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An In-Depth Analysis of the Learning and Study Strategies Inventory (LASSI)

Francisco Cano
University of Granada

This study explores the latent structure of scores on the Learning and Study Strategies Inventory (LASSI) and analyzes the relationship between this structure and students’ academic performance. Two independent samples of college freshmen (n = 527) and seniors (n = 429) completed the LASSI. Data analysis of the first sample revealed acceptable psychometric properties and suggested a three-factor model, which was supported by a confirmatory analysis of the second sample data. The three latent constructs, labeled Affective Strategies, Goal Strategies, and Comprehension Monitoring Strategies, were shown to be interrelated, and the first two were positively linked to academic performance. The usefulness and rationale of the latent structure of the LASSI and the potential use of its scales are discussed.

Keywords: LASSI; learning strategies; latent factor structure; academic performance

The Learning and Study Strategies Inventory (LASSI) is a self-report instrument to assess learning strategies, which is based both on a general model of learning and cognition (Simon, 1979) and on a model of strategic learning (Weinstein, 1994). The former is derived from cognitive psychology and is focused on students as active, self-determined individuals who process information and construct knowledge. The latter also has the learner at its core, and around this core are three interactive components that explain successful learning: skill, will, and self-regulation.

Learning strategies are “any thoughts, behaviors, beliefs or emotions that facilitate the acquisition, understanding or later transfer of new knowledge and skills” (Weinstein, Husman, & Dierking, 2000, p. 727). An early taxonomy of learning strategies was delineated by Weinstein and Mayer (1986), who differentiated between strategies that operate directly on information (rehearsal, elaboration, and organization) and strategies that provide affective and metacognitive support for learning (affective control strategies, and comprehension monitoring strategies).
The LASSI (Weinstein, Schulte, & Palmer, 1987) purports to assess high school and college students in 10 areas (subscales), which, as is suggested in the users’ manual, include the three components of strategic learning. Although the LASSI has been used widely in the evaluation of learning strategies (Weinstein, 1994) and has been applied in a variety of research projects (Tallent-Runnels et al., 1994; Weinstein et al., 2000), “it is one of the most . . . understudied measures of learning and study processes” (Murphy & Alexander, 1998, p. 509), and very little is known about its psychometric properties. In addition to this limitation, concerns have been raised by various researchers regarding both the 10 subscales and the latent constructs assessed by the LASSI (Melancon, 2002; Murphy & Alexander, 1998). This study sets out to address these limitations and to improve both our understanding and possible uses of this inventory.

First of all, it is worth remembering how the LASSI was created, as the concerns of some researchers about this instrument (e.g., items’ factor structure) appear to derive from a misunderstanding of how it was designed and developed. The items it contains were selected using a functional approach (Swenson, 1977) closely related to students’ learning methods (which may affect their learning outcomes) rather than using a traditional correlational approach in which items are selected because of correlations with learning and achievement but do not yield information about how the students learn. As Weinstein, Zimmerman, and Palmer (1988) recognized, “a team of experts . . . grouped the items according to a particular theme or factor. This process was repeated several times. Refinements were made in the groupings using the coefficient alphas” (p. 34). In the users’ manual, these authors reported Cronbach’s alphas ranging from .86 to .68. A controversial topic amongst psychometricians is whether the magnitude of these estimates of reliability is adequate. Recently, Henson (2001) provided an integrative framework for understanding the meaning, assumptions, and proper use of coefficient alpha and a review of its generally accepted magnitudes. A value of .68 may be rather low. However, two issues should be borne in mind. First, coefficient alpha is a function of the number of items, average items correlations, and dimensionality. Second, as several researchers (Cortina, 1993; Henson, 2001) have agreed, alpha should be interpreted with some caution, taking the context into consideration. Thus, Henson affirmed that the adequacy of “the exact magnitude of the estimate will vary depending on the purposes of the research and uses of the scores” (p. 181).

Since Weinstein’s first studies, only five representative and well-designed research projects have focused on the psychometric analysis of the LASSI. Two of these used high school students as participants (Murphy & Alexander, 1998; Olivárez & Tallent-Runnels, 1994), and three (on which we will focus) used college students (Melancon, 2002; Olaussen & Braten, 1998; Olejnick & Nist, 1992). Olejnick and Nist (1992) used the LASSI on two separate samples of American first-year college students enrolled in the first (n = 264) and last quarters (n = 143) of a developmental studies program where the previous grade point average was very high. Data from the first sample were used for computing exploratory factor analysis.
and reliability estimates, as well as to identify the latent model measured by the inventory. This model was cross-validated using the data provided by the second sample.

The principal component analysis of the subscale scores indicated three distinct factors. The first factor had high pattern coefficients on Motivation, Time Management, and Concentration. The second factor comprised Information Processing, Study Aids, and Self-Testing scales. The third factor consisted of Anxiety, Selecting Main Ideas, and Test Strategies scales. In this model, three scales had pattern coefficients on more than one factor: Main Idea (Factors 2 and 3), Concentration (Factors 1 and 3), and Attitude (all three factors).

The three factors of the above structure, labeled by the authors as values-related activities, goal orientation, and cognitive activities, respectively, were tested in a confirmatory analysis that provided adequate fit statistics. These constructs or latent variables were interrelated, but not in the same way. Although effort-related and cognitive activities proved significantly interrelated, goal orientation had “a much weaker association with both effort-related and cognitive activities” (Olejnick & Nist, 1992, p. 158). Interpreting the results, the researchers suggested that the three latent variables might be similar to three constructs suggested by Rohwer and Thomas (1987) in their learning model for adults (selective allocation activities, processing activities, and cognitive activities). Moreover, they raised an interesting question not answered in their study, nor yet investigated and published: What are the links between these constructs and learning?

Olaussen and Braten (1998) selected two samples of high-achieving Norwegian college students from the Faculty of Education in their first and second years \((n = 173\) and \(n = 176\), respectively), to whom they administered the LASSI. The exploratory factor analyses of subscale scores revealed a similar factor structure to that detected by Olejnick and Nist (1992), the only difference being that Attitude in their study showed consistently low pattern coefficients on all three factors. Moreover, the factor solution for second-year students was the same as that detected by Olivárez and Tallent-Runnels (1994) using high school students as participants. The two samples of Norwegian students produced a fairly similar three-factor solution, distinguished only by the consistently high pattern coefficients on Factors 1 and 2 of the Concentration scale for the second-year sample. The three factors were labeled Effort-Related Activities, Goal Orientation, and Cognitive Activities. In this model, as in Olejnick and Nist’s model, three scales had pattern coefficients on more than one factor: Concentration (Factors 1 and 2), Selecting Main Ideas (Factors 2 and 3), and Attitude (Factors 1 and 2). In addition, Information Processing had pattern coefficients on Factors 2 and 3, and Test Strategies had pattern coefficients on Factors 1 and 2. The confirmatory factor analysis of this latent structure as well as the testing of it according to models suggested by American researchers supported the proposed three-factor measurement model for the LASSI. However, this model differs from previous ones in two main aspects. First, only Effort-Related Activities and Cognitive Activities are positively interrelated, whereas in the American models, Goal Orientation and the other two latent variables are also positively associated. Second, it appears to be
more complex, because each manifest variable is allowed to serve as an indicator for more than one latent variable.

Melancon (2002) carried out a factor analysis of responses to the items (not subscales) of the LASSI and identified 18 factors with eigenvalues greater than 1.0. She concluded that “results suggest that the LASSI does not measure the 10 scales described in the manual” (p. 1026). However, although this inference is possible in terms of logic, it seems implausible because, as was mentioned above, Weinstein et al. (1988) admitted they used experts, but no factor analysis, for item selection and subscale development. As some researchers have pointed out, “reliance on factor analysis alone to validate scales of this type is not justifiable; it is equally important to maintain the conceptual clarity of the group of items” (Entwistle, Meyer, & Tait, 1991, p. 257).

The results provided by the literature seem to suggest two conclusions with regard to the latent model measured by the LASSI. First, more than one indicator is needed for each latent factor. Second, a three-factor (oblique) solution might be the most suitable. Taking into account the common results obtained by Olejnick and Nist (1992) and Olaussen and Braten (1998) in their research, these factors could be defined using the following scales: Time Management, Motivation, and Concentration (Factor 1); Anxiety, Selecting Main Ideas, and Test Strategies (Factor 2); and Information Processing, Study Aids, and Self-Testing (Factor 3). In this model, two other scales would also have pattern coefficients on more than one factor: Attitude (Factors 1 and 2) and Selecting Main Ideas (Factors 2 and 3). In Olaussen and Braten’s research, four additional scales emerged that might also have pattern coefficients on more than one factor (Test Strategies and Self-testing on Factor 1 and Concentration and Information Processing on Factor 2). Although these did not appear in Olejnick and Nist’s study, they are included in the present study.

The above-mentioned studies have provided some psychometric information about LASSI scores, but they share several limitations. First, the participants were few in number, high achievers, and enrolled only in 1st- and second-year college psychology programs. Second, very little research was done on the association between the latent constructs measured by the LASSI and learning. The purpose of the present research, therefore, is twofold: first, to determine whether the LASSI psychometric properties and latent structure can be generalized over a large sample of participants with a range of academic performance levels and enrolled in a wide diversity of college study programs and years, and second, to analyze the relationship between students’ academic performance and the latent constructs of the LASSI.

**Method**

**Participants**

The data presented were gathered from two independent samples of college students from 10 faculties, including chemistry, physics, medicine, architecture
(sciences); psychology, education, and law (social sciences); and history, translation/interpreting, and linguistics (arts); from the University of Granada (Spain). The first sample comprised 527 first-year students (221 men, 306 women; age $M = 18.91, SD = 1.24$). The second sample comprised 429 final-year students (188 men and 241 women; age $M = 22.37, SD = 1.29$).

**Instruments**

The LASSI (Weinstein et al., 1987), college version, consisted of 77 items divided into 10 scales representing the three components of strategic learning. These scales and their corresponding internal consistency coefficients (Cronbach’s alphas), reported in the users’ manual, are as follows: Information Processing ($\alpha = .83$), Selecting Main Ideas ($\alpha = .74$), and Test Strategies ($\alpha = .83$) (skill component); Attitude ($\alpha = .72$), Anxiety (all items are reverse scored) ($\alpha = .81$), and Motivation ($\alpha = .81$.) (will component); and Self-Testing ($\alpha = .75$), Concentration ($\alpha = .84$), Time Management ($\alpha = .86$), and Study Aids ($\alpha = .68$) (self-regulation component). Students gave responses on a Likert-type scale, from 1 (*not at all like me*) to 5 (*very much like me*).

**Procedure**

During class time, students received information about the research, instructions for participating, and assurances regarding the confidentiality of all data collected. Their participation was entirely voluntary, and none refused to answer the questionnaire. They also gave their name, age and sex. At the end of the academic year, students’ grades for all subjects were noted, along with the mean of these values or average mark ($M = 1.60; SD = 0.82$; maximum = 4.00; minimum = 0.05; range = 3.94).

**Results**

**LASSI Psychometric Properties and Latent Structure**

The results of the descriptive and internal consistency analyses for each of the 10 scales, as well as its correlation matrix for first- and last-year samples, are presented in Table 1.

To ascertain the factor structure of the LASSI, the correlations between its sub-scales for the first-year sample were subjected to a principal component analysis with oblique direct oblimin and delta (\(\delta\)) set at zero. This kind of rotation is “more desirable because it is theoretically and empirically more realistic” (Hair, Anderson, & Tatham, 1987, p. 245). Following the recommendations of some authors (Fan & Thompson, 2001; Henson, Capraro, & Capraro, 2004; Thompson & Daniel, 1996), I am replacing the rather vague term *loading* with the more specific *pattern coefficient* or *structure coefficient* (according to the type of matrix) and employing the most
widely used rules of factor extraction (Kaiser-Gutman rule of 1.0 as the minimum eigenvalue, and Catell’s scree test) in conjunction with more sophisticated rules (parallel analysis and Velicer’s minimum average partial test) (O’Connor, 2000).

The analysis and the rules mentioned above yielded a three-factor solution accounting for 66.24% of the variance before rotation: Factor 1, Affective Strategies (35.57%); Factor 2, Goal Strategies (18.08%); and Factor 3, Comprehension Monitoring Strategies (12.58%).

Because an oblique rotation was carried out, the factor pattern and the factor structure matrices were not necessarily identical; therefore, both the pattern coefficients (which indicate the unique contribution of each variable to each factor) and the structure coefficients (which indicate the bivariate correlations between each factored variable and each latent factor) were reported following the guidelines of Henson et al. (2004).

The first factor comprised four scales: Time Management, Motivation, Concentration, and Attitude. The latter two also had low pattern coefficients on Factor 2, which consisted of Test Strategies, Anxiety, and Attitude. The third factor had high pattern coefficients on three scales: Information Processing, Study Aids, and Self-Testing.

Table 1

<table>
<thead>
<tr>
<th>ATT</th>
<th>MOT</th>
<th>TMT</th>
<th>ANX</th>
<th>CON</th>
<th>INP</th>
<th>SMI</th>
<th>STA</th>
<th>SFT</th>
<th>TST</th>
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<tr>
<td>MOT</td>
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<td>.72a</td>
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<td>.558</td>
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<td>.84a</td>
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<td>.019</td>
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<td>.73b</td>
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<td>.292</td>
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<td>.158</td>
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<td>.433</td>
<td>.275</td>
<td>.66a</td>
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<td>.190</td>
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<tr>
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<td>.282</td>
<td>.344</td>
<td>.166</td>
<td>.420</td>
<td>.63a</td>
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<tr>
<td>TST</td>
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<td>.399</td>
<td>.498</td>
<td>.123</td>
<td>.573</td>
<td>-.042</td>
<td>.031</td>
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</table>

Meana 31.5 25.9 24.2 23.7 26.7 27.4 19.2 24.1 23.1 30.7
SDa 4.1 5.2 6.5 5.8 5.7 5.3 3.0 5.0 4.7 4.6

Meanb 31.6 25.9 24.2 23.7 26.5 27.5 19.3 24.3 23.3 30.8
SDb 3.8 4.9 6.3 6.5 5.4 4.8 3.0 5.0 4.8 4.7

Note: a and b superscripts refer to statistics for first- and last-year samples, respectively. Statistics shown on the main diagonal are internal consistency estimates using Cronbach’s alpha. ATT = Attitude; MOT = Motivation; TMT = Time Management; ANX = Anxiety; CON = Concentration; INP = Information Processing; SMI = Selecting Main Ideas; STA = Study Aids; SFT = Self-Testing; TST = Test Strategies.
Table 2

Three-Factor Solution (Factor Pattern and Structure Matrices) for the 10 Scales of the Learning and Study Strategies Inventory (LASSI) for the Sample of First-Year Students (Separately, by Faculties, and Grouped)

<table>
<thead>
<tr>
<th>Scale</th>
<th>Pattern</th>
<th>Inter-FC.</th>
<th>Eigen.</th>
<th>Eigen. NR</th>
<th>% Var.</th>
</tr>
</thead>
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<td></td>
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<td>F2</td>
<td>F3</td>
<td>F1</td>
<td>F2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
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<td>–.06</td>
<td>.91</td>
<td>–.06</td>
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<td>.85</td>
<td>.07</td>
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<td>.59</td>
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<td>–.07</td>
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<td>.55</td>
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<td>.77</td>
<td>.00</td>
<td>.03</td>
<td>.87</td>
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<td>.35</td>
<td>.02</td>
<td>.65</td>
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<td>–.20</td>
<td>.63</td>
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<td>–.25</td>
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<tr>
<td>STA</td>
<td>.10</td>
<td>–.13</td>
<td>.72</td>
<td>.24</td>
<td>–.09</td>
</tr>
</tbody>
</table>

Grouped (N = 527) Separately

Sciences (n = 193) Social Sciences (n = 167) Arts (n = 167)

Eigen. NR

1.00 1.00 1.00

% Var.

35.57 18.08 12.58 35.43 19.44 12.43 36.96 18.43 12.68 35.85 18.08 13.07

(continued)
Table 2 (continued)

<table>
<thead>
<tr>
<th>Scale</th>
<th>Grouped (N = 527)</th>
<th>Sciences (n = 193)</th>
<th>Social Sciences (n = 167)</th>
<th>Arts (n = 167)</th>
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<td>.10</td>
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</tr>
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<tr>
<td>Trace</td>
<td>2.68</td>
<td>2.09</td>
<td>1.62</td>
<td>2.67</td>
</tr>
</tbody>
</table>

Note: Numbers appear in bold to draw attention to the loadings that define the factors in the grouped faculties and to facilitate comparison with the loadings that emerged in the other faculties. Inter-FC. = Interfactor correlations; Eigen. = eigenvalues prerotation; Eigen. NR = eigenvalue for the first factor not retained; % Var. = variance explained by the factor; TMT = Time Management; MOT = Motivation; CON = Concentration; ATT = Attitude; ANX = Anxiety; TST = Test Strategies; SMI = Selecting Main Ideas; INP = Information Processing; SFT = Self-Testing; STA = Study Aids; Trace = transformed eigenvalues (postrotation).
the latter having moderate pattern coefficients on Factor 1. The first and second factors were those which related most strongly to one another, whereas the third factor’s relation to the other two was weaker.

To test whether similar factors emerge for students from different groups of faculties, the same method and rules of extraction as employed previously were used for the scale scores of each group. A careful inspection of the pattern coefficients in Table 2 revealed that the number of factors was identical for each of the three groups of faculties, the scales with high pattern and high structure coefficients on the different factors were almost the same, and the same labels can be used to name factors for the three groups. Therefore, it seemed unnecessary to use statistical comparisons to infer that the factor solution appears to be quite stable across groups.

As the measurement model identified through factor extraction only provided an indirect test of the theoretical model, confirmatory factor analysis (CFA) was carried out using the correlation matrix for the last-year sample. The use of CFA as a model testing procedure to develop and validate the factor structure of an existing instrument is favoured in recent literature (Burnett & Dart, 1997; Henson et al., 2004). The model seemed to fit the data reasonably well, $\chi^2 (26) = 96.67; p < .01$; goodness-of-fit index (GFI) = .96; adjusted goodness-of-fit index (AGFI) = .91; root mean square residual (RMR) = .04; comparative fit index (CFI) = .95; and although two modification indices were suggested by the program to be included in Factor 3, its values were not unduly high (Time Management = 25.11; Motivation = 22.88); consequently, no modification was made to the model.

Figure 1 depicts the three-factor measurement model for the last-year sample, the interrelationships between the three constructs, and the relations between these constructs and manifest or observed variables for the LASSI scales.

The values in Figure 1 are standardized maximum likelihood estimates, and the values in parentheses are standard errors. All the estimated parameters had $t$ values greater than 4.45, with the exception of the links between Test Strategies (TST) and the first construct, and Information Processing (INP) and the second construct, which equalled 3.94 and 2.74, respectively. However, they were all statistically significant, because $t$ values greater than 2.0 are generally judged to differ from 0 (Jöreskog & Sörbom, 1996). Furthermore, the structure coefficients for the error terms were generally modest, suggesting that the manifest variables were good indicators of the three constructs, which were labeled Affective Strategies, Goal Strategies, and Comprehension Monitoring Strategies. These constructs were interlinked, but in different ways. Whereas the first was positively correlated with the second and third, the second was negatively correlated with the third.

Although the suggested model fits the data well, this does not “prove” its validity because alternative models may fit the same data. As Thompson and Daniel (1996) indicated, “Testing multiple plausible models does yield stronger evidence regarding validity” (p. 204). With this in mind, we followed Kelloway’s (1998) guidelines and obtained two alternative models by restricting all interfactor correlations to a value of 1 (i.e., a
unidimensional model) and 0 (i.e., a model containing orthogonal factors). Whereas the unidimensional or one-factor model did not converge, the three-factor orthogonal model did, $\chi^2(2) = 104.73, p < .01; \text{GFI} = .94; \text{AGFI} = .89; \text{RMR} = .098$. Because these estimated models stood in a nested sequence, it was possible to compare them, using the $\chi^2$ difference test. Although the result of this test was not statistically significant,
\( \chi^2_{(3)} = 6.83, p > .10 \), it should be noted that the fit indices all converge in suggesting that our hypothesized three-factor (oblique) model provided a better level of fit to the data than did the three-factor (orthogonal) model, although the correlations among the factors are not large.

**Latent Constructs and Academic Performance**

Our next step was to ascertain possible relationships among the above-mentioned latent constructs (as independent variables [IVs]) and academic performance (as the dependent variable [DV]). These latent constructs consisted of standardized factor scores estimated differently for first- and last-year samples. For the former, the standard scores for the original variables were multiplied by the factor score coefficients obtained in the LASSI principal component analysis. For the latter, a more elaborate mathematical procedure was carried out, based on the correlation between variables, the correlation between factors, and the factor pattern matrix. Explanations of how to compute these scores have been provided by various authors (see Jöreskog, 2000; Mason & Tu, 1995) and programs that do so have also been described (Mason & Tu, 1995; Mels, 2004).

Once the standardized estimates of the factor scores had been obtained, two standard multiple regression analyses were carried out to analyze the relationships between these IVs and the DV, one for the first-year sample, and the other for the last-year sample. Table 3 contains the results of these two analyses.

With statistically significant beta weights, Affective Strategies and Goal Strategies contribute to the regression equation in both samples, but Comprehension Monitoring Strategies do not. Although the bivariate correlations of Comprehension Monitoring Strategies with the criterion were statistically significant in the first-year sample \( (r = .09, p = .02) \) and in the last-year sample \( (r = .10, p = .01) \), this latent construct (Comprehension Monitoring Strategies) does not contribute to a statistically significant degree to the prediction of academic performance.

**Discussion**

This study constitutes the first investigation in which the LASSI has been administered to a large and representative sample of students taking first- and last-year courses in the varied contexts of different groups of faculties. The results suggest that the LASSI assesses three latent constructs and that these constructs are generally associated with academic performance.

**LASSI Psychometric Properties and Latent Structure**

The results in terms of reliability and principal component analysis of the sub-scale scores in the LASSI for both first- and last-year samples appear to bear out the
findings of Olejnick and Nist (1992) and Olaussen and Braten (1998). That is, the subscales had similar internal consistency coefficients and were combined in a similar, though somewhat less simple, three-factor solution.

The proposed three-factor measurement model was cross-validated with the last-year sample, using CFAs. Although the interfactor correlations were low (the factor pattern and factor structure coefficients were very similar), the fit indices all converged in suggesting that the proposed three-factor (oblique) model provided a better level of fit to the data than did an alternative three-factor orthogonal model. The first latent construct (Affective Strategies) basically included affective and support learning strategies, whereas the second (Goal Strategies) and the third (Comprehension Monitoring Strategies) included a mixture of strategies to both interact directly with the learning material and provide metacognitive and affective support for learning—that is, both

### Table 3

<table>
<thead>
<tr>
<th>Selected Sample</th>
<th>Latent Constructs (Strategies)</th>
<th>DV</th>
<th>1</th>
<th>2</th>
<th>b</th>
<th>β</th>
<th>t</th>
<th>p</th>
<th>Sr^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Affective</td>
<td></td>
<td>.26</td>
<td>.22</td>
<td></td>
<td>.17</td>
<td>.17</td>
<td>5.15</td>
<td>&lt;.001</td>
<td>.048</td>
</tr>
<tr>
<td>2. Goal</td>
<td></td>
<td>.24</td>
<td>.21</td>
<td></td>
<td>.16</td>
<td>.16</td>
<td>4.96</td>
<td>&lt;.001</td>
<td>.045</td>
</tr>
<tr>
<td>3. Comprehensive Monitoring</td>
<td></td>
<td>.09</td>
<td>.25</td>
<td>.02</td>
<td>.02</td>
<td>.02</td>
<td>0.66</td>
<td>.510</td>
<td>.001</td>
</tr>
</tbody>
</table>

R^2 = .1115; adjusted R^2 = .1064; R = .3340; p < .001

<table>
<thead>
<tr>
<th>Last-year</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Affective</td>
<td></td>
<td>.39</td>
<td>.31</td>
<td></td>
<td>.25</td>
<td>.25</td>
<td>6.47</td>
<td>&lt;.001</td>
<td>.090</td>
</tr>
<tr>
<td>2. Goal</td>
<td></td>
<td>.28</td>
<td>.20</td>
<td></td>
<td>.16</td>
<td>.16</td>
<td>4.28</td>
<td>&lt;.001</td>
<td>.041</td>
</tr>
<tr>
<td>3. Comprehensive Monitoring</td>
<td></td>
<td>.10</td>
<td>.24</td>
<td>-.15</td>
<td>.05</td>
<td>.05</td>
<td>1.36</td>
<td>.173</td>
<td>.004</td>
</tr>
</tbody>
</table>

R^2 = .1870; adjusted R^2 = .1820; R = .4330; p < .001

Note: LASSI = Learning and Study Strategies Inventory; IVs = independent variables; DV = dependent variable; Sr^2 = squared semipartial correlation. For the first-year sample, unique variability was .0940 and shared variability was .0175; whereas for the last-year sample, the corresponding results were .1359 and .0511. Sr^2 for an IV expresses its unique contribution to the total variance of the DV (the amount by which R^2 is reduced if this IV is deleted from the regression equation). Unique variability is the total sum of the Sr^2 of each IV. Shared variability is the difference between R^2 and unique variance and represents variance that the IVs jointly contribute to R^2.
processing activities and cognitive monitoring activities, in the terms used by Rohwer and Thomas (1987). Moreover, the skill, will, and self-regulated components of strategic learning did not appear as independent constructs but merged.

Two likely issues arise from these findings. First of all, Weinstein’s belief that LASSI subscales reflect the three components of strategic learning becomes questionable from a statistical viewpoint. Researchers’ intuitions and experts’ opinions do not always conform to the results of statistical techniques. Second, there is only partial support for both Olejnick and Nist’s (1992) hypothesis that LASSI latent variables clearly reflect the three constructs of the learning model suggested by Rohwer and Thomas (1987) and for Olaussen and Braten’s (1998) opinion that these latent constructs “represent important components of learning and studying” (p. 95). This might be attributed to two interrelated facts: the complexity of the estimated parameters (a minimum of four indicators is provided for each latent factor) and the noteworthy diversity of our sample (which included numerous first- and last-year students with a wide variety of academic performance levels, who were enrolled on programs in 10 different faculties). In both these aspects, diversity was greater in our study than in previous ones (Olaussen & Braten, 1998; Olejnik & Nist, 1992).

The above-mentioned diversity could also have influenced the complex interrelationship between the three LASSI latent constructs. These results are consistent with those of Olaussen and Braten (1998) in that while Affective Strategies are positively associated with Cognitive Monitoring Strategies, these are, in their turn, negatively linked to Goal Strategies. Where my results differ from those of Olaussen and Braten is in the positive relationship between Affective Strategies and Goal Orientation, these being only weakly related to each other, as Olejnik and Nist (1992) pointed out. It might be that besides the above-mentioned diversity, the Goal Strategies include not only mastery but also performance achievement goals, which are, in the main, negatively associated with deep processing (Elliot & McGregor, 2001; represented by the Information Processing subscale and included in the Cognitive Monitoring construct). This could offer an explanation of the results obtained.

These data about the complexity of latent constructs measured by the LASSI together with data showing how the instrument was developed (Weinstein et al., 1988) pose an interesting question for future consideration: What is the theoretical rationale, and the practical advantage, of continuing to analyze LASSI latent constructs and using them in place of individual subscales? More information is needed on the multiple components of learning and studying and on how to optimize the value of the LASSI by trying to balance conceptual clarity with the results of statistical techniques. In addition, it would be advisable to examine the possibility of responses associated with negatively worded items being biased, as Samuelstuen (2003) suggested.

Latent Constructs and Academic Performance

Multiple regression analyses revealed that although the first two latent constructs assessed by the LASSI, Affective Strategies and Goal Strategies, were statistically
significant predictors of students’ academic performance in both samples, the third latent construct, Cognitive Monitoring Strategies, was not. Although the bivariate correlation between this latent construct and academic performance (DV) was positive and statistically significant in both first- and last-year samples, Cognitive Monitoring Strategies was the worst predictor and its standardized weights did not contribute to a statistically significant degree to the regression. Moreover, its unique contribution to the total variance of the DV was minimal. It seems therefore, that the relationship between this latent construct and the DV is either mediated by, or irrelevant to, the relationships between the DV and other IVs in the set. Working with effort (Affective Strategies) and coping with anxiety and examinations (Goal Strategies) appear to succeed for first- and last-year students, but self-regulation and control (Comprehension Monitoring Strategies) do not.

One would assume that, at tertiary level, students will be competent, self-regulated, and active individuals deploying deep approaches to learning (Kember, 2000). Unfortunately, the reverse may be perfectly normal (Biggs, 1987; Biggs & Moore, 1993; Kember, 2000; Peverly, Brobst, Graham, & Shaw, 2003; Watkins & Hattie, 1985). Students learn to navigate the choppy waters of the curriculum and experience the “institutionalization of learning . . . whereby (they) tend to pick up the tricks that get you by” (Biggs, 2001, p. 91). Numerous researchers have demonstrated that learning motives and learning strategies may be influenced by features of the learning context, such as course contents or assessment (Entwistle, McCune, & Walker, 2001; Entwistle & Ramsden, 1983; Gow & Kember, 1990). Students at the tertiary level tend to use surface learning approaches (i.e., they tend to be extrinsically motivated and to use rote learning strategies) because they are adapting to the new institutional demands (e.g., heavy curriculum, work pressures, assessment procedures; Biggs, 1987; Gow & Kember, 1990; Kember, 2000).

Students’ scores on the LASSI, therefore, may be used to reflect the quality of students’ reactions to the demands of the educational system in general, and of educational interventions in particular, helping to ensure and enhance the quality of teaching and learning. However, as was suggested above, the current use of latent constructs might not be based on a sound conceptual or theoretical framework.

In a nutshell, the findings of the present research lend support to the wide applicability of the LASSI psychometric properties to a large and diverse sample of participants and provide evidence that it is a complex measurement tool that assesses three interrelated, but somewhat vague, latent constructs, two of which are linked to a statistically significant degree with academic performance. Furthermore, these findings suggest that additional research is needed on the rationale of the LASSI, by trying both to integrate the theoretical framework and the results of statistical techniques, and to explore the potential use of its subscales as a research instrument as well as an evaluation tool, thus moving beyond its simple diagnostic and prescriptive uses.
References


