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Knowledge Monitoring Accuracy and College Success of Underprepared Students

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Abstract: *The goal of the current project is to examine the relationships between Knowledge Monitoring Accuracy (KMA), KMA Training, academic achievement and retention. Significant relationships were found between KMA accuracy, training and academic achievement. Additionally, a key predictor of retention, first term GPA, was positively correlated with KMA accuracy.*
Keywords: *Knowledge Monitoring Accuracy, Retention, Academic Achievement*

Numerous universities and colleges use SAT scores, as well as high school GPAs (HSPGA), to predict the success of potential students. As a result of the academic diversity of students and other contextual factors, the degree to which the SAT and HSGPA can predict first term GPA (FTGPA) and progression has come into question (Korbin & Patterson, 2011). Despite admission requirements, those who enter college are underprepared for the learning environment and expectations of college (Sparks & Malkus, 2013). Yet, when underprepared students actively engage in educationally effective strategies, specifically self-regulation, they are more likely to succeed in college (Kinzie, Gonyea, Shoup, & Kuh, 2008). In the current study, self-regulation in the form of knowledge monitoring was examined. The current study had three goals 1) to examine the predictive validity of the SAT, HSGPA and FTGPA for retention of underprepared students; 2) to examine the relationships between KMA training and academic achievement; and 3) to examine the predictive validity of the KMA for FTGPA for underprepared students.

The number of students graduating high school and immediately enrolling in 2 or 4-year colleges or universities is increasing (NCES, 2012b). The National Center for Educational Statistics (NCES, 2012a) notes that between 1990 and 2000 college enrollment increased by 11 percent whereas between 2000 and 2010 enrollment increased by 37 percent. As universities and colleges are trying to expand and at the same time fight for dollars, they enroll more students from a variety of educational and social backgrounds. Often, these students are underprepared for the academic and social expectations of higher education.

Ley and Young (1998) found underprepared college students had deficiencies in their self-regulatory strategies in comparison to prepared students. Self-regulating students select effective study strategies, manage their time and monitor their own progress (Dembo & Seli, 2007; Tobias & Everson, 2009). Tobias and Everson (2009) contend that at the foundation of self-regulation is knowledge monitoring. In a study of community college students, Cukras (2006) found that students who scored well on class exams monitored their study plans.

High-achieving students regulate their learning through knowledge monitoring, and poor performing students often over-estimate their future performance and do poorly on their tests and quizzes (Hacker, Bol, Hogan & Rakow, 2000; Hartwig, Was, Isaacson, & Dunlosky, 2012; Isaacson & Fujita, 2006; Was, Isaacson, Beziat & Dippel, 2011). A positive relationship has

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been established between knowledge monitoring accuracy and performance on classroom exams (Hartwig et al., 2012; Was et al., 2011). The findings from Hartwig et al. (2012) show students in the beginning of the semester that were able to accurately monitor their knowledge performed well on future exams in the class. In addition, students who were accurate knowledge monitors outperformed poor knowledge monitors on the final exam.

Importantly, research has shown self-regulation, in the form of knowledge monitoring, can be taught and improved (Isaacson, Was, Beziat & Dippel, 2011; Isaacson & Was, 2010; Pintrich, 1995). Isaacson and colleagues' (2011, 2010) research examined the effects of knowledge monitoring practice in college classrooms. During the semester students were provided with multiple opportunities to practice their knowledge monitoring and receive feedback about their accuracy. Students' knowledge monitoring scores were correlated to their final exam scores and overall, students' knowledge monitoring accuracy increased from the beginning the semester. Evidence from this research provides support that knowledge monitoring accuracy can be improved through training and is a predictor of success in a college class.

The first aim of the current project was to examine the predictive validity of the SAT and HSGPA as well as, FTGPA for retention of underprepared students. A second aim of the current project was to examine the relationships between KMA training and academic achievement. A third and final aim of the current study was to examine the predictive validity of KMA Scores, and introductory course grades (U100) for FTGPA.

EXPERIMENT ONE

METHODS AND RESULTS

To examine the retention question, archival academic data was reviewed for 315 students enrolled in an introductory course designed to prepare students for the expectations of college. Composite SAT scores, transformed high school GPAs (HSGPA), first term GPAs (FTGPA), and data on whether or not students returned in the spring and the next year were included in the study. A total of 199 students were included in the final analysis. Table 1 presents descriptive statistics on SAT scores and HSGPA. Based on the College Board's mean SAT and High School GPA for that year, students in the current sample are underprepared for college.

Table 1. *Descriptive Statistics*

	Composite SAT Score	High School GPA
Mean	850 (1017*)	2.54 (3.31*)
Median	830	2.54
Minimum	580	.86
Maximum	1260	3.87

*Notes: *Mean Scores from 2008 College Board Report*

Forward logistic regression was conducted to determine if SAT, HSGPA, FTGPA or Fall to Spring Retention were predictors of one year retention. Descriptive statistics of the independent variables are listed in Table 2. Results indicate the overall model of two predictors (FTGPA and Fall to Spring Retention) was questionable in distinguishing between those who were and were not retained after one year (-2 Log Likelihood=203.642, *H-L* =10.02, p=.263) but was statistically significant in predicting retention ($\chi^2(2)$=64.538, p<.001). The model correctly classified 76.4% of the cases. Regression coefficients are presented in Table 3. Wald statistics

indicated that FTGPA and Fall to Spring Retention significantly predicted one year retention. The odds ratio for FTGPA indicated little change in the likelihood of the individual returning the next year, however, the odds ratio for fall to spring retention indicated a significant change in likelihood of the individual returning the next year.

Table 2. *Descriptive Statistics for Retention*

	Minimum	Maximum	*M*	SD
SAT	580	1260	850.69	112.221
HSGPA	.86	3.87	2.5373	.49016
FTGPA	.0	4.0	1.825	1.2236
Fall to Spring Retention		*N*	%	
Retained		241	76.5	
Not Retained		74	23.5	
One Year Retention				
Retained		174	55.2	
Not Retained		141*	44.8	

*Note: *67 of these students left after the fall term*

Table 3. *Regression Coefficients for Retention*

	B	*Wald*	*df*	*p*	Odds
Fall to Spring Retention	2.410	13.036	1	.000	11.135
FTGPA	.689	18.159	1	.000	1.992
Constant	-2.973	19.583	1	.000	.051

For the current sample, composite SAT scores and HSGPA were not valid predictors of college retention. FTGPA and fall to spring retention proved to be predictors of one year retention. A significant moderate correlation was found between FTGPA and fall to spring retention and between FTGPA and one year retention (See Table 4). Success in the first semester of college is important for progression and retention.

Table 4. *Correlations Among Academic Scores and Retention*

	HSGPA	SAT	FTGPA	Fall to Spring Retention	One Year Retention
HSGPA		.019	.345*	.098	.161*
SAT			.037	.032	-.009
FTGPA				.490*	.447*
Fall to Spring Retention					.510*
One Year Retention					

*Notes: N's range from 216 to 315 due to occasional missing data; *p*<.01*

EXPERIMENT TWO

METHOD AND RESULTS

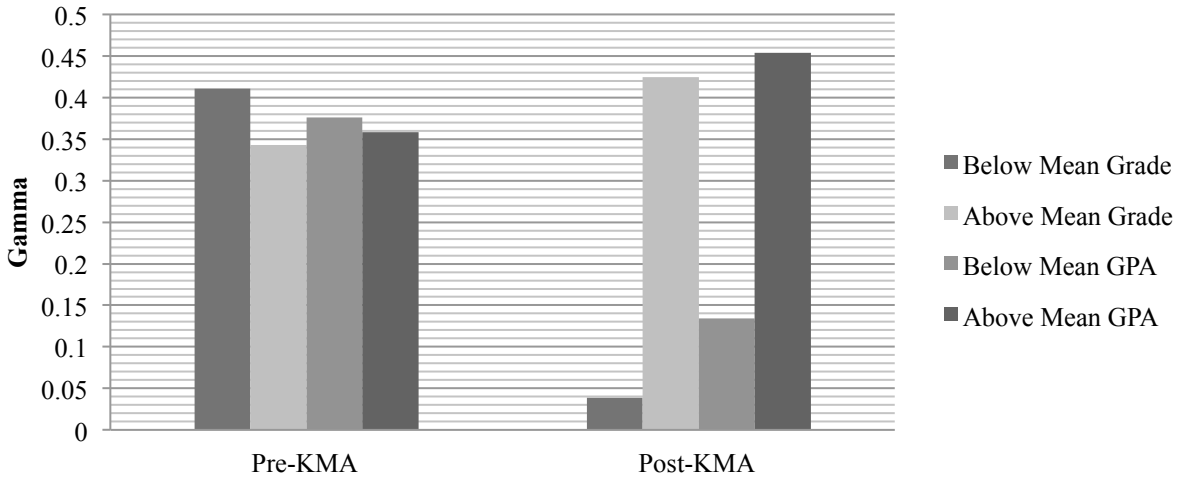
Students enrolled in an introductory course (U100) were given a knowledge monitoring assessment in the first two weeks (Pre-KMA) and the last two weeks of the semester (Post-

KMA). The U100 syllabus states the class is a "3-credit course that provides opportunities for discovery learning, instruction in learning skills, and assimilation into the social and academic cultures of [name removed] campus." The students' U100 grades and first term GPAs were collected in addition to their pre and post KMA scores.

A repeated measures ANOVA was conducted to see if there were differences from the beginning of the semester to the end of the semester for KMA. Results from the multivariate tests indicate a statistically significant effect for the within-subjects factor, test, Wilk's $\Lambda = .968$, $F(1,136)=4.94$, $p=.036$, $m\eta^2=.032$. Student enrolled in the U100 class improved their knowledge monitoring accuracy over the course of the semester (Pre-KMA $M=.232$, SD=.053; Post KMA $M=.401$, SD=.066).

To determine if these changes affected students' grades in the class and for the term further analyses were conducted. To conduct these analyses the data was first split in two groups based on those who scored above and below the mean for the class. An independent sample t-test found that those who scored above the mean for the class had significantly higher post KMA scores, $t(68)=3.46$, $p<.001$. The second analyses used a mean split for FTGPA. Again, those scoring above the mean had significantly higher post-KMA scores than those below the mean, $t(68)=3.42$, $p=.001$. Those scoring above the mean for the course grade and on their term GPA exhibited better knowledge monitoring accuracy at the end of the semester (see Graph 1).

Graph 1. *Mean Split Analyses*



Note: *Mean Grade=78 Mean GPA=2.21*

Regression analyses were conducted to determine which independent variables, Pre-KMA, Post-KMA or U100 Grade were predictors of FTGPA. The overall regression model results indicated Post- KMA and U100 Grade were predictors of FTGPA, $R^2=.670$, $R^2_{adj}=.650$, $F(3,49)=33.19$, $p<.001$. Table 5 contains a summary of correlations and regression coefficients.

The current model accounted for 67% of the variance in FTGPAs. Students' scores in the introductory classes were strongly correlated with their FTPGAs. Additionally, there were significant correlations between students Post-KMA scores and their U100 Grade and their FTGPA. Interestingly, Pre-KMA scores were not correlated with academic scores.

Table 5. *Predictors of Term GPA (N=53)*

Variable	Zero-Order *r*				β	*t*	*p*
	Pre-KMA	Post-KMA	U100 Grade	Term GPA			
Pre-KMA		.027	.234	.204	.107	.404	.688
Post-KMA			.334**	.472**	.237	2.72	.009
U100 Grade				.787**	.700	7.18	<.000
Term GPA					Intercept =	-3.57	
Mean	.347	.356	85.28	2.56			
SD	.291	.384	9.19	.907	R^2 =	.670	

DISCUSSION

The results from this study confirmed SAT scores and HSGPAs are not accurate predictors for students' progression and retention within the first year. A student's success in the first semester, particularly their GPA that semester and progressing to the next semester, are better predictors of one-year retention. Despite the evidence that SAT and HSGPAs are ineffective predictors of students' success and progression; many universities continue to employ them in their admission requirements. Higher education should continue to reevaluate their screening processes taking into account the variety of factors that affect a student's success in college.

Additionally, the current study confirmed that knowledge monitoring can be improved through training and higher KMA scores are related to academic success. The current study also found that post-KMA scores are a predictor of first term GPAs. The first experiment found first term GPAs is a predictor of retention and the second experiment results indicated that first term GPAs are correlated with KMA scores. Further research should explore the relationships between first term GPAs, KMA scores and retention. Of particular importance, is whether accurate knowledge monitoring is a predictor of retention for underprepared students in college?

Finally, students with varying education levels are entering college and at times they lack the necessary skills to succeed in college. In the current study, students who were academically successful in their introductory course were more likely to return to campus the next fall. Though this course offered limited direct training on knowledge monitoring skills, it did promote self-regulatory skills. Despite the limited training, students KMA scores improved over the course of the semester and students with better knowledge monitoring accuracy, a form of self-regulation, outperformed less accurate monitors in their introductory course and in their overall GPA. One plausible way to improve retention of underprepared students is to have them take an introductory course that focuses on knowledge monitoring and self-regulatory skills. This will in turn hopefully improve their first semester GPA and the prospect that they will return the next semester. Continued research should explore how training in knowledge monitoring and self-regulation can improve students' academic outcomes and possibly improve retention rates.

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