Predicting cégep student academic outcomes

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Entry level study skills and strategies, assessed by the Learning and Study Strategies Inventory (LASSI; Weinstein, Palmer and Schulte, 1987) relate to, and moderately well predict eventual academic outcomes of a cohort of 17-19 year old college students at Champlain-St.Lawrence Cégep. All first session students (Fall, 2001; N = 331) took the LASSI at the time of registration.

Student academic outcomes fall into one four categories: quit/transferred passing, quit/transferred failing, graduated, or persisting (still registering to complete degree requirements). This action research, with an ex post facto design, tests the ability of entry level study skill and strategy scores, measured by the LASSI, to predict these academic outcomes. One expects study skills to vary with academic success. Although many institutions use entry level study skills, such as the LASSI, there are few published studies on the predictive validity of both entry level study skills and of the instrument in relation to long term academic achievement.

Discriminant analysis of the LASSI scores with academic outcomes shows that 36.4% of quit/ transferred passing, 50% of quit/transferred failing, 54.1% of graduates, and only 21.1% of the persisters were correctly classified. Student problems are with motivations, test taking and preparation, anxiety, concentration, and attitudes. When comparisons between only the quit/transferred failing and graduate groups are made, the classification results increase to 64.5% and 71.2%, respectively. When the same analyses are applied to academic outcomes at the end of the first session, or even at mid-term during the first session, the pattern of results remains stable.

Entry level study skill and strategies, measured by the LASSI, discriminate in statistically significant ways between students who are likely to move to graduation or fail out of college, and this even as soon as mid-term of the first session of study.

Québec cégeps are under pressure to increase persistence and achievement in view of promoting higher graduation rates. At the same time funding is becoming a problem and the demands on resources are high. An early identification of students who might need assistance, and determining the type of assistance, becomes critical in such a context. This report addresses these issues.

Weinstein, Palmer and Schulte (1987) report the Learning and Study Strategies Inventory (LASSI) to be adopted by about 1,700 post-secondary educational institutions, mostly in the United States. Interest in the inventory is spreading to American High School levels (Weinstein and Palmer, 1990) as well as to some other countries (Monteith, 1997; Murphy and Alexander, 1998; Olaussen and Braten, 1998; and Talbot, 1994a).

The constructs of the LASSI appear sound (Olaussen and Braten, 1998; Obiekwe, 2000) although the explanations for underlying structures reported in the LASSI are being debated (Nist et al. 1990; Olejnik and Nist, 1992; and, Murphy and Alexander, 1998). Also, there are validity (Eldredge, 1990) and norm (Mealey, 1988) issues with the LASSI.

Deming, Valeri-Gold and Idleman (1994) report reliability coefficients "approach" the reported LASSI norms. Their developmental studies' students had a different norming pattern than for students in the LASSI norming groups (Weinstein, 1987). We also observe a similar trend. Our students' norms, compared to either the reported LASSI norms, or the high/low scale patterns reported by Deming et al. (1994), departed markedly. A solution, much in keeping with the suggestion of "The First Year Experience" literature (Gilbert et al. 1997), is to develop one's own institutional norms. We simply discarded the norms reported in the LASSI manual or the professional literature.

Contrary to others (Nist et al., 1990; Ickes and Fraas, 1990), our initial investigation of the LASSI (Talbot, 1994a) reveals sufficient validity and reliability to retain its use. The strength of the LASSI is its focus on the processes rather than the products of learning.

The work reported by Hulick and Higginson (1989) on identifying "at risk" students and planning "early alert" interventions is in keeping with our needs. These authors offer evidence, from a study of 514 college freshmen at Murray State University (Kentucky), that the LASSI discriminates amongst students who either do well or become "at risk". Their students apparently do better when LASSI motivation, concentration and test-taking are reportedly used in high school. However, when current attitude, time management and anxiety strategy scores are below average, the students find college "more difficult". This work shows it is possible to ask students to reflect on their past behaviour and to link study skills (LASSI) results to the upcoming task demands within the culture of the institution. Our earlier work (Talbot, 1996) confirms that cégep students reliably report perceptions about learning task demands and the study skills needed to meet those demands.

Ickes and Fraas (1990) succinctly summarize our problem: "Can groups of at-risk freshmen who have different levels of academic performance be identified through pre-existing differences in study skills?"

At a time when colleges and universities are debating whether to implement a credit vs non-credit, and either a voluntary or an obligatory "study skills" course, it seems essential to know if students can be reasonably well targeted at the time of registration for such special services. And, if these services are implemented, may we reasonably expect them to contribute to increasing graduation rates by clearly indicating what skills and strategies must be improved?

1. METHOD

Subjects were 331 first session (Fall, 2001) students in the open-door, two year Québec College (cégep) System. Of the 44 Cégeps in the network, these students registered at Champlain-St.Lawrence, one of the three English language cégeps. All students were tested at the time of registration.

We assume students have acceptable levels of ability, as evidenced by the obtention of the Secondary V Certificate. We assume also that English language proficiency skills, as measured by the English entrancetests at the Cégep, effectively screen for basic oral and written English language skills. Student course loads, dictated by government regulations, are such that students normally take seven courses in the Fall and eight courses in the Winter sessions.

Students, in groups of about 30, took the Web-LASSI. No problems were reported using the Web-LASSI site. A computer technician and a teacher were available at all times during testing to assist students with technical or language problems. Eight students expressed concerns for meanings of words like “procrastination” and “cramming”. At the end of the Fall, 2003 session computerized student profiles were sorted into one of the four categories for academic outcome.

2. RESULTS

Table 1 provides the descriptive statistics on the LASSI for students. Of the 331 students, 13.29% (n = 44) quit or transferred failing, 18.73% (n = 62) quit or transferred passing, 33.53% (n = 111) graduated on time, and 34.44% (n = 114) are persisting.

TABLE 1

GROUP	QUIT/TRANSFERRED PASSING			QUIT/TRANSFERRED FAILING			GRADUATED			PERSISTING		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
Attitudes	44	36.08	8.38	62	37.54	9.03	111	34.35	8.61	114	37.39	9.42
Motivations	44	61.82	6.04	62	60.77	7.08	111	64.59	5.82	114	62.59	7.09
Time Management	44	53.52	8.96	62	53.39	9.46	111	52.68	8.63	114	53.64	7.46
Anxiety	44	53.64	10.54	62	55.89	12.9	111	49.98	10.72	114	51.95	11.47
Concentration	44	50.45	9.19	62	51.53	11.01	111	47.21	8.51	114	50.11	9.39
Information processing	44	71.08	11.88	62	70.52	13.7	111	74.08	11.84	114	72.41	12.29
Selecting main ideas	44	54.73	8.13	62	56.84	8.2	111	56.04	7.19	114	55.37	7.65
Using support, techniques & services	44	67.22	14.03	62	63.59	12.41	111	67.64	12.3	114	67.61	12.61
Self-testing reviewing	44	68.18	12.31	62	64.52	13.09	111	68.58	12.17	114	67.19	13.07
Test-taking & preparation	44	38.35	11.04	62	41.98	11.51	111	36.28	8.08	114	38.86	10.3

The tests of equality of group means, borrowed by discriminant analysis from one-way ANOVA's, are computed for each of the study skills (LASSI) scales individually. Table 2 reveals important differences for motivation (F = 5.138, p = 0.002), test taking/preparation (F = 4.396, p = 0.005), anxiety (F = 3.821, p = 0.010), concentration (F = 4.470, p = 0.016), and attitudes (F = 2.726, p = 0.044).

TABLE 2

TESTS OF EQUALITY OF GROUP MEANS FOR LASSI SCORES

	WILKS' LAMBDA	F	DF1	DF2	SIG.
Attitudes	.976	2.726	3	327	.044
Motivations	.955	5.138	3	327	.002
Time Management	.998	.269	3	327	.847
Anxiety	.966	3.821	3	327	.010
Concentration	.969	3.470	3	327	.016
Information processing	.988	1.322	3	327	.267
Selecting main ideas	.993	.821	3	327	.483
Using support, techniques & services	.985	1.660	3	327	.176
Self-testing reviewing	.987	1.448	3	327	.229
Test-taking & preparation	.961	4.396	3	327	.005

Tables 3 and 4 provide information about the basic assumptions for using discriminant analysis. The population covariance matrices, as revealed by the Box M statistic (F = 1.045, p = 0.033), are not significantly different. The eigenvalues in Table 5, and their significance reported by Wilks' Lambda (Table 6; Wilks' Lambda = 0.867, p = 0.030) suggest that the centroids (means) of all three functions are similar. We should limit ourselves to the study of all three functions, and not 2 through 3, or only the third one, because the functions 2 through 3 and function 3 are not significant (F = 0.956, p = 0.686; F = 0.988, p = 0.0871). We cannot single out an academic outcome group since the importance of any one academic outcome is relative to the academic outcomes of the other groups.

TABLE 3

LOG DETERMINANTS OF LASSI SCORES

SLCSTAT2	RANK	LOG DETERMINANT
Quit/Transferred Passing	10	40.962
Quit/Transferred Failing	10	43.153
Graduated	10	41.523
Persisting	10	42.216
Pooled within-groups	10	42.557

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

TABLE 4

BOX'S M TEST RESULTS FOR LASSI

BOX'S M		184.422
F	**Approx.**	1.045
	df1	165.000
	df2	93329.361
	Sig.	.330

Tests null hypothesis of equal population covariance matrices.

TABLE 5

EIGENVALUES OF LASSI SCORES

FUNCTION	EIGENVALUES	% OF VARIANCE	CUMULATIVE %	CANONICAL CORRELATION
1	.102(a)	69.0	69.0	.305
2	.034(a)	22.9	91.9	.181
3	.012(a)	8.1	100.0	.109

(a) First 3 canonical discriminant functions were used in the analysis.

TABLE 6

WILKS' LAMBDA OF LASSI SCORES

TEST OF FUNCTION(S)	WILKS' LAMBDA	CHI-SQUARE	DF	SIG.
1 through 3	.867	46.123	30	.030
2 through 3	.956	14.649	18	.686
3	.988	3.845	8	.871

We see the relative importance of all three functions in the structure matrix (Table 7). Statistically significant relationships exist amongst all the scales with motivation (-0.677) and attitudes (0.602) having the greatest effects. A student with atypical motivation (unmotivated, demotivated) for college studies and the absence of positive attitudes towards learning and improving is most likely "at risk" in our cégep.

TABLE 7

STRUCTURE MATRIX OF LASSI SCORES

	FUNCTION		
	1	2	3
Motivations	-.677(*)	.080	.035
Test-taking & preparation	.588(*)	-.289	.424
Anxiety	.558(*)	-.293	-.162
Concentration	.554(*)	.072	.134
Information processing	-.339(*)	.048	.158
Using support, techniques & services	-.265	.485(*)	-.057
Selecting main ideas	.008	-.442(*)	.272
Time Management	.127	.146(*)	.087
Attitudes	.435	.199	.602(*)
Self-testing reviewing	-.294	.284	-.372(*)

Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions.
Variables ordered by absolute size of correlation within function.
(*) Largest absolute correlation between each variable and any discriminant function.

The relative ability of entry level study skills to discriminate amongst all four academic outcomes is presented in Table 8: 36.4% of the 44 students; 50% for the 62 students who quit/transferred failing, 54.1% for the 111 graduates, and only 21.1% of the 114 students were correctly classified. When we focus on the two important target groups, students who fail out versus graduate, we see in Table 9 that the LASSI is 64.5% and 71.2% correct in its classification. This is an impressive result given that the time interval is five semesters between the entry level characteristics measured by the LASSI (August 2001) and the measure of academic outcome (December, 2003).

TABLE 8

CLASSIFICATION RESULTS OF LASSI SCORES ON ACADEMIC OUTCOMES
AT THE END OF THE FIFTH SESSION (a)

		PREDICTED GROUP MEMBERSHIP				
	SLCSTAT2	QUIT/TRANSF PASSING	QUIT/TRANSF FAILING	GRADUATED	PERSISTING	TOTAL
(Original Count)	Quit/Transf Passing	16	11	12	5	44
	Quit/Transf Failing	10	31	13	8	62
	Graduated	22	15	60	14	111
	Persisting	27	26	37	24	114
	Ungrouped cases	1	3	1	2	7
(%)	Quit/Transf Passing	36.4	25.0	27.3	11.4	100.0
	Quit/Transf Failing	16.1	50.0	21.0	12.9	100.0
	Graduated	19.8	13.5	54.1	12.6	100.0
	Persisting	23.7	22.8	32.5	21.1	100.0
	Ungrouped cases	14.3	42.9	14.3	28.6	100.0

(a) 39.6% of original grouped cases correctly classified.

TABLE 9

CLASSIFICATION RESULTS WHEN ACADEMIC OUTCOME
IS DICHOTOMIZED TO FAILED VERSUS GRADUATED (a)

		PREDICTED GROUP MEMBERSHIP		
	SLCSTAT3	QUIT/TRANSF FAILING	GRADUATED	TOTAL
(Original Count)	Quit/Transf Failing	40	22	62
	Graduated	32	79	111
	Ungrouped cases	86	79	165
(%)	Quit/Transf Failing	64.5	35.5	100.0
	Graduated	28.8	71.2	100.0
	Ungrouped cases	52.1	47.9	100.0

(a) 68.8% of original grouped cases correctly classified.

When the measures of academic outcomes are for the end, or at mid-term, of the first session, the results[1] (Tables 10 and 11) remain the same (Kruskal-Wallis analysis of variance of the ranks[2], $P^2 = 4.48$, df = 3, $p > .05$).

TABLE 10

CLASSIFICATION RESULTS OF LASSI SCORES ON ACADEMIC OUTCOMES AT THE END OF THE FIRST SESSION (a)

		PREDICTED GROUP MEMBERSHIP				
	STATUS End of Session F01	**QUIT**	**ACADEMIC PROBATION**	**PASSED ALL**	**SOME F'S AND/OR ABD'S**	**TOTAL**
(Original Count)	Quit	4	4	3	1	12
	Academic Probation	13	9	12	11	45
	Passed all	28	25	84	34	171
	Some f's and/or abd's	24	23	35	28	110
(%)	Quit	33.3	33.3	25.0	8.3	100.0
	Academic Probation	28.9	20.0	26.7	24.4	100.0
	Passed all	16.4	14.6	49.1	19.9	100.0
	Some f's and/or abd's	21.8	20.9	31.8	25.5	100.0

(a) 37.0% of original grouped cases correctly classified.

TABLE 11

CLASSIFICATION RESULTS OF LASSI SCORES ON ACADEMIC OUTCOMES AT MID TERM OF THE FIRST SESSION (a)

		PREDICTED GROUP MEMBERSHIP				
	STATUS Midterm F01	**QUIT**	**ACADEMIC PROBATION**	**PASSED ALL**	**SOME F'S AND/OR ABD'S**	**TOTAL**
(Original Count)	Quit	2	0	0	0	2
	Academic Probation	5	22	11	13	51
	Passed all	0	29	61	25	115
	Some f's and/or abd's	7	48	52	63	170
(%)	Quit	100.0	.0	.0	.0	100.0
	Academic Probation	9.8	43.1	21.6	25.5	100.0
	Passed all	.0	25.2	53.0	21.7	100.0
	Some f's and/or abd's	4.1	28.2	30.6	37.1	100.0

(a) 43.8% of original grouped cases correctly classified.

1 Box's M test, and other basic assumptions for using a statistical test, reveal discriminant analysis is appropriate with these data.

2 The rank is determined by its place with a 3 by 4 table of session of study (mid-term, end of first, end of fifth) by academic outcome (4 levels).

Again, when the academic outcomes at the end, or at mid-term, of the first session are dichotomized into pass (students passed all courses) versus failed (qualified for academic probation) the results (Tables 12 and 13) are similar to those in Table 8. Students who qualify for academic probation at mid-term of their first session are most likely to eventually quit.

TABLE 12

CLASSIFICATION RESULTS OF LASSI SCORES FOR TWO GROUPS (PASS/FAIL) ON ACADEMIC OUTCOMES AT THE END OF THE FIRST SESSION (a)

		PREDICTED GROUP MEMBERSHIP		
	PASS/FAIL ONLY End F01	**1.00**	**2.00**	**Total**
(Original Count)	1.00	30	15	45
	2.00	51	120	171
	Ungrouped cases	60	62	122
(%)	1.00	66.7	33.3	100.0
	2.00	29.8	70.2	100.0
	Ungrouped cases	49.2	50.8	100.0

(a) 69.4% of original grouped cases correctly classified.

TABLE 13

CLASSIFICATION RESULTS OF LASSI SCORES FOR TWO GROUPS (PASS/FAIL) ON ACADEMIC OUTCOMES AT MIDTERM OF THE FIRST SESSION (a)

		PREDICTED GROUP MEMBERSHIP		
	PASS/FAIL ONLY MT F01	**1.00**	**2.00**	**Total**
(Original Count)	1.00	34	17	51
	2.00	34	81	115
	Ungrouped cases	82	90	172
(%)	1.00	66.7	33.3	100.0
	2.00	29.8	70.4	100.0
	Ungrouped cases	47.7	52.3	100.0

(a) 69.3% of original grouped cases correctly classified.

The implication is that as early as mid-term of the first session of study we have a clear indication of which students are in need of assistance. It behoves us then to not only measure study skills and strategies at the time of registration, but also to implement support services and strategies in the first half of the first session of study.

CONCLUSIONS

The LASSI assesses, in simple language, student study strategy strengths and weaknesses. Groups of at-risk students may be identified through pre-existing weaknesses in study skills at the time of registration. The pattern of academic performances established by mid-term of the first session of study is a reasonably strong indicator of academic outcomes.

Our results parallel very closely those by Hulick and Higginson (1989), with the exception that we did not observe a statistically significant impact of time management on academic outcomes. We now know that students who eventually get into academic difficulties may have problems with test-taking and preparation, motivation, anxiety, concentration, and/or attitudes. Such information works to guide policy and streamline operations to focus on specific needs of the college clientele. The most striking result is that ***early*** identification of study skills and strategies and intervention plans appear possible ***and necessary***.

There is a relatively high percentage (13.29%) of students who quit/transferred ***passing***. A closer examination of their central file[3] shows few transfer students changed colleges ***and programs***. Given that these students appear to have the skills necessary to be in the "graduates" group, it would seem a way to increase our graduation rates if we could convince these students to stay at Champlain-St.Lawrence Cégep. Exit interviews with these students would inform us on this issue.

A general item is the relatively stable perceptions all students have of their entry level study and learning strategies. A casual examination of the descriptive statistics shows few major fluctuations within any one LASSI scale for all four academic outcome groups. And yet, relatively high numbers (37.54%) of students fail. Students' perceptions of themselves as being «at risk» need to be brought into clearer ***and personal*** focus, without dramatizing results, or threatening their self-esteem. Students need help in identifying the «danger» signals (early alerts), and challenging faulty motivations and deficient attitudes, which have been detailed in an earlier monograph (Talbot, 1992). We are reminded from recent work (Talbot, 2002) that whatever approach is taken, students are neither receptive to feedback that their study skills and learning strategies are deficient nor will they easily cooperate to take remedial measures.

Teachers who want to assist students with their attitudes, motivations, and test-taking and preparation, must also make efforts and show motivation for these concerns in their methods. With respect to teachers and teaching, because classroom practices and teacher-made tests are decided by teachers, students might actually not expect teachers to motivate them, but actually complain that teacher practices demotivate them. Both of these ideas have also been discussed in earlier monographs (Talbot, 1994b, 1998). The message in both of these monographs is that students learn not only the information from teachers but almost as importantly, the meaning of learning. Teachers may improve students' motives and attitudes if they focus and accentuate these traits in class and as they work with students.

Some attention will also have to be directed at the possibility that characteristics of the institutional climate, other than teachers and teaching, may also impact on student attitudes and motivations (Gilbert et al., 1997). Finally, future work will have to address issues of ***rapidly*** gaining the attention, cooperation and commitment of students to become self-regulated learners (Ellis, 2000).

3 Système d'information et de gestion des données sur l'effectif collégial (SIGDEC).

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