Using the Learning and Study Strategies Inventory Scores as Additional Predictors of Student Academic Performance

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This study focuses on the usefulness of the Learning and Study Strategies Inventory (LASSI) in predicting student academic performance. It examines whether LASSI scores enhance the accuracy of traditional predictors, namely SAT/ACT scores and high school rank. Findings indicated a slight, but not significant, increase in the predictability of student academic performance when LASSI scores, particularly the subscales of Motivation and Time Management, were considered along with traditional predictors.

Introduction

For professionals working in higher education, the question of which students will persist is ever present. Numerous studies have been conducted to predict college students' academic performances. The most commonly used predictors have been and remain the College Board Scholastic Aptitude Tests (SAT), the American College Testing (ACT) exams, and high school (HS) class rank.

Although traditional predictors such as SAT/ACT scores and HS rank are of value, prediction for success could be more focused and intervention strategies could be more accurately placed if more were known about preadmitted students. Because college students are complex and impacted by many variables, complete prediction of success can never occur. Yet, educators still want to understand as much as possible about prediction, success, and retention factors. This study explored whether the Learning and Study Strategies Inventory (LASSI) (Weinstein & Palmer, 1990a), when used as an additional factor to standard predictors, contributes to the forecast of student achievement. As part of the study, the LASSI subscales were analyzed to examine if any of them are more predictive of academic performance, as measured by grade-point average (GPA), than others.

SAT and ACT scores have been used as selection criteria and for predicting college student academic achievement for more than four decades. These scores, as well as HS class rank, of admitted students are also used to summarize the academic quality of existing colleges. Research on student academic performance consistently finds that those who score high on the SAT or ACT or have a superior HS rank are more likely to be successful in college than lower scoring or ranked students (Mortenson, 1995). The College Board Validity Study Service (1988) has conducted several studies examining predictive validity and has concluded that ". . . on the average, nationwide, the best single predictor of academic performance in the freshman year is HS record. Running a close second are SAT scores. Better than either alone is a combination of the two" (p. 1). However, the Dartmouth College (1990) contradicts the above finding and reports that SAT and ACT scores were generally better predictors of freshman year performance than HS grades. Data published by *U.S. News and World Report* (Elfin & Wright, 1994) in their annual report on "America's Best Colleges" were analyzed and Institutional Graduation Rates (IGRs) for 188 national universities were plotted against the mean/median SAT scores reported for the same institutions. The correlation between SAT and IGR was 0.80 for cited universities (Mortenson, 1995). A cursory review of the *U.S. News and World Report ratings* (Elfin & Wright, 1994) shows that top-rated colleges and universities have high IGRs and students with high SAT scores.

A study by the College Entrance Examination Board (1989) examined the validity of admission criteria and found that SAT scores were strongly correlated with freshman GPA. While the zero-order correlation between the SAT verbal scale and freshman GPA was 0.36 and between SAT Math and freshman GPA it was 0.35, the multiple correlation was 0.42 for the combined SAT and freshman GPA. Noble (1991) supported the use of ACT scores with other variables, such as HS grades, for predicting freshman GPA.

Studies have also been done using the LASSI to predict academic performance. Nist (1990) measured cognitive and affective growth with the LASSI by examining regularly admitted and

developmental students who matriculated in the fall of 1988. The study showed that both cognitive and affective growth occurred for each group. Normandin (1993) employed the LASSI to assess study skills of entering students. Each student was provided with immediate feedback and students with low study skills scores were provided with prescribed support services including a developmental course, academic skill building class, tutoring, and counseling. The retention rate was 80% for the study year, 74% for the previous year, and 75% for the year following the study. Arthur (1994) compared pre-LASSI scores and post-LASSI scores of students who participated in Educational Psychology (EDPSY) 100 (Study Skills for College Students) to those who did not participate in the course. She concluded that while the non-EDPSY 100 students' pre-LASSI scores were significantly higher than the EDPSY 100 students' pre-LASSI scores on 9 of the 10 subscales, the post-LASSI scores for both groups were not significantly different on 8 of the 10 subscales after the EDPSY 100 students had completed 15 weeks of the course.

Method

Instrument

The LASSI is a standardized, self-report measure and is currently being used by more than 1,189 institutions (Weinstein & Palmer, 1993). As stated in the *LASSI User's Manual* (1990b), the inventory is "designed to measure college students' use of learning and study strategies" (p. 3). The LASSI, consisting of 76 items, gives scores on 10 subscales: Attitude, Motivation, Time Management, Anxiety, Concentration, Information Processing, Selecting Main Idea, Study Aids, Self-testing, and Test Strategies. The subscales are reported in percentiles, with low scores indicating low skills and high scores signifying developed skills.

The LASSI has been administered to incoming freshmen at Ball State University during summer orientation for several years. Based on the results of the survey, the students' strengths and weaknesses were identified prior to meeting with advisors and registering for fall classes. This practice provided an early focus on students' study habits and facilitated discussions pertinent to desirable study behaviors. Since the LASSI scores were used to assess the students' learning and study behaviors, determining whether specific subscores can be useful predictors of academic performance in combination with SAT or ACT scores and HS class rank is important.

Depending upon which test the student had taken, either the SAT Verbal and Quantitative scores or the ACT English and Math scores and HS percent rank were used. To form the HS percent rank, the raw HS rank was divided by the HS class size, and then this percent was subtracted from 100. Higher HS percent rank scores corresponded to better academic standing of the students among their HS class peers.

Subjects

The participants attended Freshman Orientation either during the summer of 1994 or 1995 and enrolled at Ball State University for at least two semesters. Students who scored at or below the 25th percentile on five or more LASSI subscales were excluded because university procedures flag these students for extra advising attention. The flagging is an arbitrary standard determined by a group of advisors and the Learning Center staff to identify at-risk students for placement into a study skills course. In addition, the flagged students are recommended for other support services, including a reading course, Learning Center services, and additional advising sessions. At-risk students were excluded from this study because they received special treatments.

Students without test scores or recorded HS rank were omitted from the study, as were 1,106 flagged students. Of the participants, 4,311 had completed the SAT and 1,847 had taken the ACT. Their scores were analyzed as predictors of first and second semester accumulated GPA. Students who had both ACT and SAT scores were included in both categories.

Analysis

A variance partitioning approach was used (Pedhazur, 1982) to assess how much additional variance the LASSI subscales could provide in predicting student GPA over test scores and HS rank. SPSS (1997) computer software was used to calculate the following statistics. SAT or ACT scores and HS percent rank were entered on the first step of a multiple regression analysis to obtain the initial R^2: the degree that first semester and second semester accumulated GPA could be accounted for by these standard predictors. Then all the LASSI subscales were entered on the second step to see how much additional variation could be accounted for in GPA. The difference between the R^2 in the first and second steps was tested to see if a statistically significant improvement in predictive power existed. On the final

step, the relative contribution of the LASSI subscales, SAT or ACT, and HS percent rank in predicting GPA was compared by examining the statistical significance of the regression weights and the relative size of the standardized coefficients.

Results

The means of the first semester and second semester accumulated GPAs, SAT Verbal and Quantitative scores, ACT English and Math scores, and HS percent ranks are listed in Table 1. The LASSI subscale means ranged from a low of 49.37 for Test Strategies to a high of 62.03 for Study Aids with a mean LASSI subscale score of 56.08. The zero-order correlations of the LASSI subscales, GPA, SAT and ACT scores, and HS percent ranks are shown in Table 2.

For students who took the SAT, the multiple regression revealed that 36% of the variance in first semester and 40% of the variance in second semester accumulated GPAs could be accounted for by SAT scores and HS percent rank. The addition of the LASSI subscales produced a R^2 change of 0.02 for first semester and second semester accumulated GPA, for a total R^2 of 0.38 and 0.42, respectively. As can be seen in Table 3, the HS percent rank was clearly the strongest predictor relative to the other variables (standardized β = 0.38 for first semester GPA and 0.41 for second semester accumulated GPA). For both regresion equations, SAT Verbal and SAT Quantitative were the next most influential predictors of GPA. Three of the 10 LASSI subscales (Motivation, Time Management, and Selecting Main Idea) made statistically significant additions to the predicting power, but did not provide much unique information concerning GPA. Of the LASSI subscales, the Motivation subscale was the strongest factor, after SAT Quantitative scores, in the prediction of first semester GPA and second semester accumulated GPA.

Table 1 Descriptive Statistics

Variable	*M*	*SD*
First Semester GPA	2.70	0.76
Accumulated GPA	2.68	0.72
SAT Verbal	505.18	80.42
SAT Quantitative	505.67	84.70
ACT English	21.41	4.64
ACT Math	21.04	4.34
HS percent rank	66.47	21.27
LASSI subscales		
Attitude	58.26	22.86
Motivation	56.60	24.21
Time Management	54.93	24.44
Anxiety	57.53	25.86
Concentration	59.22	23.38
Info. Processing	54.10	25.04
Selecting Main Idea	51.21	22.82
Study Aids	62.05	23.51
Self-testing	57.46	24.29
Test Strategies	49.38	24.62

Note. For SAT, n = 4,311; for ACT, n = 1,847; for GPA, HS percent rank, and LASSI, n = 4,805.

A similar pattern was found for students who took the ACT. ACT scores and HS percent rank accounted for 39% of the variance in first semester and 45% of the variance in second semester accumulated GPAs. The addition of the LASSI subscales produced a R^2 change of 0.02 for first semester GPA and 0.03 for second semester accumulated GPA, for R^2 values of 0.41 and 0.48, respectively. As shown in Table 4, HS percent rank was by far the strongest predictor of GPA, followed by ACT English and Math. For the LASSI subscales, Motivation was again the strongest predictor of GPA. However, Time Management was the only other statistically significant LASSI subscale.

Stepwise regression analyses using the LASSI subscales, HS percent rank, and either the ACT or SAT scores were then used to reveal the potential set of best predictors for first semester and second semester accumulated GPAs. For both sets of regression analyses, HS percent rank was entered first, followed by either SAT Verbal or ACT English, and then the LASSI Motivation subscale. The quantitative aptitude test (SAT Quantitative or ACT Math) entered after the LASSI Motivation subscale, with the standardized β of the Motivation subscale dropping considerably. The overall R^2, once all statistically significant predictors had been considered, was 0.38 for the regression using SAT scores and 0.41 for the one using the ACT in predicting first semester GPA. For predicting accumulated GPA, the regression using SAT scores had R^2 = 0.42 and for the one using ACT scores, R^2 = 0.47. The results of the stepwise regressions can be seen in Tables 5a and 5b, which show the entry order of the variables.

Summary and Discussion

The findings from this study support those of the College Entrance Examination Board (1988)

Table 2 Correlation of SAT, ACT, HS percent rank, and LASSI subscales

	Fall GPA	Acc. GPA	SAT Verbal	SAT Quant.	ACT Engl.	ACT Math	HS% Rank	ATT	MOT	TMT	ANX	CON	INP	SMI	STA	SFT
Accumulated GPA	0.94															
SAT-Verbal	0.40	0.41														
SAT-Quantitative	0.42	0.44	0.58													
ACT-English	0.48	0.51	0.77	0.60												
ACT-Math	0.49	0.51	0.56	0.88	0.62											
HS Percent Rank	0.56	0.60	0.41	0.49	0.52	0.57										
Attitude (ATT)	0.15	0.15	0.05	0.08	0.14	0.13	0.18									
Motivation (MOT)	0.30	0.32	0.08	0.07	0.18	0.18	0.37	0.51								
Time Management (TMT)	0.16	0.17	–0.10	–0.09	–0.03	–0.00	0.15	0.39	0.63							
Anxiety (ANX)	0.19	0.19	0.37	0.34	0.36	0.34	0.23	0.23	0.15	0.07						
Concentration (CON)	0.16	0.17	0.05	0.08	0.07	0.11	–0.19	0.47	0.58	0.64	0.30					
Info. Processing (INP)	0.09	0.09	0.21	0.12	0.16	0.13	0.07	0.20	0.21	0.15	0.13	0.18				
Selecting Main Idea (SMI)	0.15	0.15	0.34	0.18	0.31	0.21	0.18	0.32	0.29	0.20	0.45	0.41	0.37			
Study Aids (STA)	0.09	0.10	0.01	0.02	0.06	0.04	0.09	0.23	0.31	0.30	–0.04	0.21	0.42	0.21		
Self-testing (SFT)	0.10	0.11	–0.02	–0.06	0.05	–0.01	0.11	0.30	0.45	0.43	0.01	0.35	0.47	0.29	0.54	
Test Strategies (TST)	0.24	0.24	0.39	0.29	0.35	0.32	0.28	0.41	0.37	0.28	0.62	0.50	0.24	0.70	0.10	0.20

Table 3 Regressing SAT, HS percent rank, and LASSI subscales on first semester and second semester accumulated GPA

	Fall GPA			Accumulated GPA		
	β			β		
Variable	Unstandardized	Standardized	*t*	Unstandardized	Standardized	*t*
SAT Verbal	0.0017	0.177	10.89*	0.0016	0.181	11.50*
SAT Quantitative	0.0014	0.152	9.433*	0.0013	0.149	9.57*
HS Percent Rank	0.0136	0.378	24.57*	0.0141	0.412	27.79*
LASSI Subscales						
Attitude	–0.0001	–0.002	–0.10	–0.0004	–0.013	–0.90
Motivation	0.0034	0.107	5.79*	–0.0037	0.122	6.86*
Time Management	0.0024	0.076	4.26*	0.0023	0.078	4.50*
Anxiety	–0.0007	–0.023	–1.45	–0.0006	–0.023	–1.50
Concentration	–0.0005	–0.016	–0.91	–0.0004	–0.013	–0.77
Info. Processing	–0.0003	–0.011	–0.76	–0.0005	–0.019	–1.30
Selecting Main Idea	–0.0014	–0.042	–2.30*	–0.0012	–0.038	–2.14*
Study Aids	0.0003	0.008	0.57	0.0005	0.016	1.14
Self-testing	0.0001	0.005	0.27	0.0001	0.004	0.23
Test Strategies	0.0002	0.006	0.30	0.0003	–0.010	–0.51
Constant	0.0058		0.76	0.0961		1.37

Notes. R^2 for fall GPA = 0.38; R^2 for accumulated GPA = 0.42; *df* = 4,295.
*$p < 0.05$.

Table 4 Regressing ACT, HS percent rank, and LASSI subscales on first semester and second semester accumulated GPA

	Fall GPA			Accumulated GPA		
	β			β		
Variable	Unstandardized	Standardized	*t*	Unstandardized	Standardized	*t*
ACT English	0.0332	0.203	8.20*	0.0321	0.205	8.78*
ACT Math	0.0273	0.156	6.18*	0.0261	0.156	6.56*
HS Percent Rank	0.0117	0.337	13.77*	0.0124	0.373	16.21*
LASSI Subscales						
Attitude	0.0005	0.014	0.60	0.0003	0.009	0.41
Motivation	0.0032	0.103	3.72*	0.0040	0.135	5.15*
Time Management	0.0021	0.067	2.53*	0.0025	0.084	3.35*
Anxiety	–0.0000	–0.002	–0.06	0.0001	0.002	0.09
Concentration	–0.0001	–0.005	–0.17	–0.0006	–0.018	–0.71
Info. Processing	0.0001	0.002	0.08	0.0002	0.006	0.27
Selecting Main Idea	–0.0011	–0.033	–1.20	–0.0006	–0.020	–0.78
Study Aids	0.0002	0.005	0.24	0.0004	0.014	0.64
Self-testing	–0.0003	–0.010	–0.40	–0.0007	–0.023	–1.00
Test Strategies	0.0002	0.006	0.18	–0.0004	–0.015	–0.51
Constant	0.4330		4.89*	0.3890		4.88*

Notes. R^2 for fall GPA = 0.41; R^2 for accumulated GPA = 0.48; *df* = 1,832.
*$p < 0.05$.

Table 5a SAT stepwise regression results for the first semester GPA

SAT		Final β	
Step	R^2	Unstandardized	Standardized
1. HS % rank	0.319	0.014	0.379
2. SAT Verbal	0.351	0.002	0.173
3. Motivation	0.364	0.003	0.105
4. SAT Quant.	0.376	0.001	0.147
5. TimeMgmt	0.378	0.002	0.071
6. Select Idea	0.380	–0.002	–0.052
Constant		0.070	

Table 5b ACT stepwise regression results for the first semester GPA

ACT		Final β	
Step	R^2	Unstandardized	Standardized
1. HS % rank	0.335	0.012	0.338
2. ACT Eng.	0.381	0.032	0.195
3. Motivation	0.396	0.003	0.101
4. ACT Math	0.408	0.027	0.156
5. TimeMgmt	0.411	0.002	0.062
Constant		0.431	

Table 6a SAT stepwise regression results for the second semester GPA

SAT		Final β	
Step	R^2	Unstandardized	Standardized
1. HS % rank	0.360	0.014	0.414
2. SAT Verbal	0.391	0.002	0.178
3. Motivation	0.405	0.003	0.115
4. SAT Quant.	0.416	0.001	0.149
5. TimeMgmt	0.419	0.002	0.072
6. Select Idea	0.422	–0.002	–0.048
7. Anxiety	0.422	–0.001	–0.033
Constant		0.105	

Table 6b ACT stepwise regression results for the second semester GPA

ACT		Final β	
Step	R^2	Unstandardized	Standardized
1. HS % rank	0.392	0.012	0.375
2. ACT Eng.	0.437	0.003	0.197
3. Motivation	0.459	0.004	0.123
4. ACT Math	0.471	0.026	0.155
5. TimeMgmt	0.474	0.002	0.069
Constant		0.391	

study in that SAT and HS percent rank were both strong predictors of first semester and second semester accumulated GPA. When LASSI subscales were added to the traditional predictors of SAT/ACT scores and HS percent rank, the results showed only a slight improvement in the predictability of student academic performance. For students who took the SAT, the addition of the LASSI subscales to test scores and HS rank increased the total predictive variance by 2% in GPA for the first semester and accumulated second semester GPA. Similar patterns were found for students who took the ACT. The addition of the LASSI subscales to test scores and HS rank raised the predictive variance by 2% and 3%, respectively, for first and second semester accumulated GPAs.

According to the stepwise regression results, of the 10 LASSI subscales, both Motivation and Time Management were of some use in predicting student academic performance. While the results of other subscales may provide information about a particular student, educators should pay most attention to these two subscale scores as predictors of success or failure. Students who score high on the Motivation and Time Management subscales are more likely to succeed academically than those who score low on these subscales. Students who can obtain direct instruction in time management and selecting main ideas either through tutoring or a study skills class will have a better chance of success. Serious motivational issues may need to be addressed by advisors and counselors in students who score low on this LASSI subscale.

In summary, adding the LASSI scores had limited impact on the predictability of first semester and second semester accumulated GPAs. Whether the 2%–3% gains in predictability warrant inclusion of LASSI scores for student success predic-

tion is doubtful. A more appropriate use of the LASSI may be as a means of identifying skills that need remediation in those students who score poorly on the more traditional predictors of academic performance. However, these results suggest that if LASSI results are to be used as predictors of academic success, the scales of major focus should be Motivation and Time Management.

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