

LEARNING SKILLS AND MOTIVATION: CORRELATES TO SUPERIOR ACADEMIC PERFORMANCE

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ABSTRACT

This paper describes a study that was conducted at a mid-sized public state-university in the mid-south, USA, to examine various factors affecting student academic performance. In this study, the 10-scale Learning and Study Strategies Inventory (LASSI) assessment device was administered. This set of scales measures students' receptivity to skills and strategies that purportedly enhance one's ability to learn and successfully perform in an academic setting. Results from this instrument showed that the single most influential learning and study skill promoting positive academic performance was level of intrinsic motivation. To explore the individual aspects of motivation, the 8-scale Downing Self-Assessment Questionnaire was also administered. The Downing questionnaire examines motivational factors, for example, behaviors and beliefs, which might maximize one's potential for positive achievement in college. Along with motivation, the subscale measuring an attitude of life-long learning significantly predicted academic performance. The results of this study have pedagogical implications for helping students maximize their academic performance in college.

JEL: I21; I23

KEY WORDS: Learning Skills, Academic Performance, Student Success, LASSI

INTRODUCTION

At present, it can be safely said without exaggeration that a crisis of sorts currently exists in college education in the United States. As recently as the late 1990s the US led the world in the percentage of students who graduate from college (Abel, 2000). In just a little more than a decade, the US has fallen from first to sixteenth in world college graduation rates (Chalian, 2012). This startling statistic has serious socio-economic implications for the future of the US; and in response, President Obama has urgently expressed the goal of having the US retake the lead in world college graduation rates by 2020 (Carey, 2010). College educators are naturally keenly interested in all aspects of inducing student academic success which would in turn result in higher graduation rates. One area of particular interest to academicians is the question of what personality characteristics, beliefs, and behaviors contribute most positively to student academic performance as measured by student GPA. There is a rich history of academic research on this topic (see the literature review below), but much ambiguity persists. In a recent study (Griffin, MacKewn, Moser & VanVuren, 2012) it was found that amongst learning and study skills, the student's level of motivation is the single most important determinant of superior academic performance. This paper expands upon the earlier Griffin, et al., study by delving more deeply into specific aspects of student motivation.

The specific motivation for this paper was to bring additional clarity to the issue of determinants of superior academic performance in a business school setting. The college or university level of instruction is chosen for examination. In the Griffin, et. al. (2012) study, the Learning and Study Strategies

Inventory (LASSI) (Weinstein, et. al., 1987) assessment device was used to investigate various learning and study skills that arguably should enhance student academic performance. Of the ten subscales comprising the LASSI, the scale dealing with aspects of student's motivation was the scale with the strongest positive correlation with student GPA. Those results beg the question of "just what elements comprise student motivation?" If indeed it is true that a major determinant of superior academic performance is the student's motivation, an in-depth description and understanding of elements of motivation can help academicians in developing pedagogical approaches aimed at helping students maximize their academic performance.

LITERATURE REVIEW

Morrison (1999) examined various student attributes associated with academic motivation. The study drew upon theoretical foundations in the areas of learning, cognitive, sociocultural, and motivational theories (Ames & Ames, 1984; Bandura, 1977; Piaget, 1952; Rotter, 1954; Weiner, 1985). Administering the College Student Inventory (Stratil, 1988), an inventory consisting of 194 items contained in 17 different scales, to entering freshman students at a private liberal arts college, Morrison found that aspects of motivation, such as study habits, academic confidence, family emotional support, and career planning, differed statistically between unconditionally admitted freshman and conditionally admitted freshman. For all of the above-mentioned factors, the unconditionally admitted freshman scored higher than did the conditionally admitted freshman. McKenzie, Gow, and Schwietzer (2004) also used university freshman to examine the relationship between personal attributes and academic performance.

The results of their study found previous academic performance, use of self-regulating learning strategies, and being introverted correlated with successful first year university academic performance. Ridgell and Lounsbury (2004) found that general intelligence, Big Five personality traits, and work drive to be predictors of collegiate academic performance. Previous research by Lounsbury, Sundstrom, Loveland, & Gibson (2003) provided evidence that work drive explained a statistically significant portion of variance, beyond both cognitive ability and Big Five personality measures, in predicting academic performance. In that study, the dependent variable being predicted was the grade in a single course and a hierarchical multiple regression analysis showed that after considering cognitive ability, work drive was a significant predictor of course grade when entered after the Big Five constructs. Interestingly, however, Big Five constructs were not significant predictors when entered after work drive.

The Ridgell and Lounsbury (2004) study had four objectives: 1) to evaluate the effectiveness of general intelligence as a predictor of academic performance; 2) to evaluate the effectiveness of Big Five personality traits as a predictor of academic performance, both individually and in relation to general intelligence; 3) to evaluate the effectiveness of work drive as a predictor of academic performance, both individually and uniquely in relation to general intelligence and Big Five personality traits; and 4) to compare the results of objectives one through three, above, when the dependent variable was an individual course grade versus an overall self-reported GPA. Participants were undergraduate students from a large southeastern USA public university. General intelligence was operationalized by a scale developed by one of the authors (Lounsbury and Gibson, 2002). Big Five personality measures were derived from the Personal Style Inventory (Lounsbury and Gibson, 2002), which was validated in a study by Lounsbury, Tatum, Chambers, Owens, & Gibson (1999). Work drive was operationalized via an 11-item scale also developed and validated by one of the authors (Lounsbury & Gibson, 2002; Lounsbury et al., 2003). The results of the Ridgell & Lounsbury, 2004, study indicated that general intelligence was a statistically significant predictor for both the individual course grade and for overall GPA. Of the Big Five personality traits only one, Emotional Stability, was found to be a statistically significant predictor of a single course grade. However, it did not predict overall GPA with statistical significance. Work drive was also found to predict with statistical significance both individual course grade and overall GPA. And finally, the study results indicated similar validities for both dependent variables – individual course grade

or overall GPA. Bivariate correlations for individual course grade versus overall GPA were similar (i.e., no statistically significant differences) on any of the predictors of general intelligence, Big Five personality traits, or work drive.

Kanfer, Wolf, Kantrowitz, & Ackerman (2010) examined over 25 measures of personality and motivational traits, such as conscientiousness, desire to learn, critical thinking, and goal orientation. This study was predicated on a substantial body of prior research [Hunter & Hunter (1984); Ackerman & Humphreys (1990); Kanfer, Ackerman, Murtha, & Goff (1995); Schmidt & Hunter (1998); Kanfer & Kantrowitz (2002); Kuncel, Hezlett, & Ones (2004)] on the topic of predicting academic and work achievement based on an individual's cognitive abilities or non-ability traits.

This prior research somewhat suggested that either cognitive abilities or non-ability traits can have a strong positive influence on both academic performance and subsequent employment performance. A subsequent study by Crede & Kuncel (2008) indicated that cognitive abilities and non-ability traits have an influence on academic performance. The 2010 Kanfer, et.al., study extended this prior research in at least four ways. First, using a within-subject design, the Kanfer study results confirmed that both cognitive and non-ability traits are significant predictors of academic performance. Furthermore, using a hierarchical regression analysis, results showed that an individual's non-ability traits have statistically significant predictive ability of job performance beyond prediction of academic performance. Secondly, the 2010 Kanfer study utilized factor analysis to specify non-ability traits into seven basic underlying categories: avoidance orientation; learning/mastery orientation; achievement; competitive-other orientation; technical/procedural self-concept; social orientation/communion; and self-management. Using these categories, Kanfer was able to observe a different pattern of results from what might have been expected using just a single generic construct of non-ability trait alone.

Thirdly, the results of the study revealed that the role of the individual and the setting in which they are operating affect the predictive validity of cognitive ability and non-ability traits. In other words, it matters in job performance prediction whether the individual is operating in the role of an intern, versus a full-time entry-level employee, versus an experienced mid-level manager. And finally, the study provided evidence on the effect of different types of specific job knowledge when predicting academic and job performance. Extending on the work of Schmidt, Hunter, Outerbridge, & Tratter (1986); Rolffhus & Ackerman (1999); Ackerman (2000); Ackerman, Bowen, Beier, & Kanfer (2001); Beier & Ackerman (2003) and Kuncel & Hezlett (2007), Kanfer examined the relationship between broad generic knowledge and academic performance and subsequent work performance. The somewhat surprising results from the study were that although positively correlated, preliminary specific job-knowledge was not statistically significant incrementally predictive of either academic or job performance.

Still other studies have looked at such motivational related characteristics such as self-discipline (Mumford, et.al., 1993), best learning styles (Williams, 1992), devotion to study time (Nonis & Hudson, 2006), and commitment to lifelong learning (Kirby, et.al., 2010; and Wielkiewicz, et. al., 2005). Kim, et al., (2010) conducted a study to examine such aspects of motivation as competitiveness, time management, stress management, and involvement in extracurricular activities. All of the above are either aspects of motivation or have implications for motivation. This paper examines more deeply some of these aspects and tries to ascertain with statistical analysis their effect towards inducing superior academic performance of students.

DATA AND METHODOLOGY

Two widely known and statistically validated instruments were used to compile data concerning aspects of motivation. The first, the LASSI, is a series of ten subscales that measure parameters having to do with

learning and study skills and strategies that logically should positively correlate with superior or improved academic performance.

The ten subscales can be summarized as follows: Anxiety (ANX), which addresses the degree to which one experiencing anxiety and stress in pursuing academic endeavors. This subscale is reversed scored, meaning that the lower the indicated anxiety, the higher the score. The logical assumption underpinning this structure is that high anxiety actually is counter-productive to high academic performance, thus reversing the score so that the higher the score, the more favorable the implication for superior academic performance. Attitude and Interest (ATT) measures the degree that one has a positive attitude toward and is interested in academic pursuits. The higher the score on the subscale, the more interest indicated in academic matters, and the greater the level of superior academic performance that should be achieved. Concentration and Attention (CON) addresses the intensity of focus one applies to the pursuit of academic matters. The higher the score on the subscale, the greater the degree of concentration and focus applied. Information Processing (INP) measures the degree that one utilizes such techniques as imagery, verbal elaboration, and reasoning skills in academic pursuits. The higher the score on the subscale, the greater the degree of information processing applied. Motivation (MOT) measures one's diligence, self-discipline, and willingness to exert effort in the pursuit of academic endeavors.

The higher the score on the subscale, the greater the willingness to apply whatever effort is necessary to achieve a given academic goal. Self-testing (SFT) measures the degree to which one applies self-monitoring and review techniques to retain information relevant to a particular task. Selecting Main Ideas (SMI) addresses one's ability to identify main ideas and important points relevant to an academic task. Study Aids (STA) measures the degree to which one utilizes study aids, such as textbook end-of-chapter problems/exercises, PowerPoint slides, within chapter boldfaces and highlights, etc. Time Management (TMT) assesses the efficiency in which one utilizes available time expended in the pursuit of academic endeavors. A high score on this subscale indicates that the student engages in a minimal degree of procrastination and strong control of non-academic distractions. Test Strategies (TST) measures one's ability to effectively prepare for test-taking and then successfully execute the test-taking event. A high score on the subscale is indicative of a high degree of effective test-preparation and test-taking skills.

The average LASSI subscale scores generally range from the low-teens up to about 40, expressed as a percentile. As can be observed from the above subscale descriptions, the higher the score the better in that a high score in each respective attribute should most logically translate into greater/better academic performance. The second instrument used in this study was a questionnaire developed to assess freshman skills (Downing, 2005). The Downing Scale identifies eight key belief/behavioral factors that define a successful student. Distilling, via a factor analysis technique, from 64 individual questions, Downing came up with eight essential factors explaining superior student performance in academic affairs. Those eight factors can be summarized as follows: Accepting Self-Responsibility (APR) which measures the degree to which one accepts personal responsibility for creating the outcomes and quality of their lives. The higher the score on this subscale, the more the student sees themselves as the primary cause of their outcomes and experiences. Discovering Self- Motivation (DSM) measures the degree to which one develops a motivating purpose in life as characterized by personally meaningful goals and dreams.

A student with a high score on this scale finds largely finds purpose in their by discovering personally meaningful goals and dreams. Mastering Self-Management (MSM) addresses the degree to which one consistently plans and takes effective actions in pursuing their goals and dreams. The higher the score on this subscale, the more the student plans and takes purposeful actions in pursuit of their goals and dreams. Employing Interdependence (EMI) is the degree to which one builds mutually supportive relationships that assist in pursuing goals and dreams. Gaining Self-Awareness (GSA) measures whether one gains heightened self-awareness by developing empowering beliefs, attitudes, and behaviors conducive to achieving goals and dreams. Adopting Lifelong Learning (ALL) addresses whether one strives to become

a lifelong learner, striving to find valuable lessons in nearly every life experience. Developing Emotional Intelligence (DEI) – measures the development of one’s emotional maturity as characterized by optimism, happiness, and peace of mind. A high score on this subscale indicates that the student effectively manages their emotions in support of their goals and dreams. Believing in Myself (BIM) measures the degree to which one feels capable, lovable, and unconditionally worthy as a human being. A student with a high score on this subscale has a high level of self-confidence and feeling of self-worth.

The average Downing subscale scores generally range from low teens to around 80. The Downing Survey version used in this study was actually comprised of 64 individual questions – 8 questions each, via factor analysis, loading on the 8 factors or subscales indicated above. The possible response to each question is structured as an 11-point Likert scale ranging from “totally false” to “totally true”. The eight aggregate Downing subscale scores were computed by taking the response values for four individual questions that should logically have a positive correlation with performance outcome, adding them up, adding 40, and then subtracting the sum of the response values for the corresponding reverse-scored individual questions that should have a negative correlation with performance outcome. Thus, the higher the score on the 8 factor subscales the better in that a high score in each respective attribute should most logically translate into greater/better performance outcome.

In this study, the LASSI and the Downing questionnaire was administered to 45 freshman undergraduate students in the Fall 2011 semester at a mid-sized public university in the mid-south, USA. Of the 45 students, 20 were males and 25 were females. Broken down by major, 25 were business majors and 20 were non-business majors. Most recent cumulative GPA was designated as a measure for academic performance. The final GPA was observed at the end of the Fall 2011 semester, the same time the two survey instruments were administered to the students.

RESULTS

The first step in the analysis of factors affecting academic performance was to observe the average scores of the 10 LASSI subscales and 8 Downing subscales. Table 1 shows the means and standard deviations.

Table 1: Means and Standard Deviations of the 10 LASSI and 8 Downing Subscales

LASSI subscale	Mean	SD	Downing subscale	Mean	SD
Anxiety	26.42	6.03	Personal Responsibility	60.15	11.60
Attitude	31.11	4.04	Self-Motivation	55.83	12.19
Concentration	27.53	5.47	Self-Management	56.58	12.35
Info. Processing	27.89	5.67	Interdependence	44.53	10.07
Motivation	32.20	3.92	Self-Awareness	52.11	13.00
Self-Testing	24.89	5.54	Lifelong Learning	48.21	16.85
Selecting Main Ideas	28.16	5.18	Emotional Intelligence	51.09	14.35
Study Aids (Use of)	24.51	5.33	Believing in Myself	58.38	12.19
Time Management	24.67	5.20			
Test Strategies	28.11	3.53			

This table summarizes the means and standard deviations of the 10 LASSI and 8 Downing Subscales.

Remembering that the higher the score the more strongly felt the attribute, the highest LASSI subscale mean (32.20) was Motivation – assessing the student’s diligence, self-discipline, and willingness to exert the effort requisite to achieve superior performance. The lowest/weakest felt subscale mean (24.51) was Use of Study Aids. For the Downing questionnaire, the highest subscale mean (60.15) was Accepting Personal Responsibility and the lowest (44.53) was Interdependence. Aside from the mean scores of the LASSI and Downing subscales, the real issue is which, if any, of these attributes drive positive/improved academic performance? The answer to this question can be inferred by observing bivariate correlations of the LASSI and Downing subscale scores with GPA. Table 2 shows the results.

Table 2: Pearson Correlations with the LASSI and Downing Subscales with College GPA

LASSI subscale	r	p-value	Downing subscale	r	p-value
Anxiety	0.095	0.534	Personal Responsibility	0.233	0.133
Attitude	0.279	0.064	Self-Motivation	0.410	0.007 **
Concentration	0.234	0.123	Self-Management	0.433	0.005 **
Info. Processing	0.140	0.358	Interdependence	0.222	0.152
Motivation	0.404	0.006 **	Self-Awareness	0.331	0.037 *
Self-Testing	0.150	0.326	Lifelong Learning	0.614	0.000 **
Selecting Main Ideas	0.146	0.339	Emotional Intelligence	0.171	0.284
Study Aids (Use of)	0.111	0.467	Believing in Myself	0.291	0.065
Time Management	0.063	0.682			
Test Strategies	0.218	0.151			

*Significant $p \leq .05$ **Significant $p \leq .01$ This table summarizes the results of Pearson correlations with the LASSI and Downing subscale scores with Final Fall GPA. Significant correlations were found between GPA and Motivation (LASSI survey), Self-Motivation, Self-Management, Self-Awareness, and Lifelong Learning (Downing). The * and ** indicate significance at the 5 and 1 percent.

The only LASSI subscale that statistically correlated with GPA was Motivation ($r = .404, p = .006$). The positive correlation suggests that the higher the degree of student motivation, the stronger the academic performance. This is not a surprising result, but a result that also begs for clarification. The LASSI construct of Motivation is somewhat vague; but in that the Downing subscales can be viewed as addressing more detailed aspects of motivation, the Downing subscales can provide some of that clarification. Of the 8 Downing subscales, four of them correlated, with statistical significance, with GPA. Those four correlating Downing subscales were Discovering Self-Motivation ($r = .410, p = .007$), Mastering Self-Management ($r = .433, p = .005$), Gaining Self-Awareness ($r = .331, p = .037$), and Adopting Lifelong Learning ($r = .614, p = .000$). Each of these four subscales, from the descriptions that Downing has chosen to assign them, seem to have something to do with a person’s deep-seated personal beliefs, attitude and motivations. Further analysis would allow for determination as to what these beliefs, attitudes, and motivations might be. Table 3 presents a summary of each of the 64 individual Downing questions correlations with GPA – but due to space considerations, lists only those individual questions that correlate, with statistical significance, with GPA.

Table 3: Pearson Correlations Between the 64 Downing Survey Questions and Fall Final GPA

Q#	Individual Downing Question	r	p
5	When I get off course from my goals and dreams, I realize it right away.	0.326	0.031 *
6	I'm not sure how I learn best.	-0.426	0.004 **
10	If I lose my motivation in college, I know how to get it back.	0.294	0.050 *
13	If I have habits that hinder my success, I'm not sure what they are.	-0.416	0.004 **
14	When I don't like the way that an instructor teaches, I know how to learn the subject anyway.	0.471	0.001 **
16	When I think about performing an upcoming challenge, I usually see myself doing well.	0.329	0.027 *
18	I don't know how to set effective short-term and long-term goals.	-0.494	0.001 **
22	I don't know how to study effectively.	-0.391	0.009 **
25	I make poor choices that keep me from getting what I really want in life.	-0.413	0.005 **
27	I lack self-discipline.	-0.464	0.001 **
29	I'm stuck with any habits of mine that hinder my success.	-0.441	0.003 **
31	I often feel bored, anxious, or depressed.	-0.462	0.001 **
37	I can be off course from my goals and dreams for quite a while without realizing it.	-0.343	0.023 *
38	I know how I learn best.	0.520	0.000 **
44	I know very few people that I can count on for help.	-0.419	0.004 **
46	If I don't like the way that an instructor teaches, I'll probably do poorly in the course.	-0.538	0.000 **
48	When I think about performing an upcoming challenge, I usually see myself doing poorly.	-0.301	0.047 *
54	I've learned to use specific study skills that work effectively for me.	0.379	0.011 *
57	I make wise choices that help me get what I really want in life.	0.323	0.033 *
58	I live day by day, without much plan for the future.	-0.343	0.023 *
59	I am a self-disciplined person.	0.492	0.001 **
62	When I face a disappointment (like failing a test), I feel pretty helpless.	-0.450	0.002 **

*Significant $p \leq .05$ **Significant $p \leq .01$ This table shows the significant Pearson Correlations between the 64 specific Downing subscale questions and Fall Final GPA. The * and ** indicate significance at the 5 and 1 percent.

Of the 64 individual Downing questions, 22 correlated with statistical significance with GPA. The statistically significant correlation coefficients ranged from a high of .538 (Q46) to a low of .294 (Q10). The interesting thing to note from Table 3 is that every statistically significant question that positively correlates with GPA is one that one would expect to logically correlate positively. Likewise, every

statistically significant question that correlates negatively with GPA is one that one would logically expect to have a negative correlation. There are no logical inconsistencies in the direction of the correlations. To add yet further clarity to the analysis, it is helpful to organize by subscale factor the 22 individual Downing questions that correlate with GPA. Table 4 shows the results.

Table 4: Summary of Pearson Correlations between Significant Individual Downing questions and Fall Final GPA

Q#	Individual Downing Question	Mean	SD	p-value	
Downing factor #1 - Accepting Personal Responsibility					
57	I make wise choices that help me get what I really want in life.	8.23	2.38	0.033	*
25	I make poor choices that keep me from getting what I really want in life.	3.67	2.63	-0.005	**
Downing factor #2 - Discovering Self-Motivation					
10	If I lose my motivation in college, I know how to get it back.	8.16	2.11	0.050	*
18	I don't know how to set effective short-term and long-term goals.	3.94	2.60	-0.001	**
58	I live day by day, without much plan for the future.	4.25	3.03	-0.023	*
Downing factor #3 - Mastering Self-Management					
59	I am a self-disciplined person.	8.28	2.68	0.001	**
27	I lack self-discipline.	3.31	2.52	-0.001	**
Downing factor #4 - Employing Interdependence					
44	I know very few people that I can count on for help.	3.43	2.62	-0.004	**
Downing factor #5 - Gaining Self-Awareness					
5	When I get off course from my goals and dreams, I realize it right away.	7.83	2.05	0.031	*
13	If I have habits that hinder my success, I'm not sure what they are.	4.65	3.01	-0.004	**
29	I'm stuck with any habits of mine that hinder my success.	3.55	2.58	-0.003	**
37	I can be off course from my goals and dreams for quite a while without realizing it.	4.25	2.79	-0.023	*
Downing factor #6 - Adopting Lifelong Learning					
14	When I don't like the way that an instructor teaches, I know how to learn the subject anyway.	6.5	2.44	0.001	**
38	I know how I learn best.	7.21	2.76	0.000	**
54	I've learned to use specific study skills that work effectively for me.	7.63	2.73	0.011	*
6	I'm not sure how I learn best.	5.1	3.05	-0.004	**
22	I don't know how to study effectively.	4.38	2.94	-0.009	**
46	If I don't like the way that an instructor teaches, I'll probably do poorly in the course.	4.73	2.89	0.000	**
62	When I face a disappointment (like failing a test), I feel pretty helpless.	4.67	2.97	-0.002	**
Downing factor #7 - Developing Emotional Intelligence					
31	I often feel bored, anxious, or depressed.	4.71	2.98	-0.001	**
Downing factor #8 - Believing in Myself					
16	When I think about performing an upcoming challenge, I usually see myself doing well.	7.37	2.78	0.027	*
48	When I think about performing an upcoming challenge, I usually see myself doing poorly.	3.67	2.61	-0.047	*

*Significant $p \leq .05$ ** Significant $p \leq .01$ This table summarizes Pearson Correlations between significant individual Downing questions and Fall Final GPA. The * and ** indicate significance at the 5 and 1 percent.

The results of Table 4 are logically consistent with the results of Table 2, except that now more underlying detail can be observed. The subscale factors of Discovering Self-Motivation, Mastering Self-Management, Gaining Self-Awareness, and Adopting Lifelong Learning were correlated with statistical significance with GPA. From Table 4 it can be readily observed why those four factors fall out with the most statistical significance. For Downing subscale #6, Adopting Lifelong Learning (ALL), seven of the eight individual questions comprising that factor show statistically significant correlation with GPA. With a correlation coefficient of .614, this subscale explains 38% of the variance in GPA (see Table 2). Two of the individual questions comprising ALL had p-values of .000 – Q38, “I know how I learn best” (positive correlation) and Q46, “If I don’t like the way an instructor teaches, I’ll probably do poorly in the course” (negative correlation). The second strongest is Mastering Self-Management (MSM). The correlation coefficient is .433 ($p = .005$) and explains 19% of the variance in GPA. Only two of the eight individual questions comprising this factor show statistically significant correlation with GPA; but those two are both very strongly correlated – Q59, “I am a self-disciplined person” (positively correlated) with a coefficient of .492, and Q27, “I lack self-discipline” (negatively correlated) with a coefficient of -.464. Both of this pair of “reverse-worded” questions has a p-value of .001. Also correlating to GPA with statistical significance is Downing subscale #2, Discovering Self-Motivation (DSM), with a correlation coefficient of .410 and p-value of .007 and explaining 17% of the variance in GPA (see Table 2). Three of the individual questions comprising DSM correlate with GPA with statistical significance, but for only one of the three is the p-value less than .01. That individual question is Q18, “I don’t know how to set

effective short-term and long-term goals” (negative correlation) with a coefficient of -.494 and p-value of .001. From Table 2, it can be seen that the fourth and final Downing subscale to correlate with statistical significance with GPA is subscale #5, Gaining Self-Awareness (GSA).

The correlation for GSA is .331 (p = .037), explaining 11% of the variance. As far as the individual questions comprising this factor, there are four statistically significant correlations, the two strongest of which are Q13, “If I have habits that hinder my success, I’m not sure what they are” (negative correlation) and Q29, “I’m stuck with any habits of mine that hinder my success” (negative correlation). Q13 has a coefficient of -.416 (p = .004) and Q29 has a coefficient of -.441 (p = .003). Thus far the analysis has shown primary correlates to superior academic performance to be motivation, as measured by LASSI subscale five and an array of Downing constructs, but further analysis is warranted. This can be accomplished by running a series of regressions with GPA as the dependent variable with LASSI subscale five and the most statistically significant Downing items as the independent (predictor) variables so the question of which mix of LASSI and Downing subscales are most efficient and effective in predicting superior academic performance can be addressed.

Table 5-1: Multiple Regression with GPA as the Dependent Variable and the Motivation Subscale from the LASSI and the Self-Motivation, Self-Management, Self-Awareness, and Lifelong Learning, from the Downing, as Predictors

Independent Variables	t	sig.	F	sig.		adj. R-sq.
MODEL #1			5.971	0.001	**	0.422
LASSI #5 - Motivation	1.86	0.07				
Downing #2 - Self-Motivation	-0.37	0.72				
Downing #3 - Self-Management	0.70	0.49				
Downing #5 - Self-Awareness	-1.286	0.21				
Downing #6 - Lifelong Learning	3.067	0.005	**			

*Significant $p \leq .05$ **Significant $p \leq .01$ This table shows the regression estimates of the equation: Fall GPA = 0.11 + 0.74 (Lifelong Learning). The first figure in the table shows the t-statistic.

The first regression model loaded all of the subscales of the 10 LASSI and 8 Downing subscales that showed statistically significant correlations with GPA as predictors. Therefore, the independent variables for the first regression model were Motivation (LASSI #5), Discovering Self-Motivation (Downing #2), Mastering Self-Management (Downing #3), Gaining Self-Awareness (Downing #5), and Adopting Lifelong Learning (Downing #6). The following regression equation was used to predict Fall GPA, Fall GPA = 0.11 + 0.74 (Lifelong Learning). results are presented in Table 5-1.

Results of the regression indicate the model to be significant, $F(4, 41) = 5.97, p = .001$. The adjusted R-squared is .42, meaning that 42 percent of the variability of GPA is explained by these five variables. Note, however, that in this model only Downing #6, Adopting Lifelong Learning has statistical significance ($t = 3.067, p = .005$). The Motivation subscale on the LASSI is in the right direction, although non-significant, $t(39) = 1.86, p = .073$. Because Self Motivation, Self-Management, and Self-awareness lack statistical significance in this model they were not be included in the second regression analysis, using the LASSI motivation subscale and the subscale Downing Life Long Learner as predictors. Results are presented in Table 5-2.

The second regression model has a much higher $F(2, 41) = 15.65, p < 0.05$, however the adjusted R-squared of .435 is only slightly improved from that of the first model. The regression equation was Fall GPA = -0.34 + 0.57 (Lifelong Learner) + 0.30 (Motivation). Recall that the Downing questionnaire starts out as 64 individual questions, which are then factored down to 8 clusters of subcategories via factor analysis. When looking at the structure of the 8 individual questions within each subscale, some are positively correlated and others are negatively correlated to that factor. Since multicollinearity could be a problem, a third regression was performed with the individual questions having statistically significant

positive correlations loaded in as predictors. Results indicated that only one individual question showed statistical significance as a predictor – Q59, “I am a self-disciplined person” ($t = 2.521, p = .017$). A fourth regression was also performed with all the individual questions having statistically significant negative correlations and loaded in as predictors. Again, only one individual question showed statistical significance as a predictor – Q18, “I don’t know how to set effective short-term and long-term goals” ($t = -2.447, p = .022$). Note that Q59 loaded on subscale #3, Mastering Self-Management, and Q18 loaded on subscale #2, Discovering Self-Motivation. Therefore, a third regression model (DV still GPA) was constructed with IVs of the LASSI subscale Motivation, Downing subscale Adopting Lifelong Learning), and Downing individual questions #59 and #18. Results are presented in Table 5-3.

Table 5-2: Multiple Regression with GPA as the Dependent Variable and the Motivation Subscale from the LASSI and the Life Learning Subscale from the Downing as Predictors

Independent Variables	t	sig.	F	sig.	adj. R-sq.
MODEL #2			15.647	0.000 **	0.435
LASSI #5 - Motivation	2.44	0.020 *			
Downing Factor #6 - Lifelong Learning	4.61	0.000 **			

*Significant $p \leq .05$ **Significant $p \leq .01$ This table summarizes the Multiple Regression with GPA as the Dependent Variable and the Motivation subscale from the LASSI and the Life Learning subscale from the Downing as Predictors. Both were significant predictors. The regression estimates of the equation was: Fall GPA = $-0.34 + 0.57$ (Lifelong Learner) + 0.30 (Motivation).

Table 5-3: Multiple Regression with GPA as the Dependent Variable and the Motivation Subscale from the LASSI, and the Subscale Lifelong Learning and Specific Questions from the Downing about Setting Goals and Having Self-discipline as Predictors

Independent Variables	t	sig.	F	sig.	adj. R-sq.
MODEL #3			10.058	0.000 **	0.502
LASSI #5 - Motivation	1.38	0.179			
Downing Factor #6 - Lifelong Learning	2.48	0.019 *			
Q18 - setting goals	-1.22	0.231			
Q59 - having self-discipline	2.04	0.050 *			

*Significant $p \leq .05$ **Significant $p \leq .01$ This table summarizes a Multiple Regression with GPA as the dependent variable and the motivation subscale from the LASSI, and the subscale Lifelong Learning from the Downing, and specific questions from the Downing about Setting Goals and Having Self-discipline as Predictors. The model was significant with Lifelong Learning and Having Self Discipline being significant predictors. The regression estimates of the equation was: Fall GPA = $0.48 = 0.38 + 0.38$ (Lifelong Learner) + 0.328 (Q59 of the downing, having self-discipline).

Model-3 is a substantial improvement over the prior two models in terms of percentage of variance explained, $F(3, 41) = 10.06, p < 0.05$, adjusted $R^2 = .50$. Thus, the independent variables in this model accounted for just over half of the variability observed in GPA. The best predictor of GPA was the Downing subscale #6, Adopting Lifelong Learning ($t = 2.481, p = .019$). The individual Downing question #59, having to do with one’s degree of self-discipline, also has statistically significant predictive ability, ($t = 2.04, p = .050$).

CONCLUDING COMMENTS

In summary, this study accomplishes the goal of adding incremental clarity to the results of the prior Griffin, et. al. (2012). The current study administered the Learning and Study Strategies Inventory (LASSI) and the Downing Self-Assessment Questionnaire to 45 freshman students at a mid-sized southern U. S. public university. The LASSI is a 10-scale instrument that measures students’ receptivity to skills and strategies that purportedly enhance one’s ability to learn and successfully perform in an academic setting. The 8-scale Downing Questionnaire examines motivational factors, which might maximize one’s potential for positive academic achievement in college.

The primary finding of the initial Griffin, et al., (2012) study was that the primary learning and study skill, as defined by the Learning and Study Strategies Inventory (LASSI,) that drives superior academic performance is simply the student's motivation. Not surprisingly, the greater the student's motivation, the better they perform in academic pursuits. This study confirmed that finding and then used the Downing Self-Assessment Questionnaire to delve deeper into aspects of motivation. The results of this study indicate, more specifically, that amongst the strongest predictors of superior academic performance is the student's self-perception of their degree of self-discipline. Again, not surprisingly, the more self-disciplined a student perceives himself/herself, the better they do academically. The Downing data also indicates that the other strongest predictor of superior academic performance is the subscale of Adapting Lifelong Learning (ALL). Examining the detail of the ALL reveals that academic performance is enhanced by identifying a personal best learning style and then knowing specifically how to execute it. Finally, a student's ability to ignore an instructor's teaching style that the student doesn't like, and proceeding to learning the material anyway, is conducive to achieving superior academic performance.

College and university teachers /instructors should emphasize to their students that these are perhaps the key attributes, among numerous other possibilities, that students should develop and pursue if one of their major life objectives is to do well in school. This was an exploratory study; the sample size of 45 was not large enough to provide statistical power usually expected for a study of this nature. Furthermore, the usual reservations concerning insufficient statistical validity and reliability are certainly appropriate regarding this study. One might argue, also, that there are better constructs other than the LASSI and Downing subscales to serve as predictors of academic performance. One might even argue that there are more appropriate measurements other than GPA to serve as proxy for academic performance.

In that the LASSI and the Downing questionnaire are both self-assessment instruments, it should also be pointed out that the study may have been diminished by various response biases. For future study, some of the above limitations can be addressed by replicating the study with a larger sample of respondents drawn from a more diverse population of students. Statistical reliability can be more strongly established by replicating the study with other student sample groups drawn from other universities. The statistically dominant predictors (i.e., student self-discipline, propensity for life-long learning, and ability to identify a personal best learning style) of superior academic performance that were identified by this study can perhaps best studied in the future using experimental study designs and methodologies.

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