Pintrich, 2004, p.395).

In an attempt to reconcile both approaches—that is on the one hand the benefit of the SAL approach in providing a general overview of students approaches to learning and on the other hand the benefit of the SRL approach by providing detailed information about students' motivational beliefs and the use of learning strategies—we selected the MSLQ, a widely used SRL self-report instrument that was designed to measure a large number of motivational and self-regulated learning constructs, and tested whether it is valid to use it for the purpose of measuring students' general motivational beliefs and the use of self-regulated learning strategies. The MSLQ is an 81-item, self-report instrument consisting of six motivation subscales and nine learning strategy subscales (Pintrich, Smith, Garcia, & McKeachie, 1991). The motivational section consist of three general motivational constructs: expectancy, value, and affect (Pintrich, 1988a, 1988b, 1989). Expectancy components refer to students' beliefs that they can accomplish a given task. The MSLQ has two subscales that address this component: self-efficacy and control beliefs for learning. The self-efficacy subscale incorporates expectancy for success, which is specific to task performance and judgments about one's ability to accomplish a task and be confident in one's skills to perform a task. Control beliefs for learning refer to students' beliefs that outcomes are contingent on one's own effort, rather than external factors like the teacher. The value component refers to the reasons students engage in an academic task. The values subscales of the MSLQ are based on both achievement goal theory and expectancy-value theory. There are three subscales in the MSLQ that address this component: intrinsic goal orientation (a focus on learning and mastery), extrinsic goal orientation (a focus on grades and approval from others), and task value beliefs (students' judgments of how interesting, useful and important a task is). The third component, affect, is operationalized by the subscale of test anxiety, which addresses students' concerns and worries of taking exams.

The learning strategies section consists of three components: cognitive processes, metacognitive processes, and resource management. The cognitive component comprises four subscales: rehearsal, elaboration, organization strategies, and critical thinking. The most basic cognitive subscale is rehearsal and refers to rehearsing materials over and over again to increase recall of information. The remaining subscales address more complex cognitive strategies like elaboration strategies (e.g., summarizing and integrating information), organizing strategies (e.g., outlining or creating tables or concept maps to better comprehend learning materials), and critical thinking, which refers to students' strategies to apply prior knowledge to new contexts or critically evaluate ideas and concepts. The second general component, metacognition, addresses students' use of strategies to monitor and regulate their cognition. This large subscale includes planning (e.g., setting goals and task analysis), monitoring (e.g., tracking one's attention, self-testing and questioning), and regulating (i.e., fine-tuning and continuous adjustment of cognitive activities). The third general component is resource management, which includes students' regulatory strategies to manage resources other than their cognition. These strategies include managing one's time and study environment (e.g., scheduling, planning and managing one's study time and setting realistic goals), regulating one's effort (e.g., willingness to try hard even when work is difficult), peer learning (e.g., working collaboratively with peers on a task), as well as help seeking (e.g., when facing difficulties to identify and approach someone who can provide assistance).

The MSLQ can be used either in its entirety or its subscales and has most frequently been applied to evaluate the motivational and cognitive effects educational programs have on students (Bong, 2004; Bong & Hocevar, 2002). The MSLQ has however not yet been used at the general curriculum level to determine students' *general* motivational beliefs and self-regulated learning strategies. The advantage of using the MSLQ at the general curriculum level when compared to available SAL instruments is its smaller grain-size. This becomes apparent when

comparing the MSLQ with another widely used SAL instrument, the *Study Process Questionnaire* (Biggs, 1987). Entwistle and McCune (2004, p.330) provided a conceptual comparison of both instruments by comparing the number of subscales they have in common when addressing several general constructs. For instance, when comparing the number of subscales that tap into students' meaning orientations (i.e., "indicating an orientation to understand for oneself") the Study Process Questionnaire uses two subscales (i.e., deep strategy and deep motive) whereas the MSLQ uses five subscales (i.e., elaboration, critical thinking, organization, intrinsic goal orientation, and task value). The same is the case for the other self-report instruments that were used in the comparison.

Although the MSLQ has been portrayed as a reliable and valid instrument (Pintrich et al, 1993; Pintrich et al., 1991) and has been used in a variety of studies across various courses, content areas, and countries (Bandalos, Finney, & Geske, 2003; Brookhart & Durkin, 2003; Ommundsen, 2003; Seibert, 2002; Zusho, Pintrich, & Coppola, 2003), closer examination of its psychometric properties suggests that there is room for improvement. For instance, the commonly used cut-off values for the model fit statistics reported in the MSLQ test manual (REF) are just on the edge of what is commonly considered acceptable (see Table 2). This applies also to the reliability in terms of internal consistence of some of the subscales, such as extrinsic goal orientation (alpha = .62), organization (alpha = .64), and help seeking (alpha .52). With the present study we tested whether the psychometric properties improve when administering the MSLQ at the general curriculum level.

Using the MSLQ at the general curriculum level would however only be justified if its course-specific constructs, like metacognitive self-regulation, critical thinking, and elaboration, can also be measured at the general curriculum level. For instance, metacognitive self-regulation should not only be observable at the course-specific level, but also at the more general curriculum level. There are several studies that demonstrated that various motivation and learning related constructs were stable across subject domains. This implies that students may have stable dispositional learning behaviors. For instance, Wolters and Pintrich (1998) conducted a study where they investigated the contextual differences in student motivation and self-regulated learning in mathematics, English, and social studies. They used several subscales of the MSLQ, like task value, self-efficacy, test anxiety, rehearsal, elaboration, and metacognitive self-regulation. Apart from their findings that there were some mean-level differences of motivational and cognitive variables between the subject areas, their results revealed that there were no differences in regulatory strategy use. In other words, the correlational relations between motivational and self-regulated learning construct did not significantly vary as function of the subject area, indicating that students seem to have stable habitual or dispositional self-regulated learning strategies.

Vermetten, Lodewijks, and Vermunt (1999) conducted a similar study in which they investigated the consistency and variability of learning strategies in different university courses. They used the *Inventory of Learning Styles* (Vermunt, 1998), which includes four different domains of learning, namely cognitive processing, metacognitive regulation strategies, learning orientations, and mental models of learning. Their results are very similar to the findings of Wolters and Pintrich, suggesting that the learning context had only minor influence on the use of learning strategies. They concluded that students have a personal, habitual component in strategy used across domains.

Based on the initial findings of the above studies we further tested the assumption that students display consistency in the use of learning strategies and motivational beliefs by investigating whether the factor structure of the MSLQ remains stable when students are asked to report on their general motivational beliefs and learning strategies. We hypothesized that this would provide

more reliable insights of the existence of stable dispositional self-regulated learning strategies rather than comparing correlational structures across courses. Moreover, we were interested to test whether a typical SRL-instrument is capable of predicting course grades accurately in both situations; not only at the course-specific level, but also at the general curriculum level. To that end we calculated zero-order correlations between the MSLQ scores and the overall semester grade. In addition, we analyzed the relationships between the MSLQ scores and course grades for English and Mathematics to test for variability in domain contexts and to see whether the MSLQ is capable of identifying differences in strategy use. We selected English and Mathematics since previous research suggests that the differences in motivation and learning strategies are most profound between these subject areas (cf. Eccles, 1983; Wigfield, 1994; Wigfield & Eccles, 1992). Previous research indicates that teachers from different subject areas have different views of the nature of their discipline and these views are related to different instructional beliefs and practices (Grossman & Stodolsky, 1995; Stodolsky & Grossman, 1995). Researchers found that the beliefs between mathematics and language teachers vary. Mathematics teachers believed that their subject domain is sequential and static, whereas English teachers believed that their subject domain is more open, less sequential, and more dynamic. These findings suggest that mathematics classrooms provide fewer opportunities for self-regulated learning. We assumed that the different course grades represent—to a certain degree—differences in the application of learning strategies. We therefore predicted that the strengths of correlations between the MSLQ scores and the course grades for English and Mathematics would reveal differences that are due to context-specific variations in strategy use (i.e., correlations between the MSLQ scores and Mathematics would be significantly weaker than the correlations between MSLQ scores and English since students' efficacy beliefs, task value, and interest are generally less positive and less adaptive in Mathematics than in English). If this is indeed the case it would add to the overall validity of the instrument since it is capable of detecting not only student's general motivational beliefs and self-regulated learning strategies but it is also sensitive to context-specific variations in their strategy use.

In sum, the objective of the present study was to investigate whether the MSLQ is a suitable instrument to determine students' motivational beliefs and self-regulated learning strategies pertaining to the general curriculum level by determining its construct validity using a structural equation modeling approach. Moreover, the instrument's predictive validity was examined by calculating the correlations between the MSLQ scores and the overall semester scores as well as the English and Mathematics scores to test for variability in context-specific motivations and self-regulated learning strategies.

METHOD

Participants

Newly graduated secondary school students from Singapore participated in the study. At the time the study was conducted, the participants were about to enroll in diploma programs at a local polytechnic. The sample consisted of 1,166 participants (44% male and 56% female) with an average age of 17.40 years (SD = .93). The majority of the participants (96%) were Singaporean citizens, the remaining participants came from China, India, Indonesia, Japan, Malaysia, Myanmar, Philippines, Sri Lanka, and Thailand. During the freshmen orientation program at the polytechnic all first-year students were administered the modified MSLQ.

Materials

For the purpose of this study we used the *Motivated Strategies for Learning Questionnaire* (Pintrich et al., 1991). Several of the original items were modified to enable measurement of motivation and learning strategies at the general

curriculum level. The modification was done with the intent to minimally alter the items to assure a close resemblance to the original MSLQ. For instance, all items referring to a "course" were altered to fit the more general context of a "School" or "Polytechnic" (e.g., "*I'm confident I can learn the basic concepts taught in this course*" was altered to "*I'm confident I can learn the basic concepts taught at the Polytechnic*").

For the purpose of this study we incorporated all subscales of the MSLQ except for "test anxiety" and "task value". We considered test anxiety to have a scale too narrow to be an adequate measure of general affect (cf. Pintrich, 2004). Similarly, task value, was considered to be too course-specific to be a meaningful subscale representing general motivational beliefs without significantly altering the items. Overall, we included four motivational subscales (i.e. intrinsic goal orientation 4 items, extrinsic goal orientation 4 items, control beliefs about learning 4 items, and self-efficacy for learning and performance 8 items, in total 20 items) and nine learning strategies subscales (i.e. rehearsal 4 items, elaboration 6 items, organization 4 items, critical thinking 5 items, effort management 4 items, metacognition 12 items, time and study environment 8 items, help seeking 4 items, and peer learning 3 items, in total 50 items) in the modified MSLQ.

In order to determine the predictive validity of the modified MSLQ we correlated the mean values of the MSLQ subscales with the overall first semester grade, the English grade and the Mathematics grade. The overall semester grade is the aggregated mean score, based on all five module grades of a common first semester at the polytechnic (i.e., English, Mathematics, Science, Enterprise skills, and Cognitive learning).

Procedure

Participants had 20 min. to complete the questionnaire and had to rate the statements on a 5-point Likert-scale: 1 (*strongly disagree*), 2 (*disagree*), 3 (*neutral*), 4 (*agree*), and 5 (*strongly agree*). Participants were provided with an instruction to think of school in general when responding to the statements. No information was given about the underlying assumptions of the questionnaire.

Analysis

First, responses to negatively stated items (n = 8) were reversed so that for all items the highest score was indicative of a positive rating. Next, data were analyzed using structural equation modeling. The analysis was done with AMOS 5 (Arbuckle, 2003). The analysis was conducted using three different types of samples: one *exploration sample* (N = 583), to conduct an initial analysis of the hypothesized models, and a second *construct validation sample* (N = 583) to retest the models and cross-validate them with the first sample. Participants were randomly assigned to either one of the two samples until the entire population (N = 1,166) was equally distributed over both samples. After the analyses were completed for the first two samples we retested all models with the *main sample*. The two sections of the MSLQ were analyzed separately as suggested by the developers (Pintrich et al., 1991). Thus, two confirmatory factor analyses were conducted: one for the set of motivation items and another for the set of learning strategies items. Parameter estimates were generated using maximum likelihood and tests of goodness of fit. Chi-square accompanied by degrees of freedom, sample size, p-value and the root mean square error of approximation (RMSEA) were used as indices of absolute fit between the models and the data.

The Chi-square is a statistical measure to test the closeness of fit between the observed and predicted covariance matrix. A small Chi-square value, relative to the degrees of freedom, indicates a good fit (Byrne, 2001). A Chi-square/df ratio of less than 5 is considered to be indicative of a good fit. RMSEA is sensitive to model specification and is minimally influenced by sample size and not overly affected by estimation method (Fan, Thompson, & Wang, 1999). The lower the RMSEA value, the better the fit. A commonly reported cut-off value is .06 (Hu &

Bentler, 1999). In addition to these absolute fit indices, the comparative fit index (CFI) was calculated. The CFI value ranges from zero to one and a value greater than .90 is conventionally considered a good model fit (Bentler, 1990). More recently however, cut-off values close to .95 were suggested (Byrne, 2001).

Finally, Hancock's coefficient *H* was calculated for each subscale. The coefficient *H* is a construct reliability measure for latent variable systems that represents an adequate alternative to the conventional Cronbach's alpha. According to Hancock and Mueller (2001) the usefulness of Cronbach's alpha and related reliability measures is limited to assessing composite scales formed from a construct's indicators, rather than assessing the reliability of the latent construct itself as reflected by its indicators. The coefficient *H* is the squared correlation between a latent construct and the optimum linear composite formed by its indicators. Unlike other reliability measures the coefficient *H* is never less than the best indicator's reliability. In other words, a factor inferred from multiple indicator variables should never be less reliable than the best single indicator alone. Hancock recommended a cut-off value for the coefficient *H* of .70.

RESULTS

Descriptive statistics were calculated for all items ($n = 70$); no outliers or other abnormalities were found. As a next step we tested the measurement model to see whether the data fitted the hypothesized factor structure of the MSLQ well. Confirmatory factor analysis was conducted to determine the adequacy of the model fit. All factor loading (i.e., regression weights) were statistically significant and ranged from .09 (metacognitive self-regulation) to .78 (self-efficacy for learning and performance). Correlation and covariance matrices were calculated for all input variables. Covariance matrices were used to perform maximum likelihood linear structural relations analyses. The motivation and learning strategies models were tested with all three samples. First, with the exploration sample, followed by the validation sample, and finally with the main sample. The model fit statistics for all three samples are summarized in Table 1.

The results demonstrate that the data fit the motivation and learning strategies models well. The Chi-square/df ratio for the motivation section (main sample, $N = 1{,}166$) was 3.86, $p < .00$, RMSEA = .05 and CFI = .94. Also, the learning

Table 1

Chi-square/df ratio, p-value, RMSEA and CFI values for the Motivation and Learning Strategies Sections of the modified MSLQ

Samples	N	P-value	Chi-square/df ratio	RMSEA	CFI
Motivation Section					
Exploration Sample	583	*p<.00*	2.47	.05	.94
Construct Validation Sample	583	*p<.00*	2.32	.05	.95
Main Sample	1,166	*p<.00*	3.86	.05	.94
Learning Strategies Section					
Exploration Sample	583	*p<.00*	2.46	.05	.82
Construct Validation Sample	583	*p<.00*	2.22	.05	.84
Main Sample	1,166	*p<.00*	3.26	.04	.85

Table 2
Comparison of the Goodness-of-Fit Index, the Adjusted Fit Goodness-of-Fit Index and Root Mean Residual between the Pintrich et al. (1993, pp.807-809) Study and the Findings of the Present Study.

Subscale/Index	Pintrich et al. study	Present study
Motivation Section		
GFI	.77	.95
AGFI	.73	.93
RMR	.07	.03
Learning Strategies Section		
GFI	.78	.88
AGFI	.75	.86
RMR	.08	.03

strategies section fitted the data reasonably well: The Chi-square/df ratio (main sample, $N = 1{,}166$) was 3.26, $p < .00$, RMSEA = .04 and CFI = .86. These findings are in agreement with the Pintrich et al. (1993) results at the course-specific level. In fact, when comparing the model fit statistics used in the Pintrich et al. "reliability and predictive validity study" (Pintrich et al., 1993) one can see that our data fitted the model even better. In the Pintrich et al. study the goodness-of-fit and adjusted goodness-of-fit indices (GFI and AGFI) as well as the root mean residual (RMR) were used as model fit indices. A GFI and AGFI of .90 or greater and an RMR of .05 or less are heuristic values that indicate an adequate model fit. Table 2 provides and overview of the comparison.

Overall, our results show a good model fit indicating that the MSLQ is a valid instrument to determine student motivation and self-regulated learning strategies at the general curriculum level.

Before testing the predictive validity of the modified MSLQ reliability analyses were carried out. The reliability of the 13 subscales was assessed using the coefficient *H*, which represents the degree of replicability of a construct based on its measured indicator variables. See Table 3 (third column) for details. Values ranged from .52 (peer learning) to .86 (self-efficacy for learning and performance), on average .68. The values are indicative of a moderate to good internal consistency of the motivation and learning strategies subscales.

After having tested the construct validity and reliability of the modified MSLQ, the instruments' predictive validity was assessed by computing Pearson's correlation coefficients for each subscale and the overall semester grade as well as the course grades for English and mathematics. The overall semester grade is the accumulated average grade of five modules (i.e., English, Mathematics, Science, Enterprise skills, and Cognitive learning). The results of the correlation analyses are displayed in Table 3 (last four columns).

The results revealed that although the correlations between the MSLQ subscales and the overall semester grade are moderate to weak they are all statistically significant except for the "control of learning beliefs" subscale. Stronger correlations were found for variables that are considered to be indicative for a positive adaptation of self-regulated learning strategies and responsible for higher academic performance, like self-efficacy for learning and performance, intrinsic goal orientation, elaboration strategies,

Table 3
Descriptive Statistics, Coefficient H and Correlations with Final Semester Grades for Motivation and Learning Strategies Subscales

Subscales	*M* (*SD*)	Coefficient *H*	*r* with English Course Grade	*r* with Math Course Grade	*r* with Overall Semester Grade	*Pintrich et al. (1993, p.808)*
Self-efficacy for learning and performance	3.61 (.53)	.86	.11**	.04	.14**	.41**
Control of learning beliefs	3.78 (.55)	.62	.04	.04	.06	.13**
Intrinsic goal orientation	3.74 (.52)	.58	.14**	-.01	.16**	.25**
Extrinsic goal orientation	3.89 (.67)	.70	.05	.06*	.06*	.02
Rehearsal	3.65 (.58)	.68	.05	.08*	.07*	.05
Elaboration strategies	3.59 (.48)	.77	.11**	.05	.14**	.22**
Organization strategies	3.58 (.55)	.67	.08**	.04	.10**	.17**
Critical thinking	3.51 (.50)	.73	.11**	.03	.12**	.15**
Metacognitive self-regulation	3.48 (.39)	.79	.13**	-.02	.17**	.30**
Time and study environment management	3.49 (.45)	.71	.11**	.01*	.16**	.28**
Effort regulation	3.57 (.58)	.61	.13**	-.01	.19**	.32**
Peer learning	3.51 (.50)	.52	.07*	-.02	.08**	-.06
Help seeking	3.65 (.50)	.62	.12**	.01	.14**	.02

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

metacognitive self-regulation, time and study environment, and effort regulation. As expected, weaker correlations were found for less positive and less adaptive constructs like extrinsic goal orientation and rehearsal strategies. Similar results were found for the correlations between the MSLQ subscales and the course-specific English grade. Comparable to the findings concerning the overall semester grade, stronger correlations were found for the adaptive constructs and weaker correlations for the less adaptive constructs. Overall, the correlations for the overall course grade and the English grade were non-significantly different. A different outcome could however be observed for the correlations with the Mathematics grade. Most of the correlations were rather weak and non-significant, expect for extrinsic goal orientation and rehearsal. These findings confirm our predictions and are indicative for the application of contextually dependent learning strategies; whereas for the English grade and the overall semester grade positive and more adaptive constructs seems to have a greater influence on academic performance, the opposite is the case for Mathematics. Stronger correlations were found for less adaptive and more "surface"

learning strategies. Considering the findings of the correlational analysis it seems that the MSLQ was not merely able to predict the overall semester grade, but was also able to discriminate between the English and Mathematics grade as a result of different strategy use.

DISCUSSION

The objective of this study was to investigate whether the MSLQ is capable of measuring students' motivational beliefs and self-regulated learning strategies pertaining to the general curriculum level. Until now, the MSLQ has exclusively been used at the course-specific level with a focus on situational factors that may influence student motivation and learning. Our study was based on the assumption that student motivation and learning strategies are not necessarily limited to situational contexts but that students may have fairly stable dispositional self-regulated learning strategies that can be observed at the general curriculum level as well. This assumption was based on findings from previous studies that were conducted at the course-specific level and suggest that students have stable patterns of learning strategies when comparing them across different subject areas (cf. Vermetten et al., 1999; Wolters & Pintrich, 1998). For the purpose of administering the MSLQ at the general curriculum level we slightly modified the wordings of several items and administered the modified MSLQ to 1,166 polytechnic students in Singapore. The data were analyzed using confirmatory factor analysis to test whether the factor structure of the modified MSLQ remains stable when administering it at the general curriculum level. The results revealed a good fit of the motivation and learning strategy models with the data. All factor loadings were significant and contributed to the latent constructs, which is indicative of a good construct validity of the 13 subscales of the instrument. The model fit indices and factor loadings we found in our study are quite similar to the ones found in an earlier study with the course-specific MSLQ (Pintrich et al., 1993). Considering our findings as whole it seems reasonable to conclude that the slightly modified MSLQ is capable of measuring student motivation and learning strategies pertaining to the general curriculum level.

Concerning the predictive validity of the MSLQ for the general curriculum level, the results of the correlational analyses revealed that the instrument is capable of predicting the overall semester grade reasonably well. Although the correlations between MSLQ scores and the final overall semester grade were rather weak, they were all statistically significant (except for the extrinsic goal orientation subscale) and similar to the results found with the course-specific MSLQ (Pintrich et al., 1993). For instance, more positive and adaptive constructs such as self-efficacy for learning and performance, intrinsic goal orientation, elaboration strategies, metacognitive self-regulation, time and study environment management, and effort regulation showed higher correlations with the overall semester grades as compared to negative and less adaptive constructs like extrinsic goal orientation and rehearsal. The majority of correlations we found in our study were non-significantly different from the course-specific findings in the Pintrich et al. study. Significant differences (at the .05 level) were found for the self-efficacy for learning and performance subscale. This difference may be explained by the context-specific nature of the self-efficacy construct. As discussed elsewhere, self-efficacy is considered to be highly context-specific, eliciting students' judgments for a rather narrow and domain-specific filed of expertise (Bong & Skaalvik, 2003; Schunk, 1991). In our study it seems that students had difficulties making these context-specific judgments when asked to respond at the general curriculum level. Future research has to demonstrate whether the broader construct of academic self-concept may be a better construct than self-efficacy when measuring student motivation at the general curriculum level.

Furthermore, the differences in the strengths of correlations between the MSLQ scores and

the English and Mathematics course grades suggest that the modified MSLQ is capable of distinguishing between subject domains that may put different constraints on the application of learning strategies. This context sensitivity seems to be related to the grain-size of the instrument; despite of the fact that the MSLQ was administered at the general curriculum level we were able to pick up variations in correlations between different courses. Although this explanation needs to be tested in further studies, the results presented so far do add to the overall validity of the MSLQ.

Considering the practical implications of our findings, the modified MSLQ can be considered as an alternative instrument to existing SAL-based self-report instruments like the *Approaches to Studying Inventory* (Entwistle & Ramsden, 1983) or the *Study Processes Questionnaire* (Biggs, Kember, & Leung, 2001) in measuring student motivation and learning strategies at the general curriculum level. The advantage of using the modified MSLQ may be its smaller grain-size. As Entwistle and McCune (2004) pointed out in their comparison of SRL and SAL instruments, the subscales of the MSLQ cover a larger number of motivational, cognitive, and study resource management related constructs than most of the SAL instruments. This difference in grain-size may prove beneficial in providing educational researchers with more detailed information about students' self-regulatory capabilities as compared to other SAL instruments.

Finally, it should be noted that some of our explanations need to be explored further with additional research. Whereas our main concern was to determine the construct and predictive validity of the modified MSLQ, further studies should be directed towards a clear identification of what constitute *contextual* and *dispositional* self-regulated learning strategies. Most studies that explored dispositional self-regulatory strategies were limited to research at the course-specific level and used comparisons between correlational variable structures in different subject areas. Our study added to the existing body of research by signifying that dispositional self-regulatory learning strategies can also be observed at the general curriculum level. In order to identify however what accounts for contextual and what for the dispositional factors that influence learning, future studies should consider a combined research approach by simultaneously administering the modified MSLQ and the original, course-specific MSLQ in multiple subject domains. Comparing the results of both questionnaires would enable verification of which of the constructs remain constant in both contexts and thus represent the stable, dispositional aspect of learning. Observed variability in scores would indicate more ad hoc and context-dependent utilizations of self-regulated learning components.

REFERENCES

Arbuckle, J. L. (2003). *AMOS 5.0 Update to the AMOS user's guide*. Chicago: SmallWaters Corp.

Bandalos, D. L., Finney, S. J., & Geske, J. A. (2003). *A model of statistics performance based on achievement goal theory*. *Journal of Educational Psychology, 95*(3), 604-616.

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*(2), 238-246.

Biggs, J. (1987). *Study Process Questionnaire Manual. Student approaches to learning and studying*. Australia: Australian Council for Educational Research Ltd.

Biggs, J. (1993). What do inventories of students' learning process really measure? A theoretical review and clarification. *British Journal of Educational Psychology, 63*(1), 3-19.

Biggs, J., Kember, D., & Leung, D. Y. P. (2001). The revised two factor Study Process Questionnaire: R-SPQ-2F. *British Journal of Educational Psychology, 71*(1), 133-155.

Bong, M. (2004). Academic motivation in self-efficacy, task value, achievement goal orientations, and attributional beliefs. *Journal of Educational Research, 97*(6), 287-298.

Bong, M., & Hocevar, D. (2002). Measuring self-efficacy: Multitrait-multimethod comparison of scaling procedures. *Applied Measurement in Education, 15*(2), 143-172.

Bong, M., & Skaalvik, E. M. (2003). Academic self-concept and self-efficacy: How different are they really? *Educational Psychology Review, 15*(1), 1-40.

Brookhart, S. M., & Durkin, D. T. (2003). Classroom assessment, student motivation, and achievement in high school social studies classes. *Applied Measurement in Education, 16*(1), 27-54.

Byrne, B. M. (2001). *Structural equation modeling with Amos: Basic concepts, applications, and programming*. Mahwah, NJ.: Lawrence Erlbaum Assoc Inc.

Dyne, A., Taylor, P., & Boulton-Lewis, G. (1994). Information processing and the learning context: An analysis from recent perspectives in cognitive psychology. *British Journal of Educational Psychology, 64*(3), 359-372.

Eccles, J. S. (Ed.). (1983). *Expectancies, values, and academic behaviour*. San Francisco: Freeman.

Entwistle, N. J., & McCune, V. (2004). The conceptual bases of Study Strategy Inventories. *Educational Psychology Review, 16*(4), 325-345.

Entwistle, N. J., & Ramsden, P. (1983). *Understanding student learning*. London: Croom Helm.

Entwistle, N. J., & Waterston, S. (1988). Approaches to studying and levels of processing in university students. *British Journal of Educational Psychology, 58*, 258.

Fan, X., Thompson, B., & Wang, L. (1999). Effects of sample size, estimation methods, and model specification on structural equation. *Structural Equation Modeling, 6*(1), 56-83.

Grossman, P., & Stodolsky, S. (1995). Content as context: The role of school subjects in secondary teaching. *Educational Researcher, 24*(8), 5-11.

Hancock, G. R., & Mueller, R. O. (2001). Rethinking construct reliability within latent systems. In R. Cudeck, S. d. Toit & D. Sörbom (Eds.), *Structural equation modeling: Present and future - A Festschrift in honor of Karl Jöreskog* (pp. 195-216). Lincolnwood, IL: Scientific Software International.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1-55.

Lonka, K., Olkinuora, E., & Mäkinen, J. (2004). Aspects and prospects of measuring studying and learning in higher education. *Educational Psychology Review, 16*(4), 301-323.

Mäkinen, J., Olkinuora, E., & Lonka, K. (Eds.). (2002). *Orientations to studying in Finnish higher education. Comparison of study orientations in university and vocational higher education*. Tampere, Finland: Tampere University Press.

Ommundsen, Y. (2003). Implicit theories of ability and self-regulation strategies in physical education classes. *Educational Psychology, 23*(2), 141-157.

Pintrich, P. R. (1988a). A process-oriented view of student motivation and cognition. In J. Stark & L. Mets (Eds.), *Improving teaching and learning through research: New directions for institutional research* (Vol. 57, pp. 65-79). San Francisco: Jossy-Bass.

Pintrich, P. R. (1988b). Student learning and college teaching. In R. E. Young & K. E. Eble (Eds.), *College teaching and learning: Preparing for new commitments. New directions for teaching and learning* (Vol. 33, pp. 71-86). San Francisco: Jossey-Bass.

Pintrich, P. R. (1989). The dynamic interplay of student motivation and cognition in the college classroom. *Advances in Motivation and Achievement, 6*, 117-160.

Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 451-502). San Diego, CA: Academic Press.

Pintrich, P. R. (2004). A conceptual framework for assessing motivation and self-regulated

learning in college students. *Educational Psychology Review, 16*(4), 385-407.

Pintrich, P. R., Simith, D., Garcia, T., & McKeachie, W. J. (1993). Reliability and predictive validity of the Motivated Strategies for Learning Questionnaire (MSLQ). *Educational and Psychological Measurement, 53*(3), 801.

Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1991). *A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ)*. Ann Arbor, MI: National Center for Research to Improve Postsecondary Teaching and Learning.

Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educational Psychologist 26*(3), 207-231.

Seibert, D. C. (2002). Effects of engagement principles in a video teleconferencing environment on the development of knowledge, motivation and clinical expertise. *Dissertation Abstract International 63*(6), 2136.

Stodolsky, S., & Grossman, P. (1995). The impact of subject matter on curricular activity: An analysis of five academic subjects. *American Education Research Journal, 32*(2), 227-249.

Trigwell, K., & Prosser, M. (2004). Development and use of the Approaches to Teaching Inventory. *Educational Psychology Review, 16*(4), 409.

Vermetten, Y. J., Lodewijks, H. G., & Vermunt, J. D. (1999). Consistency and variability of learning strategies in different university courses. *Higher Education, 37*(1), 1-21.

Vermunt, J. D. (1998). The regulation of constructive learning processes. *British Journal of Educational Psychology, 68*(2), 149-172.

Wigfield, A. (1994). Expectancy-value theory of achievement motivation: A developmental perspective. *Educational Psychology Review, 6*(1), 49-77.

Wigfield, A., & Eccles, J. S. (1992). The development of achievement task values: A theoretical analyses. *Developmental Review, 12*(3), 165-310.

Wolters, C. A., & Pintrich, P. R. (1998). Contextual differences in student motivation and self-regulated learning in mathematics, English, and social studies classrooms. *Instructional Sciences, 26*(1-2), 27-47.

Zusho, A., Pintrich, P. R., & Coppola, B. (2003). Skill and will: The role of motivation and cognition in the learning of college chemistry. *International Journal of Science Education, 25*(9), 1081-1094.