Do Learning And Study Skills Affect Academic Performance? – An Empirical Investigation

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ABSTRACT

Universities and colleges are very interested in understanding the factors that influence their students' academic performance. This paper describes a study that was conducted at a mid-sized public university in the mid-south, USA, to examine this issue. In this study, the 10-scale, Learning and Study Strategies Inventory (LASSI) (Weinstein et al., 1987) assessment device was administered to 107 students to measure receptivity to several skills and strategies that purportedly enhance a student's ability to learn and successfully perform in an academic setting. The results of this study showed that the LASSI scales dealing with attitude, concentration, information processing skill, motivation, self-testing and review techniques, use of study support techniques, time management, and effective test-taking strategies all correlated positively (with statistical significance) to student GPA. There were also statistically significant differences between males and females in their mean scores for several of the above mentioned LASSI scales. Every LASSI subscale, where females significantly outscored males, positively correlated with superior academic performance (i.e., GPA). However, after controlling for variance explained by the LASSI scores, there were no statistically significant correlations between gender and academic performance. The primary conclusion from this study is that contrary to prior research that suggests that females predominantly outperform males in academics, such differences can be better explained by mediating variables such as learning and study strategies. This debunking of the female stereotype of superior academic performance merely because of gender has pedagogical implications.

Keywords: Academic Performance; LASSI; Learning Strategies; Gender Differences; Learning and Study Strategies Inventory

INTRODUCTION

*I*t has been observed via numerous studies over the years that academic performance varies along various parameters. Prior academic research is replete with studies observing apparent differences in academic performance according to gender. It has been observed that females often outperform males in collegiate academic performance (Sheard, 2009). Nguyen, Allen, and Fraccastoro (2005) found this to be the case at both the undergraduate and graduate level. Others have found statistically significant evidence that females tend to achieve university degrees with honors at a rate disproportionately higher than males (Barrow, et.al. 2009; Farsides & Woodfield, 2007; Richardson & Woodley, 2003). Cullen, et.al, (2004) found have females achieved better grades than males in both university English and Math courses; and Busch (1995) observed superior academic performance by female students of Business Administration. Some studies have examined gender performance differences at a more detailed level within an academic discipline. For example, Gammie, Paver, Gammie, & Duncan (2003) found female students achieved better grades than males in first year accounting and auditing courses. Lipe (1989) also observed superior academic performance in female accounting students, but only when the instructor was also female. Buckless, et.al. (1991), when surveying accounting instructors, found that females were perceived to be

superior accounting students in their academic performance. Even in the sciences, where it has been suggested that males often outperform females, at least in terms of number degrees earned (Taasoobshirazi & Carr, 2008), females have been observed to outperform males in some instances. Tai (2008) found that females achieved higher grades in undergraduate algebra-based physics courses while males had higher grades in calculus-based physics courses. Finally, Chyung (2007) found that females achieved higher exam scores than males across several disciplines in an on-line course environment.

On the other hand, not all prior research has supported the proposition that males and females differ significantly in performance oriented attributes. Janet Shibley Hyde is perhaps the most well-known proponent of The Gender Similarities Hypothesis. In (2005) Hyde reported in the *American Psychologist* the results from a review of 46 meta-analyses that men and women differ very little on most all psychological variables. Included in this study were such academic performance related attributes as mathematical comprehension and problem-solving, reading comprehension, verbal reasoning, and abstract reasoning. The only areas where Hyde's comprehensive study found significant gender differences were in some motor behaviors (e.g., throwing ability), certain aspects of sexuality, and certain forms of aggression. Thus, there appears to be conflicting prior research as to the issue of whether there are fundamental gender-driven differences in academic performance.

MOTIVATION FOR THIS PAPER

This paper attempts to add more clarity as to the relationship between gender and academic performance. We posit the notion that it is really learning skills and strategies that drive academic performance differences. Our inquiry into this issue distills to three research questions, in the following logical order:1) Is there a statistically significant relationship between academic performance and learning skills and strategies?; 2) Do learning skills and strategies differ with statistical significance between genders?; and 3) Controlling for study skills and strategies, does academic performance differ by gender? If propositions 1 & 2 produce affirmative results and proposition 3 does not, this would present logical and statistical evidence that gender is not the true driving force for differences in academic performance.

ASSESSMENT INSTRUMENT AND SUBJECTS

Data concerning students' learning and study strategies was developed via administering the Learning and Study Strategies Inventory (LASSI). The LASSI is a well-known and well-respected vehicle for assessing students' knowledge and use of various skills and strategies for achieving learning in an academic environment. In total the LASSI consists of 80 question items organized into 10 separate scales. A brief description of the ten scales is as follows:

1. **Anxiety (ANX)** – The Anxiety Scale addresses the degree to which students worry and experience anxiety about academic performance. Since anxiety is logically assumed to be negatively correlated with performance (i.e., the greater the anxiety, the poorer the performance), the scale is reversed scored. This means that a low score on the scale indicates high levels of anxiety associated with academic performance; and may indicate the need for the student to develop stronger, i.e., more effective, anxiety coping-skills.
2. **Attitude and Interest (ATT)** – The Attitude and Interest Scale assesses how facilitative or debilitative students are in their general approach to academic studies. Low scores on the scales indicate low interest and suggest that the students judge there to be little connection between academic performance and the achievement of their future life goals.
3. **Concentration and Attention (CON)** – The Concentration Scale assesses students' ability to concentrate and maintain focus when dealing with academic tasks. A low score indicates poor concentration and little ability to "block-out" distracting thoughts and feelings when dealing with academic tasks.
4. **Information Processing (INP)** – The Information Processing Scale addresses how well students can use imagery, verbal elaboration, organization strategies, and reasoning skills to obtain and retain knowledge. A low score indicates a deficiency in the ability to make information meaningful to the task at hand and then retaining it for future recall.

5.   **Motivation (MOT)** – The Motivation Scale assesses students' diligence, self-discipline, and willingness to exert the requisite effort necessary to achieve satisfactory academic performance. A low score indicates a lack of academic performance goal setting and an unwillingness to accept responsibility for poor academic performance.

6.   **Self-Testing (SFT)** – The Self-Testing Scale addresses students' use of reviewing and self-monitoring techniques to determine whether they understand and retain information that they are trying to learn. A low score on the scale indicates a lack of skill in adequately preparing for classes and test-taking.

7.   **Selecting Main Ideas (SMI)** – The Selecting Main Ideas Scale assesses students' ability to identify and sort out the most pertinent information, amongst a mass of data, relevant to the academic task at hand. A low score indicates a lack of the ability to identify the most importance information and main ideas.

8.   **Study Aids (STA)** – The Study Aids Scale assesses the students' use of support techniques or materials that can help them obtain and retain learning. Examples range from such tools as end-of-chapter exercises and problems, within-chapter italics and headings, to PowerPoint slides, etc. A low score indicates a lack of use of these support techniques and materials.

9.   **Time Management (TMT)** – The Time Management Scale assesses students' focus on time management in the pursuit of achieving academic goals. Aspects addressed are procrastination, control of non-academic activities, and others. A low score indicates a lack of devotion to time management in the pursuit of satisfactory academic performance.

10.   **Test Strategies (TST)** – The Test Strategies Scale assesses students' ability to effectively take tests and prepare for the taking of tests. A low score indicates the application of virtually non-existent or ineffective test-taking strategies.

The scales generally range from the low-teens to 40 and are scored on a percentile basis. The general interpretation, for any one individual student, is that a score on a particular scale of 75-percentile or above indicates a relative strength in that area. A score of 50-percentile or lower is generally construed to be a relative weakness.

In this study, the LASSI was administered to 107 freshmen undergraduate students at a mid-sized public university in the mid-south, USA. Of the 107 students, 41 were males and 66 were female; the break-down by major was 43 business majors and 64 non-business majors. Most recent cumulative official GPA was collected for all the participating students gathered concurrently in the semester in which the students supplied the LASSI data.

STATISTICAL METHODS AND RESULTS

To address the question whether there are significant correlations between academic performance and the 10 LASSI subscale score several bivariate correlations (Pearson, two-tailed) between GPA and the 10 LASSI scales were conducted. Table 1 shows the results.

Table 1 indicates strong statistically significant correlations between academic performance (GPA) and 8 of the 10 LASSI scales. The only two scales that did not correlate with GPA with statistical significance were Anxiety and Selecting Main Ideas.

Table 1
Pearson Correlations between GPA and 10 LASSI Subscales

LASSI subscale	Correlation Coefficient (2-tailed)	p-value	Significance
Anxiety	-0.119	0.22	
Attitude	0.286	0.00	$p < 0.01$
Concentration	0.274	0.00	$p < 0.01$
Information Processing	0.225	0.02	$p < 0.05$
Motivation	0.293	0.00	$p < 0.01$
Self-Testing	0.189	0.05	$p < 0.05$
Selecting Main Ideas	0.094	0.34	
Study Aids (use of)	0.223	0.02	$p < 0.05$
Time Management	0.197	0.04	$p < 0.05$
Test Strategies	0.209	0.03	$p < 0.05$

To address the question whether LASSI scores differ by gender, and what is the nature of these differences, a series of 2x2 ANOVAs were performed with gender and major as the grouping variables and the ten LASSI subscales as separate dependent variables. Results are presented in Table 2.

As seen in Table 2, of the ten LASSI - ANOVAs, six (Anxiety, Information Processing, Motivation, Self-testing, use of Study Aids, and Time Management) show statistically significant group differences by gender. In five of those six cases, females score significantly higher than males on that LASSI scale. The one scale where females scored lower than males on average was Anxiety. Recall that Anxiety is the only LASSI scale that is reversed scored, i.e., a relatively high score means the student is experiencing a relatively low amount of anxiety. If one ascribes to the theory that higher anxiety, within reason, is a good thing in that it indicates a greater degree of concern which in turn logically should translate into enhanced academic performance, female scores on the six significant LASSIs all have positive implications for promoting better academic performance.

In that in only one instance (motivation), was there a statistically significant difference in LASSI scores by major, we conclude that learning and study skills generally do not differ between business students versus non-business students.

Table 2
Means and Standard Deviations of LASSI score for Gender (Male vs. Female) and Major (Business vs. Non-business)

LASSI Subscale	Gender	X̄	SD	p-value	Major	X̄	SD	p-value
Anxiety	Male	26.8	5.24	0.05*	Bus.	26.2	5.95	0.29
	Female	23.3	7.10		Non bus.	23.6	7.03	
Attitude	Male	30.1	4.36	0.19	Bus.	30.7	4.98	0.50
	Female	31.0	5.03		Non bus.	30.6	4.69	
Concentration	Male	25.5	6.01	0.39	Bus.	26.2	6.51	0.63
	Female	26.2	6.54		Non bus.	25.8	6.25	
Information Processing	Male	26.7	4.58	0.04*	Bus.	28.1	5.06	0.13
	Female	28.2	5.31		Non bus.	27.3	5.10	
Motivation	Male	29.6	4.30	0.00**	Bus.	32	4.61	.03*
	Female	32.7	6.05		Non bus.	31.2	6.25	
Self-Testing	Male	23.3	5.56	0.00**	Bus.	25.4	6.02	0.50
	Female	27.8	5.41		Non bus.	26.6	5.77	
Selecting Main Ideas	Male	27.4	5.26	0.67	Bus.	27.3	5.72	0.95
	Female	26.8	6.02		Non bus.	26.9	5.77	
Study AIDS (use of)	Male	24.0	5.55	0.01**	Bus.	25.3	6.35	0.89
	Female	26.1	5.81		Non bus.	26.6	5.42	
Time Management	Male	21.2	5.82	0.00**	Bus.	23.9	6.16	0.20
	Female	25.9	6.17		Non bus.	24.3	6.65	
Test Strategies	Male	28.1	4.04	0.93	Bus.	28.3	4.17	0.84
	Female	28.0	4.74		Non bus.	27.8	4.68	

*Significant p≤ .05　　** Significant p≤ .01

So far the analysis stream has presented evidence that academic performance is influenced by some of the various learning skills and study strategies, as measured by the LASSI scales, and that scores on some of the LASSI scales differ by gender.

In order to verify the lack of any direct main effect of gender on academic performance, a series of ANCOVAs with GPA as the dependent variable, the LASSI scores (each one individually) as the covariate, and gender as the grouping variable, was performed. The purpose was to exclude variance in GPA that was determined by the LASSI factors. Results are presented in Table 3.

Table 3
ANCOVA for Gender on GPA while partialing out the LASSI Subscale Scores.

LASSI Subscale	F-Statistic	p-value
Anxiety	1.49	.22
Attitude	1.51	.22
Concentration	1.89	.17
Information Processing	1.39	.24
Motivation	.51	.48
Self-Testing	.68	.41
Selecting Main Ideas	2.4	.12
Study Aids (use of)	.79	.38
Time Management	.68	.41
Test Strategies	2.44	.12

After controlling for variance in GPA explained by the LASSI scores, in no case was variability in GPA attributed to gender with statistical significance.

CONCLUSIONS

In summary, the results of this study indicate that 8 of 10 Learning and Study Strategies Inventory (LASSI) scales scores for the 107 students in the study correlated with statistical significance with GPA. The statistically significant correlating scales (which were Attitude, Concentration, Information Processing, Motivation, Self-Testing, use of Study Aids, Time Management, and Test Strategies) are all attributes of student learning and study skills that correlate positively with GPA. In other words, the higher the score, the higher the students' observed GPA.

To test if there might be gender differences between the LASSI scores, 2x2 ANOVAs were conducted with the individual LASSI scores as dependent variables and gender and major as grouping variables. Females recorded scores more conducive to superior academic performance than did males on the subscales of Anxiety, Information processing, Motivation, Self-testing, use of Support Techniques, and Time Management. Males did not significantly outperform females on any subscale.

ANCOVAs confirmed that after excluding the variance in GPA that was determined by the LASSI co-variates, variance in GPA was not explained solely by gender. Thus, the linkage between gender and academic performance can be explained to a significant degree by the mediating effect of learning skills and strategies.

The results of this research suggest that it is incorrect to suppose that females necessarily outperform males in intellectual tasks. In pedagogical settings it also does not make sense to perpetuate this misconception. For teaching effectiveness, academia should focus on developing and enhancing the various learning skills and strategies of students regardless of gender.

LIMITATIONS AND FUTURE RESEARCH

The usual caveats concerning statistical validity and reliability certainly apply to this exploratory study. As far as the traditional trade-off between internal validity (are you measuring what you intend to measure) and external validity (do the study results generalize), the internal validity of this study is probably the stronger of the two. The Learning and Studies Strategies Inventory (LASSI) is a widely used scale. Nevertheless, it must be acknowledged that in spite of strong face validity, the content validity of this study may be questioned to the extent that the LASSI scales do not represent all facets of learning and study skills. It might also be argued that GPA is not the best means by which to operationalize academic performance. The possibility of various kinds of response biases (e.g., maybe females are more inclined to give expected or more "acceptable" responses to the scales than are males) should not be dismissed. Concerning external validity, since only freshmen were used in this study, it is certainly reasonable to question whether the student sample used in this study generalizes across the true population of all students. The statistical reliability, or can the statistical results be repeated, can be established by duplicating the study with other student sample groups at the same and other universities.

The results of this study invoke several interesting issues for future research. The first possibility is to extend this cross-sectional study to be longitudinal. This would entail studying the same research questions, using the same students, but studying a time period over their entire 4-5 year college career. "Major" is very fluid in first year students. It would be interesting to see how many students switch their majors by their senior year and whether any of the attributes measured by the LASSI influence their switching decisions. Further study is warranted in more detail as to specifics of those LASSI scales that did show statistically significant correlation with academic performance. Also, further study is warranted as to the relative importance of those statistically significant LASSIs. Of course, there may be other non-gender specific factors other than learning and study strategies, such as emotional maturity, intelligence, life-experiences, various support systems, etc., that influence academic performance. These possibilities also warrant further study. And finally, the negative (in this case meaning the greater the anxiety level the better the academic performance) and perhaps paradoxical correlation (although not statistically significant) between anxiety and academic performance presents an intriguing area for further research.

AUTHOR INFORMATION

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NOTES