Linking individual and institutional factors to motivation: A multilevel approach

John Rugutt
Illinois State University

Abstract
This study used a Hierarchical Linear Modeling (HLM) approach to investigate relationships between student motivation, higher-order thinking skills, quality of teaching and learning, teacher student relations, student satisfaction with course contribution to their learning, and active learning strategies, with a sample of 2,190 undergraduate students. The HLM results indicate significant differences among departments in student motivation (2 (31) = 260.90, p < 0.000). This variation among university departments suggests that the department-level variables might have accounted for the differences in motivation scores. An Intra-class correlation for this sample is 0.17, indicating that 17% of variance in motivation was among departments. Further, the reliability of the sample mean in any department for the true mean department motivation was 0.82. All three level-1 variables were found to vary among departments. Cross-level interactions showed that main effect of quality of teaching and learning was significant while student satisfaction with course did not provide significant contribution to their learning or to the explanation of the variation in motivation. The slopes for active learning strategies, higher-order thinking skills, and teacher student relations were all positive and significant.

Background of the Study

It is often common to hear faculty remark that today's college students seem less motivated to learn than those in years past, and as such it is critical that investigation is carried out to try to identify possible correlates and predictors of motivation of students in learning. Reform movements in various

subject areas of education such as mathematics promote the increased emphasis on higher-order thinking skills in the classroom (DiCintio & Stevens, 1997). National standards in many fields now place much more emphasis on critical analysis, problem solving, and integration of theories than has been typical in the classroom in these subjects for decades (Pascarella, Edison, Nora, Hagedorn & Braxton, 1996). Finding ways to increase student motivation in undergraduate courses has long been a challenge for faculty and administrators alike, particularly in large courses at large institutions.

This study investigates whether classroom emphasis on higher-order thinking skills, teacher student relations, active learning strategies, quality of teaching and learning, and student satisfaction with course contribution to their learning are related to student motivation in learning. If such relationships are shown to be significant, faculty would be well advised to increase their focus on higher-order thinking skills among the other variables so as to further develop those skills in students and improve students' motivation in their classes.

In most studies student motivation is considered as an independent variable in relation to cognitive skills such as higher-order thinking skills (Nastasi & Clements, 1994). If it can be established that student motivation can be effectively increased by doing what many educators would prefer to do anyway, then emphasis on such skills as critical analysis and integration of concepts by faculty, counselors, staff and education stakeholders might more likely change the way they carry out their responsibilities in the teaching, learning, and counseling environments.

Conceptual/Theoretical Frameworks

Motivation has been defined as the energy that is innate within all individuals, and high levels directed toward a particular situation results in greater amounts of energy expended on that task (McDevitt & Ormrod, 2004). Therefore, greater desire and higher levels of energy targeted at accomplishing a goal should result in higher levels of performance (House, 1997; McDevitt & Ormrod, 2004; Tavani & Losh, 2003). Goal theory of motivation maintains that the perceived purpose of a task is a critical factor in the quality of engagement in the task (DiCintio & Stevens, 1997). This theory describes two goal orientations, mastery goals and ego goals. Mastery goals are intrinsically motivated, self-referenced rather than based on normative comparison, and concerned with increasing competence through effort. Ego goals, in contrast, are extrinsically motivated with success determined in reference to others and

concerned with displaying competence for others to see. In middle school settings, a variety of factors in classroom and school environments have been shown to influence students' goal orientations as summarized by DiCintio and Stevens (1997).

Kanfer and Ackerman (1989) noted that task difficulty affects the demonstration of ability-motivation interactions by changing the relationships among predictors and performance. For less difficult tasks, ability may be less powerful as a predictor of performance than motivation. For more difficult tasks, however, performance is likely to be significantly affected by the interaction effects of motivation and ability. Kanfer and Ackerman (1989) considered the construct of cognitive resources or attentional resources to be a link between ability and motivation. Most research findings on motivation have concluded that academic performances and motivations are significantly related to one another.

It is important to note that teachers, through their roles are an influencing agent for student motivation. For instance, encouraging students in their pursuit for excellence in learning, providing positive feedback, being involved in positive interactions, remaining enthusiastic about students and student educational growth, and cultivating a positive classroom environment, have a strong impact on student academic motivation (Astin, 1993; Bean & Kuh, 1984; Juarez, 2001; Lamport, 1993).

Justification for the Study

Motivation theory has been discussed as an important aspect of student success in schools. Research has shown that that motivation influences students' involvement and academic achievement (Gambrell, 2001). There also is a growing interest in understanding the relationships between motivation and teacher-student relationship. This study seeks to investigate if teacher-student relations influence motivation when students' higher order thinking skills and active learning strategies are taken into account.

Being aware of how teacher-student interaction (relations) can promote academic motivation may provide implications in a variety of areas for educators. Teachers can likely restructure the teaching and learning environment by providing different learning strategies to students and finding ways to motivate students to learn and to engage them in active learning. Without knowing and understanding how teacher-student relations influence motivation, teachers may limit their abilities to improve instruction.

Students engage in learning through behaviors and motivation and those learners who are highly motivated remain engaged, enthusiastic and are more likely to participate in academic activities. On the contrary, the less motivated the students are, the less they remain engaged in learning.

Most previous studies have not directly examined the impact of emphasis on higher-order thinking skills, teacher student relations, and active learning strategies on student motivation and involvement in the university classroom (DiCintio & Stevens, 1997; Nastasi & Clements, 1994). This study will investigate the direction and magnitude of these relationships for a sample of undergraduates at a major public university. Most prior studies of the relationship between these variables used much smaller samples than the 2,190 subjects in this study, thereby limiting the statistical power of those smaller studies. Many of these studies also focused on elementary and middle school higher-order thinking skills, which are both qualitatively and quantitatively different from the higher-order thinking skills typical at the college level. If indeed emphasis on higher-order thinking skills is shown to predict student motivation and involvement, then college and university faculty would have greater incentive to change their teaching methods to increase their emphasis on higher-order thinking skills.

Further, much of prior research considered motivation in young children in relationship to cognitive skills that are developmentally appropriate for elementary and middle schools (DiCintio & Stevens, 1997; Nastasi & Clements, 1994; Singh & Singh, 1994). This study looks directly at whether student motivation is related to the emphasis on higher-order thinking skills, active learning strategies, quality of teaching and learning, and student satisfaction with course contribution to their learning in a post-secondary teaching and learning environment, and specifically in the university classroom.

Whereas prior studies have considered the student's motivation as the independent variable and cognitive skills including higher-order thinking skills as dependent variables, this study considers whether the emphasis on higher-order thinking skills in relation to active learning strategies and teacher student relations affect student motivation. Also, earlier studies measured actual performance on tests of higher-order thinking rather than the emphasis given to those skills in the classroom (Kanfer & Ackerman, 1989). In light of the aforementioned statements, this study posits that

emphasis on higher-order thinking skills in the classroom, teacher student relations, and active learning strategies will serve to motivate students and increase their involvement in the class and directly or indirectly lead to positive academic change.

Pertinent Research

Motivation and Higher-Order Thinking Skills

The literature regarding the relationship between motivation and higher-order thinking skills is drawn from diverse settings such as K-12 education, higher education, and even training to become military air-traffic controllers. In few cases, motivation is viewed as the dependent variable with higher-order thinking skills as an independent variable. More often, motivation is viewed as a predictor of higher-order thinking skills.

Nastasi and Clements (1994) studied motivation and higher-order thinking in third-grade students in two cooperative computer environments, one using Logo for programming and the other using computer-based instruction for writing. They found that the treatment (environment) accounted for significant portions of the variance in both motivation and in higher-order thinking skills and that motivation accounted for a significant portion of the variance in higher-order thinking skills. While this study treated higher-order thinking skills as the dependent variable, the authors maintained that the learning environment that placed greater emphasis on higher-order thinking skills saw higher levels of student motivation.

DiCintio and Stevens (1997) investigated whether the level of higher-order thinking required by instruction is related to motivational goals in middle school mathematics classrooms. Higher-order thinking skills were found to be a significant predictor of motivational variables with fifth-grade providing more emphasis on higher-order thinking skills than sixth- and seventh-grade mathematics classes and much more emphasis on higher-order thinking skills in a high-ability fifth-grade class than in an average ability fifth-grade class. The motivational variable of mastery orientation (intrinsic motivation) was also significantly higher for fifth-graders than for the older students in the study. The authors, however, cited a lack of variance in higher-order thinking skills within grade level as a confounding issue limiting generalization of the study's conclusions.

Kanfer and Ackerman (1989) conducted a study of skill acquisition in U.S. air force recruits learning to become air-traffic controllers. Their research found that goal assignments provided during the declarative stage of complex skill acquisition actually decreased performance among both low-ability and high-ability groups with more impairment among low-ability subjects. They define the declarative phase as the earliest phase of skill acquisition when the focus is on facts. This stage is followed by stages of integration and automatization of the skill. Higher-order thinking skills are most closely related to the integration phase of skill acquisition. The study concludes that low-ability subjects benefit more from imposition of a goal assignment (motivation) during the integration portion of complex skill acquisition than do high-ability subjects. Their conclusion can be stated another way, that emphasis on higher-order thinking skills provides an environment in which motivational interventions are more effective. While learning to become an air-traffic controller certainly differs from academic learning in a university setting, Kanfer and Ackerman's (1989) study is one of few to consider the effect of emphasis on higher-order thinking skills on motivation rather than vice versa.

Other studies that have investigated the relationship between motivation and higher-order thinking skills with mixed results include research by Singh and Singh (1994) on the role of motivation in integrational capacity in young children. They found that motivation was a significantly better predictor of integrational capacity than an ability construct was for some but not all age levels. Mayer (1998) found that motivational skills were necessary in academic problem solving but cognitive and strategic (metacognitive) skills were even more necessary. House (1995) found that motivational variables were significant predictors of grade performance but that academic background was a stronger predictor. Prediction models presented in these studies varied by ethnicity and by gender.

Motivation and Teacher Student Relations

Kuh and Hu (2001) stressed that meaningful and frequent interaction between teachers and students are important to learning. While recognizing the importance of the teacher student interactions, Astin (1993), Bean and Kuh (1984), Juarez (2001), Lamport (1993), and Kuh, Douglas, Lurd, and Ramin (1994) investigated the relationships between faculty and students and how teacher-student relations influences motivation and academic performance. Astin (1993) found that quality of teacher interactions have a

positive association with student academic outcomes while Pascarella and Terenzini (1991) reported that student-faculty interaction is an important factor in college student development. If a positive teacher-student relationship brings positive impact on students' motivation and achievement, it is possible to consider that negative teacher-student relationship will probably cause negative impact on motivation on achievement. Plecha (2002), however, found no significant difference in negative impact on students' motivation and achievement based on negative teacher-student relationship.

Teacher as a motivation factor influence students' learning greatly. How teachers behave in classroom can directly promote student learning and motivation. It is important that teachers care about how they motivate students because if the students are not actively motivated to learn, learning will not occur. Patrick, Hisley, Kempler, and College (2000), noted that teacher behaviors promote student intrinsic motivation to learn. Their research of how teachers' enthusiasm and interaction relate to each other found that a significant relationship between teacher-student relations and intrinsic motivation. Students who are intrinsically motivated view learning as a goal in itself, while students who are extrinsically motivated view learning as a reward (Cokley, 2000; Covino, & Iwanicki, 1996; Dweck, 1986).

Teacher Student Relationships

Tinto's model (1987) posits that persistence is largely determined by the levels of academic and social integration that a student experiences with the institution. Tinto is also credited for developing a model of factors crucial to academic continuation which includes student-teacher relationship. Tinto (1987, 1993) as well as Woodside (1999) concluded that both informal and formal interaction with teachers is important in predicating freshmen academic outcomes, satisfaction, and attrition.

Students learn how experts (mentors) think and solve problems by interacting with faculty members inside and outside the classroom (Institutional Benchmark Report, 2002). Numerous projects have focused on the relationship that exists between student-faculty interactions and outcome variables such as academic achievement and overall satisfaction of college students (Astin, 1993; Kuh, 2001; Terenzini & Pascarella, 1994). Factors associated with student-faculty interaction include; student's academic achievements, educational attainment and aspirations, career and major choice, college satisfaction and persistence, and cognitive development. First-year

students have occasional contact (once or twice a month) with their instructors, while seniors at doctoral-extensive universities interacted less with faculty members than first-year students at liberal arts colleges, (Kuh, 2001).

Faculty exerts much influence in their out-of-class as well as in-class contact with students. Terenzini and Pascarella (1994) pointed out that faculty educational influence is enhanced when their contacts with students extend beyond the formal classroom to the informal non-classroom setting. The extent of student informal contact with faculty is positively linked with a wide array of outcomes--perception of intellectual growth during college, increase in intellectual orientation and curiosity, liberalization of social and political values, growth in autonomy and independence, increase in interpersonal skills, and educational aspiration, persistence and attainment (Terenzini & Pascarella, 1994).

Astin (1993) found that student-faculty interaction had a significant positive correlation with every academic attainment outcome such as college GPA, degree attainment, graduating in honors and enrollment in graduate or professional school. Further, Astin stated that student-faculty interaction is associated with student satisfaction with quality of instruction, support services, intellectual and personal growth, behavioral outcomes, career outcome and the overall college experience. Pascarella and Terenzini (1976, 1991) pointed out that the frequency of student-faculty interactions significantly predicts freshman academic outcomes such as college satisfaction and attrition.

Student-faculty interaction produces a sense of identification with faculty and has important implications for student development (Astin 1993). Pascarella and Terenzini (1991) noted that the change in student's intellectual orientation is influenced by interaction with people in the college setting-faculty and students. Tinto (1987, 1993) stated that student-faculty interactions, which include both formal classroom experiences and informal interactions out of class, are crucial to the academic continuation and intellectual development of students. According to Tinto (1987, 1993), a lack of such interactions is a significant determinant of attrition. One project that specifically examined the relation between student-faculty interaction and academic performance found that student-faculty interactions had a significant influence on students' academic performance as measured by students' SAT scores and freshman year cumulative GPA. The interactions

were most powerful in affecting achievement if they concerned intellectual or course-related subjects. It was also found that students who interacted more frequently with faculty performed better academically than what was predicted from their SAT scores. On the other hand, students who seldom met with faculty tended to achieve at lower levels than predicted. Taken together, the existing research suggests that student-faculty interactions are important to a student's college experience (Astin, 1993; Pascarella & Terenzini, 1991; Woodside, 1999).

Quality of Teaching and Learning

Grade point average provides only one indicator of educational quality and may or may not truly reflect what a student gains from a classroom experience. As colleges increasingly focus on developing students' critical thinking skills, measures of the impact of college on development of these skills proliferate. For adult students, with a few years in the workforce prior to returning to school, we may find an inflated positive impact of work on cognitive growth. Pascarella (2001) concluded from his numerous studies that focus on traditional undergraduates that particularly during a student's later years in college "work has a greater chance of being focused and integrated with a student's academic program and career goals later in his or her academic career" (p. 22). The same positive effect may occur in adult students who view the value of higher education through their own unique experiences and choose to return to school not because of societal expectations but because they see a personal or professional value the additional education may provide.

Teacher encouragement and verbal praise are one of key factors in student academic motivation (Hancock, 2000). An encouraging teacher can provide a student with the essential link between school and the home community. Cokley's (2000) research on the impact of how faculty encouragement affects student academic motivation, found that students had higher academic motivation when faculty encouraged them. Caring teacher-student relationship improved motivation according to Juarez (2001). Because students perceived teachers' caring as having support and confidence from their teachers, they were motivated more. When talking about teachers' instructional method with motivation, Flowers, Hancock, and Joyner's (1999, 2000) investigation on teachers' instruction method and motivation found that teachers' direct and

indirect instructional methods is a factor for students' motivation to learn academic content. Further, teachers are responsible for creating an environment that the students could become motivationally active in learning. Findings from various studies have found that to motivate students' learning it is imperative to provide positive classroom environment (Bembenutty, McKeachie, Karabenick, & Lin, 2001). Ames (1992) reported that a positive relationship between the classroom environment and students' intrinsic motivation. Whether teachers are supportive or controlling influences the structure of the classroom, and thus affects student motivation to learn and involvement in classroom activities.

Active Learning Strategies

The importance of student involvement or engagement and quality of effort as a significant determinant of students' educational outcomes is an important factor in predicting student academic achievement (Astin, 1984; Pace, 1984). "Active learning invites students to bring their life experiences into the learning process, reflect on their own and others perspectives as they expand their viewpoints, and apply new understanding to their own lives" (ACPA & NASPA, 1997, p. 3). Students tend to learn more when they are actively involved in their education in different settings (Institution Benchmark Report, 2002). In addition, collaborating with other students in solving problems or mastering difficult materials prepares the student for problems they will encounter during and after college (Institution Benchmark Report, 2002). Motivating, inspiring, and teaching students to assume responsibility in their education process enhances productive learning (Kuh, Lurd, & Ramin, 1994). Kuh (2001) noted that a higher proportion of students are involved in active, collaborative, and service learning. Further, Kuh points out that more than 90% of the students work with other students on projects during class and 63% of seniors engage in community service or volunteer work.

Purpose of the Study

The purpose of this study is to investigate whether student motivation is related to the amount of perceived emphasis on higher-order thinking skills, active learning strategies, and teacher student relations for college students within individuals and across departments. The focus is to examine factors within and across college/university departments that college instructors, administrators, counselors and support staff can influence to increase student

motivation and thus student success. Specifically, this study is guided by four research questions: a) Are there differences in motivation scores among university departments? b) Do department level factors (quality of teaching and learning, student satisfaction with course contribution to their learning) explain the differences in mean department motivation scores? c) Do student factors (higher-order thinking skills, active learning strategies, and teacher student relations) explain differences in motivation scores? d) Do department level factors influence the magnitude of the student factors on motivation scores?

Methodology

Research Design

This study was based on multiple design elements. It was cross-sectional in that it considered variables of a specific higher education institution's teaching and learning environment at a specific point in time. It also used a survey design to collect information from students on the key variables related to teaching and learning.

Internal and External Validity

Internal validity helps determine if the predictor variables really influenced the level-1 and level-2 outcomes variables. Threats to the internal validity offer competing explanations for the relationships. Although threats to internal validity are present in every study, the author attempted to minimize the factors that might control, influence or distort the study results. Since a single survey was administered, the researcher could control for history or the confounding effect of specific events that occurs between pretest and posttest. However, we cannot know if the survey respondents did indeed engage in conversations when completing the survey. Likewise, the single-survey research design allowed the author to control for the most common threats to internal validity in survey: location, maturation, attrition or experimental mortality, and any testing effects, although the length of the questionnaire and inclusion of other subscales not relevant to the current study could have impacted the respondents' perceptions of the key variable of this study.

Some challenges to internal validity of this study remain. Selection-history effects were a concern. Since there was no random assignment in this quasi-experimental study, there may be differences between those who work full-

time and those who do not work other than those discussed in this study since the respondents were both traditional and non-traditional learners. Previous research found some other academic characteristics and behaviors correlated to undergraduate academic performance (Marlowe, Koonce, Lee, & Cai, 2002). These characteristics may include age, economic differences, differences in family responsibilities, ACT or SAT scores, academic major, transfer versus non-transfer, or even where students sit in class. Additional factors include learning styles, personalities, or involvement in other extracurricular activities. The author could not control for any of these confounding variables. Similarly, the non-random nature of the research project could cause students to self-select the evening program based on characteristics unrelated to work status, but that could impact their perceptions of development of the key variables of this study, especially higher order thinking skills (HOTS) or academic effort. For example, previously cited research demonstrates that lower income students tend to delay college enrollment until after the age of 25 (King, 2002). The sample used in this study could over-represent lower income students, although the impact of such over-representation on our study outcome remains uncertain.

With the external validity issue, concern in this case lies with the types of subjects tested, the specific setting in an evening program, and the time in history when data collection commenced. Because of this sample, that is, evening school students at a large southern public university, the findings may not be generalizable to other types of program models, private colleges, or colleges outside of the southern public university.

Measures

A variety of self-report measures have been developed to examine student perception of learning environment and their own characteristics as learners. This study used measures contained in Student Assessment of Teaching and Learning (SATL) (Short-Form), first developed by Ellett, Culross, McMullen, and Rugutt, (1996), and later revised by Ellett, Loup, Culross, McMullen and Rugutt (1997). The measures assessed a wide variety of factors among college students. Student motivation and involvement (MI), is comprised of the sum of factor scores for five statements. Students respond to the degree to which various activities enhanced their learning using a three point scale as follows: 1 = learning not enhanced, 2 = learning sometimes enhanced, 3 = learning

almost always enhanced. A complete list of the five statements making up the MI construct is found in Appendix A.

The variable for classroom emphasis on higher order thinking skills (HOTS) is comprised of the sum of factor scores for five statements (See Appendix A). Students rate the amount of emphasis given to each type of learning as follows: 1 = no emphasis, 2 = some emphasis, 3 = much emphasis, 4 = very much emphasis.

The quality of teaching and learning (QTL) construct was computed as the sum of responses to 22 statements (see Appendix A). Students respond to the degree to which various activities enhanced their learning using a three point scale as follows: 1 = learning not enhanced, 2 = learning sometimes enhanced, 3 = learning almost always enhanced.

The active learning strategies (ALS) and teacher student relations constructs were generated from a 52 item survey using a five-point forced Likert-type scale ranging from almost never to almost always. ALS construct was the sum of scores for 15 items while the teacher student relations (TSR) construct was the sum of scores on six items (See Appendix A). The last construct was the sum of three survey items where students were asked to make summative judgements about several course-related factors such as to grade the quality of teaching in the course, to rate the course in terms of its contribution to their personal learning, and to arrive at an overall course grade using a 100-point scale (see Appendix A).

The subscales of the instrument, items per scale and their corresponding Cronbach alpha reliabilities (see Table 1) are: Quality of Teaching and Learning (QTL, 0.95), Active Learning Strategies (ALS, 0.95), Higher-Order Thinking Skills (MI, 0.83), Teacher Student Relations (TSR, 0.92), Student Satisfaction with Course contributions to their Learning (SATISFY, 0.88) and Motivational Involvement (HOTS, 0.86). Definitions of constructs are provided in Appendix B.

Sampling

The sample for this study consisted of 2,190 students from 145 classes in the Evening School of the Division of Continuing Education at one large southern university. During the semester, the sampled students took a variety of courses in such topic areas as mathematics, natural science, social science, and humanities. They also represent a broad array of individuals, including traditional-aged, nontraditional-aged, differing employment status, and gender.

This sample was 40% male, 60% female; 60% not employed full-time; 69% were traditional students while 31% were non-traditional students (see Table 2).

Further, the final useable data for the Hierarchical Linear Modeling (HLM) analysis consist of 1,633 observations collected from 32 University departments from both traditional and non-traditional students. From the HLM dataset, students who had missing data for gender, and traditional/non-traditional variables were excluded from the study. Other variables that had fewer missing data (less than 1%) had mean substitution performed.

Table 1

Cronbach Alpha Reliability Coefficients

Variable	Variable Description	Alpha Reliabilities
QTL (22)*	Quality of Teaching and Learning	.95
MI (5)	Motivation	.86
TSR (4)	Teacher Student Relations	.92
HOTS (5)	Higher -Order Thinking Skills	.83
ALS (15)	Active Learning Strategies	.95
SATISFY (3)	Student Satisfaction with Course	
	Contribution to their Learning	.88

Note. * Number of items comprising measure.

Table 2

Demographic Distributions of the Study Sample

	N*	Percent (%)
Gender		
Male	859	39.75
Female	1,302	60.25
Work full time		
Yes	864	39.69
No	1,313	60.31
Traditional		
Traditional	1,117	68.87
Non-traditional	505	31.13

Note. * Total for each demographic variable may not add up to 2,190 due to non-responses.

Data Analysis

Data analyses completed included: a) descriptive statistics for characteristics of the sample and the various measures, b) factor analysis, c) Alpha internal consistency reliabilities for measurement subscales, and d) Hierarchical Linear Modeling (HLM). The HLM approach is discussed in detail and its associated results presented.

The HLM model was used because of the nature of the research questions posed, and the need for simultaneous evaluation of student-level, and department-level variables, and the hierarchical nature of the data. The choice of HLM statistical strategy was done on the basis that students are grouped or nested within university departments, and standard regression analysis

will result in smaller standard errors and possibly incorrect conclusions. Analysis of department-level variables at the individual student level will result in aggregation bias, while aggregating student-level data to the group level fails to fully capture the effects of outcome variables that may operate at both levels of analysis (Fullerton, 2002; Hox 2002; Snijders, & Bosker, 2000). Hierarchical linear modeling techniques allow researchers to model individual outcomes within groups and then to identify and model any between-group differences that occur (Bryk & Raudenbush, 1992; Hox, 2002; Raudenbush & Bryk, 2002).

Model Specification

The two-level hierarchical linear models were specified and analyzed employing full maximum likelihood estimation using HLM 5.0 (Raudenbush, Bryk, & Congdon, 2001).

The researcher presents the two-level conditional models using notation consistent with that used by Bryk and Raudenbush (1992) and Raudenbush and Bryk (2002). To give contextual meaning to the models, in this study they are referred to as a system where the data structure is students in university departments. The basic model structure and notation, however, can be applied to any conditional two-level system.

Model 1

Model 1, which includes no predictors at the student level, partitions the total variance in motivation score into its within- and between department components. The department-level residual value from this model is used as an indicator of unadjusted department average motivation score (see Equations 1 and 2).

In this study, a basic level-2 linear model, which served as a baseline is discussed. The outcome variable of interest is the result of motivation score, represented by the variable motivation (MOTIVATION).

$$\text{MOTIVATION } (Y_{ij}) = \hat{a}_{oj} + r_{ij} \tag{1}$$

Using this data, the level-1 coefficient becomes an outcome variables at level-2 (in this case the 32 units). The intercept is modeled as varying randomly across the departments.

$$\hat{a}_{0j} = \tilde{a}_{00} + u_{oj} \tag{2}$$

It is assumed that the level-1 error term, denoted by r_{ij}, is normally distributed with a mean of zero and a constant variance $\acute{o}^2$. Equations 1 and 2 are the unconditional models developed to provide the baseline data for comparisons with subsequent conditional models which have model predictors. The unconditional level-1 model, predicts the outcome within each level-1 unit with just one level-2 parameter. $\hat{a}_{0j}$ indicates the mean outcome. On level 2 of the model, $\tilde{a}_{00}$ represents the mean outcome over departments and u_{oj} is a random term assumed to be normally distributed with a constant variance.

Model 2

Model 2 adds student level predictors by regressing motivation for student i within department j on active learning strategies, higher-order thinking skills, and teacher-student relations. The level 1 model (student level) is

Level 1 - Hierarchical Linear Model for Individual Student

$$\text{MOTIVATION } (Y_{ij}) = \hat{a}_{oj} + \hat{a}_{1j}(\text{ALS})_{ij} + \hat{a}_{2j}(\text{HOTS})_{ij} + \hat{a}_{3j}(\text{TSR})_{ij} + r_{ij} \tag{3}$$

Where:

MOTIVATION (Y_{ij}) = Motivation score of student i in department j;

The four parameters in the model may be interpreted as follows:

$\hat{a}_{oj}$ = mean motivation score (MOTIVATION) in department j,

$\hat{a}_{1j}$ = differentiating effect of active learning strategies (ALS) in department j,

$\hat{a}_{2j}$ = differentiating effect of higher-order thinking skills (HOTS) in department j,

$\hat{a}_{3j}$ = differentiating effect teacher student relations (TSR) in department j, and

r_{ij} = is a random "student effect", that is, the deviation of student i in department j from the department mean.

Level 1 predictors are department-mean centered so that the intercept $\hat{a}_{oj}$, can be interpreted as adjusted mean motivation score for department j. This adjustment is chosen to sort out the unique effects of department motivation score after controlling for the influences of student personal characteristics.

At Level 2 the researcher modeled the intercept, mean motivation score in department j, and the three level-1 regression coefficients as a function of department level characteristics. Because the student level predictors are centered around the department mean, the intercept ($\hat{a}_{oj}$) is the department-mean outcome while $\tilde{a}_{00}$ is the average of the department means on motivation across the population of departments.

Level 2 - Department-level Model

$$\hat{a}_{oj} = \tilde{a}_{00} + \tilde{a}_{01}(QTL)_j + \tilde{a}_{02}(SATISFY)_j + u_{oj}$$
$$ALS(\hat{a}_{1j}) = \tilde{a}_{10} + \tilde{a}_{11}(QTL)_j + \tilde{a}_{12}(SATISFY)_j + u_{1j}$$
$$HOTS(\hat{a}_{2j}) = \tilde{a}_{20} + \tilde{a}_{21}(QTL)_j + \tilde{a}_{22}(SATISFY)_j + u_{2j}$$
$$TSR(\hat{a}_{3j}) = \tilde{a}_{30} + \tilde{a}_{31}(QTL)_j + \tilde{a}_{32}(SATISFY)_j + u_{3j} \qquad (4)$$

Equation 4 can further be summarized such that the coefficients $\hat{a}_{ij}$ from the level-1 model can be modeled as outcome variables for level-2 model. For example:

$$\hat{a}_{oj} = \tilde{a}_{00} + \tilde{a}_{01}(QTL)_j + \tilde{a}_{02}(SATISFY)_j + u_{oj}$$

$\tilde{a}_{oj}$ = mean motivation score in department j,

$\tilde{a}_{00}$ = the average of the department motivation score across the population of departments.

$\tilde{a}_{01}$ = differentiating effect of mean department quality of teaching and learning (QTL) in department j,

$\tilde{a}_{02}$ = differentiating effect of mean department student satisfaction with course contribution to their learning (SATISFY) in department j, and

u_{oj} = is a level-2 random effect that represents the deviation of department j's level-2 coefficient, $\hat{a}_{ij}$ from its predicted value based on the department-level model.

The slope coefficients can also be interpreted in the same way, for example; (HOTS) $\hat{a}_{2j}$ = differentiating effect of higher-order thinking skills on motivation regression slope across departments.

$\tilde{a}_{31}$ = differentiating effect of quality of teaching and learning on teacher student relations toward motivation.

Results

The results are presented by research question. Table 1 contains Cronbach alpha reliability coefficients for all study constructs. Table 2 presents demographic information for the study sample. The HLM results for all research questions are presented in Tables 3, 4, 5, and 6. Table 3 presents results from the unconditional random coefficient model for individual students, Table 4 provides HLM random Level-1 reliability coefficients, Table 5 presents HLM coefficients and standard errors, and Table 6 presents HLM variance components and standard deviation for level 2 predictors. Complete results of the study are presented in the following section.

Research Question 1: Are there differences in motivation scores among university departments?

The results in Table 3 indicate that there were significant differences among departments in student motivation. The test statistic ($X^2 = 260.90$, $df = 31$), indicates significant (p < 0.000) variation among university departments in their motivation scores and suggests that the department-level variables might have accounted for the differences in motivation scores. The grand mean motivation score is 84.85. Table 3 also provides the maximum likelihood estimate of the variance components. At the student level, the variance components is $\acute{o}^2 = 247.84$. This indicates that students were more variable in their motivation scores. At the department level, $\hat{o}_{00}$ was the variance of the true department means, $\hat{a}_{oj}$ around grand mean $\tilde{a}_{00}$. The variance components for department means was $\hat{o}_{00} = 50.33$. To gauge the magnitude of the variation among departments in their mean motivation levels, a 95% confidence interval was computed for this sample. For the study sample, with mean of 84.85 and a standard error of 1.38, would indicate a 95% confidence interval of 84.85 ± 1.96 (1.38) = (82.15, 87.55).

The coefficient of 50.33 with corresponding chi-square value of 260.90, indicate some variability among departments in terms of their motivation scores. The largest variance component is at level-1 of the model for the study sample (247.84) presented in the preceding section), indicating that quite a lot of the variation in motivation remains unexplained by unconditional model presented in equation 1.

The unconditional model (Equation 1) also provides the necessary information to calculate the intraclass correlation coefficient. The intraclass correlation is the proportion of the total variation that is accounted for by the variation between level-2 units. It represents the proportion of variance in motivation scores between departments. This is calculated as an intra-class correlation for this sample is 0.169 (17%). This intra-class correlation showed

$$p = \frac{\hat{o}_{00}}{\hat{o}_{00} + \acute{o}^2} \tag{5}$$

some proportion of variation among departments, indicating that 17% of variance in motivation was among departments. Table 3 presents results from the unconditional random coefficient model.

Table 3

Results from the Unconditional Random Coefficient Model for Individual Students (n = 1,633)

Fixed Effects Total Sample	Coefficient	se^a	df^b	t	p
Average Department Mean, $\hat{a}_{oj}$	84.85	1.38	31	61.36	0.000

Random Effect Total Sample	Variance Components		df	X^2	p
Department mean, u_{oj}	50.33		31	260.90	0.000
Level-1 effect, r_{ij}	247.84				

Note: [a]Standard error; [b]degrees of freedom.

The HLM program, in its standard output provides the reliability of the least square estimated coefficients. These reliabilities can be estimated at both levels 2 and 3 of the model. For the departments (level-2 units), the

estimated reliability is defined as the ratio between the level-2 variance component and the sum of the level-2 and level-1 components, with the latter divided by the number of observations within that particular cluster. Further, an estimator of the reliability of the sample mean in any department for the true mean department for this study was 0.823, for the unconditional model. This reliability coefficient indicates that the sample means were quite reliable as indicators of the true department means. Reliability coefficients were also computed for the conditional model.

The HLM reliability coefficients provided in Table 4 are overall or average reliability for each level-1 coefficient across the set of level-2 units (departments). These estimates depend on two factors: the degree to which the true underlying parameters vary from group (department) to group and the precision with which each group's regression equation is estimated (Bryk & Raudenbush, 1992; Raudenbush & Bryk, 2002). The precision of estimation of the intercept (department mean) depends on the sample size within each department, while the precision of estimation of the slope depends both on the sample size and on the variability of the model predictors within that department. The groups (departments) that are homogeneous with respect to the model predictors will exhibit slope estimation with poor precision (Bryk & Raudenbush, 1992; Raudenbush & Bryk, 2002).

The conditional model reliability coefficient for the intercept was 0.651 (see Table 4). Further, active learning strategies and higher-order thinking skills slope reliability coefficients were 0.308, and 0.139, respectively. This indicates that the model reliability coefficients for the intercepts, active learning strategies, and higher-order thinking skills randomly varying slopes had moderate reliability coefficients. The slope estimates for teacher student relations was far less reliable (0.019) than the slope intercept estimates. The primary reason for relatively low reliability coefficients for some slopes is that the true slopes variances for the model predictors across departments are much smaller than the variances of the true means (intercepts). Also, the slopes are estimated with less precision than are the means because many departments are relatively homogeneous on some of the model predictors. Bryk and Raudenbush (1992) stated, however, that coefficient reliabilities above 0.05 are acceptable. Based on this, the model reliability coefficients for intercepts, active learning strategies, and higher-order thinking skills were within acceptable limits (see Table 4 for details).

Table 4

Hierarchical Linear Model Random Level-1 Reliability Coefficients for Study Sample (*N* = **1,633**)

Random Level-1 Reliability Coefficients	Reliability Coefficients
Department mean (Intercept)	0.651
Active learning strategies	0.308
Higher-order thinking skills	0.139
Teacher student relations	0.019

Research Question 2: Do department factors (quality of teaching and learning and student satisfaction with course contribution to their learning) explain the differences in mean department motivation scores?

The group-level variables that are observed to be significantly related to the random coefficients are termed cross-level interactions (Bryk & Raudenbush, 1992; Raudenbush & Bryk, 2002; Snijders & Bosker, 2000). Cross-level interactions for this study simply mean that a department level variable influences a student-level slope. All Level-1 variables (active learning strategies, higher-order thinking skills, and teacher student relations) were found to vary among departments. The three coefficients were then modeled as department level variables; that is, each randomly varying coefficient became a model. Table 5 shows the final estimates of the fixed effects. From these results, main effects (department means-intercepts) for quality of teaching and learning provided significant contribution to the explanation of the variation in motivation while student satisfaction with course contribution to their learning did not. The slopes for active learning strategies, higher-order thinking skills, and teacher student relations were positive and significant. Full cross-level interactions between department- and student-level for the model outcomes and predictors are presented in Table 5. Here, in explaining the intercept, $\hat{a}_{oj}$ by level-2 variables (e.g., quality of teaching and learning) leads to a main effect of quality of teaching and learning, while explaining the coefficient $\hat{a}_{1j}$ of, say, active learning strategies, by level-2 variable student satisfaction with course contributions to their learning leads to a product interaction effect of active learning strategies and student satisfaction with course contributions to their learning.

Table 5

Hierarchical Linear Model Coefficients and Standard errors for Study Sample

Dependent Variable	Predictor	Study Sample coefficient	standard error
Intercept: Department	Intercept	85.35*	0.70
Motivation mean	QTL	1.22*	0.28
	Satisfy	0.06	0.29
Slope: Average ALS-	Intercept	0.22*	0.03
Motivation regression slope	QTL	0.02	0.01
across departments	Satisfy	-0.02	0.01
Slope: Average HOTS-	Intercept	0.27*	0.02
Motivation regression slope	QTL	-0.02	0.01
across departments	Satisfy	0.02	0.01
Slope: Average TSR-	Intercept	0.14*	0.02
Motivation regression slope	QTL	-0.01	0.01
across departments	Satisfy	-0.01	0.01

Note: * $p < 0.05$;
      QTL: Quality of Teaching and Learning
      HOTS: Higher-rder Thinking Skills
      ALS: Active Learning Strategies
      TSR: Teacher Student Relations
      Satisfy: Student Satisfaction with Course Contribution to their Learning

Research Question 3: Do student factors (active learning strategies, higher-order thinking skills, and teacher student relations) explain differences in motivation scores?

Estimating Explained Variance in HLM Models

The analyses completed here followed the Raudenbush and Bryk (2002), where the explained variance at level-1 reflects the proportional reduction in individual variation at level-1 given the level-2 model, that is, the explained variance at level-2. The process is accomplished through setting up two models, one with no level-2 predictors and the final, which is the random

intercept (or slope) variance model estimated from the final fitted model which includes predictors at level-2.

Proportion reduction in variance or "variance explained" at level-1 is computed as:

$$= \frac{\text{Proportion of variance explained level 1}}{\text{ó}^2 \text{ (model without predictors) - ó}^2 \text{ (model with predictors)}} \Big/ \text{ó}^2 \text{ (model without predictors)}$$

The estimated variance in the model that did not include predictors at the level-1 is $\hat{\sigma}^2 = 260.90$. Once the three predictors are included in the model, the estimate of student-level variance $\hat{\sigma}^2$ is now 156.37. Thus, proportion of variance at level 1 for this sample is:

$$\frac{(247.84 - 156.37)}{247.84} = \frac{91.47}{247.84} = 0.369$$

It is clear that adding the three predictors reduced the within-department variance by 37%. Hence, it can be concluded that the three predictors accounts for about 37% of student-level variance in the motivation variable. This means that 37% of the variance in department mean motivation is accounted for by active learning strategies, higher-order thinking skills, and teacher student relations.

Table 6 provides estimates of the variance components for the random effects and tests of hypothesis that these variance components are zero. For this sample, department mean, and active learning strategies slopes varied significantly. This means that for some departments, the slopes are much steeper than for other departments, that is, the relationship with motivation is much stronger in some departments than in other departments. The variability among departments also suggests that department-level variables might account for some of the differences.

Research Question 4: Do department level factors influence the magnitude of the student factors on motivation scores?

The main effect for quality of teaching and learning was found to be significant across departments while that of student satisfaction with course contribution to their learning was not significant (see Table 5). Further, none of the department-level factors influenced the slopes of student level factors, that is when the three coefficients (level 1 regression coefficients) were

Table 6

*Hierarchical Linear Model Variance Components and Standard
Deviation for Level-2 Predictors for Study Sample*

Random Effects	Variance Component	Standard Deviation
Department mean (Intercept)	9.74*	3.12
ALS	0.01*	0.09
HOTS	0.00	0.05
TSR	0.00	0.02
Level-1 Residual variance	156.37	12.50

Note: * $p < 0.05$.

modeled with department-level variables. These results indicate that there were no cross-level interactions, meaning, a department-level variable (quality of teaching and learning and student satisfaction with course contribution to their learning) did not influence student-level slope.

Discussion and Implications

The purpose of this study was to examine factors within and across college/ university departments that college instructors, administrators and support staff can influence to increase student motivation and thus student success. Specifically, this study was guided by four research questions: a) Are there differences in motivation scores among university departments? b) Do department-level factors (quality of teaching and learning, student satisfaction with course contribution to their learning) explain the differences in mean department motivation scores? c) Do student factors (higher-order thinking skills, active learning strategies, and teacher student relations) explain differences in motivation scores? d) Do department- level factors influence the magnitude of the student factors on motivation scores?

At the student-level, there were three primary independent variables (measures) of concern in these analyses; a) higher-order thinking skills; b) active learning strategies; and c) teacher student relations. The dependent variable was motivation. The department-level predictors are; a) quality of teaching and learning; and b) student satisfaction with course contribution to

their learning. The results of the study indicated significant variations among university departments in their motivation scores. This suggests that students were more variable in their motivation scores. At the department-level, the main effects for quality of teaching and learning was significant indicating that department motivation means are significantly influenced by quality of teaching and learning. This finding makes intuitive sense since departments that have clear policies of course structuring and development of clear learning objectives make it easier for learners to monitor their learning progress while remaining motivated throughout. Further, the reliability coefficients for department motivation means, the randomly varying slopes for active learning strategies and higher-order thinking skills were all moderate. Table 6 provides estimates of the variance components for the random effects and tests of hypothesis that these variance components are zero. Also, the department mean, and active learning strategies slopes varied significantly. This finding means that for some departments, the slopes are much steeper than for other departments, that is, the relationship with motivation is much stronger in some departments than in other departments. The variability among departments also suggests that department-level variables, such as quality of teaching and learning accounts for some of the differences. The results document the direct effects of the individual correlate and predictors (personal variables), and institutional variables (department variables for this study), on the measure of motivation. These core findings of the study and the statistical technique utilized have a variety of implications for higher education and practice, theory development, methodology and research design, and future research.

Implications for Higher Education and Practice

Understanding individual and institutional factors related to student motivation in learning are important professional issues. All the three student-level predictor variables (higher-order thinking skills, active learning strategies, and teacher student relations) have a rather rich history in the empirical and theoretical literatures pertaining to student-faculty interaction (Astin, 1993; Pascarella & Terenzini, 1991; and Tinto, 1987) and explanation of motivation (DiCintio & Stevens, 1997; House, 1997; Plecha, 2002; Tavani & Losh, 2003).

The results of this study and those of other recent studies (Astin, 1993; DiCintio & Stevens, 1997; House, 1997; Kuh & Hu, 2001), clearly show that

higher-order thinking skills, active learning strategies, and teacher student relations are important variables in predicting motivation. Further, department-level variable of quality of teaching and learning is an important component to predicting motivation. Therefore, it seems important for university departments, colleges, schools, and university faculty to be sensitive to these student-level characteristics. Leaders in various units of colleges and universities behoove them to be cognizant of the elements of higher-order thinking skills, active learning strategies, teacher student relations, and quality of teaching and learning so that they are fully involved in providing the kinds of educational experiences that can enhance the development of these important and affective motivation characteristics in their learners. This strategy may lead to increase student motivation, elevated active learning strategies and development of higher-order thinking skills and thus student academic success. Strengthening these individual and institutional characteristics seems particularly important for learners and institutions of learning.

Implications for Theory Development

The results of this study have implications for the continued development of a nomological network (Cronbach & Meehl, 1955) for a general theory of *motivation and learning* in institutions of learning and other organizations. This research approach and concern has been on studying student-level and department-level factors related to motivation. The research believes this approach to theory development will provide a conceptual framework for future research that has stronger implications for improving strategies used to motivate learners. Thus, a developing theory of motivation and learning can be understood at both the individual student and organizational levels (departments). Obviously, there are a host of other organizational and personal variables that can be researched and added to the nomological network in explicating a theory of motivation and learning. With this goal in view, this study and other recent studies (e.g., Plecha, 2002; Tavani, & Losh, 2003) will shed more light to the current research on predictors and correlates of motivation.

Implications for Future Research

This study was a cross-sectional in nature, completed at only one point in time with one large, institution sample of traditional and non-traditional

students. Replications of the study, with the refined study measures resulting from the confirmatory factor analyses, and the addition of other important measures as well, are needed. For the most part, the measures used in this study yielded reliable data, though some of the measurement dimensions may need to be refined with revisions of items. The researcher believes these measures are adequate to do replication studies in other large research/ extensive doctoral university contexts, and with other research designs. The findings of this study suggest that these variables may be quite potent and yield rich information for theory development. As well, the continued use of mixed methodologies in future studies can strengthen the nomological network (Cronbach & Meehl, 1955) of a theory of motivation and learning and add to the utility and explanatory power of the quantitative results presented in this study.

Further, the synthesis of the pertinent studies produced greater benefits that augmented the statistical results. Majority of past research have made use of final grades and student success as indicators of good teaching, learning and student motivation. This study advocates for the need for learner-centered research that focuses on the cognitive aspect of all learners; how they learn, how learning might be increased, and what environmental factors can assist in achieving such improved results and motivation.

Since motivation consists not only of making student receptive to and excited about the subject taught, but also making them discern the value of learning itself (Covino, & Iwanicki, 1996), there are a number of strategies that are of value to the teacher in order to effectively motivate individual student or groups of students. First, through teacher student relations, the teacher gets to know students' preconceptions and misconceptions or subject matter, student's active learning strategies such as student-to-student relations and how such relationships could further the learning process, students' areas of interests, student weak points, students' ability to learn factual information and to develop concepts, understanding and applying principles, rules, applying theories, and problem solving strategies among others. With this knowledge, the teacher can devise strategies to foster motivation. Good and Brophy (1987) presented four areas such as supportive environment, as espoused in the elements of teacher student relations such as teacher taking a personal interest in student and student learning, considering student feelings, helping student when they are faced with trouble with work and maintaining

frequent communication. A second strategy is to provide an appropriate level of challenge or difficulty as listed in the elements of active learning strategies such as clarity with which the course objectives are communicated, use of class time, clarity with which student responsibilities and expectations are explained, teaching and learning techniques used during the course, quantity and quality of feedback provided on tests and graded work among others. A third strategy requires that the teacher provides meaningful learning objectives so that the student remains encouraged in expressing their own ideas, participate in small and large discussion groups, compare and contrast ideas, and appreciate to learn from each other. The fourth strategy involves moderation and variation in strategy such as dividing a class time into a variety of activities such as lecture, small groups, large group projects and presentation, and discussion groups.

Further, subjects such as mathematics and science courses are quite often best taught using a teacher-centered style where the students are taught a particular skill and then asked to duplicate that skill on their own until mastery. Social sciences and humanities often are exactly the opposite, opening up much greater opportunities for in-class discussions, group projects, and extended peer interaction and differential influence on motivation and persistence.

The findings of this study call for continued research on correlates and predictors of motivation. It must be acknowledged that there may be more variables affecting motivation that cannot be altered than those that can. Demographic, personality variables and family patterns, for example, may be the strongest predictors of motivation but lend very little to manipulation. This is not to say that researching these alterable variables is useless because of their relatively small influence. Rather, as educators, our noble task is to seek to influence what we can. Based on the findings of this study, it is evident that a systematic evaluation of correlates and predictors of student motivation at the university level requires multilevel and multi-measure approaches to the analysis of student motivation. Although the results of this study may not generalize to other universities, they are expected to inform us about desired data and methods for a more systematic approach to correlates and predictors of student motivation in institutions of higher learning.

Based on the results of this study, faculty who wish to increase the level of student motivation in their classes should focus on improving the overall quality of their teaching, be sure to include elements of active learning

strategies and teacher student relations, and to create a classroom environment that encourages relationships with other students. Such changes in teaching methods are likely to increase motivation far more than increased emphasis on higher-order thinking skills.

Information about how students perceive the quality of teaching and learning, the effectiveness/enhancement of their own learning, and important elements of the learning environment can provide a rich base for enhancing the quality of teaching and learning in higher education settings.

Implications for Research Methodology

Hierarchical linear modeling (HLM) statistical approach was utilized because of the hierarchical nature of the data and the nature of questions posed. HLM was conducted with three Level-1 and two Level-2 predictors. A model without predictors in the model (unconditional model) indicated that seventeen percent (17%) variability in motivation was due to departments. With three predictors included in the Level-1 model, the explainable variability in motivation rose to 37%.

Further, it is important that a correct choice of research design, statistical technique and presentation of research findings continued to be emphasized as a foundation of good research. From the research design and statistical technique utilized here, it is clear that if standard regression analysis with individual student as a unit of analysis was utilized, it would have resulted in smaller standard errors and possibly incorrect conclusions. Further, if analysis of department-level variables at the individual, had been used, it would have resulted in aggregation bias. It is worth noting that aggregating student-level data to a higher hierarchy (department-level in this case) fails to fully capture the effects of outcome variables that may operate at both levels of analysis (Fullerton, 2002; Hox 2002; Singer, 1998; Snijders & Bosker, 2000). It is the research design and statistical technique that has been used in this study (HLM) that allow researchers to model individual outcomes within groups and then to identify and model any between-group differences that occur (Bryk & Raudenbush, 1992; Hox, 2002; Raudenbush & Bryk, 2002).

For future research, it will be crucial that data is disaggregated to class level, discipline level, department level, or college level so that contribution of each level is assessed. Without breaking down the data to various levels stated above, it would be difficult to assess the effect size each level contributes to the differences in motivation.

As noted earlier, it would be useful to analyze this data broken down by academic level, type of course (introductory lecture, lab, senior seminar, etc.), and class size. Such factors may have more to do with all the constructs of teaching and learning considered in this study in relation to both student motivation and emphasis on higher order thinking skills.

Limitations of the Study

It should be noted that that generalization to populations comprised of traditional age college students must be viewed with caution as less than a quarter of the students in this sample were under the age of 21 and 40% worked full-time. In other ways, the sample resembled a fairly typical academic cross-section of undergraduate students at large public universities in the United States. It is important to note in consideration of higher-order thinking skills that the level and course content were not analyzed in this study due to limitation of the data. An introductory freshman course on world history may be expected to appropriately place less emphasis on higher-order thinking skills than a senior level history seminar on the transition from colonialism to independence in sub-Saharan Africa. The latter would probably attract mostly history majors who had a number of prerequisite courses and were thus prepared to be challenged with a strong emphasis on higher-order thinking skills. This study considers all levels of courses in a wide variety of academic departments but results may vary significantly in a focus on a particular course.

This study does not differentiate results by level of course or whether the course is an elective, general education, or major requirement. Motivation and involvement and emphasis on higher-order thinking skills are likely to be perceived differently by students in large introductory lecture courses versus small seminars for majors only that may be senior capstone experiences. Class size is also not taken into account but has been shown to affect course evaluations as well as the way a course is taught.

References

American College Personnel Association and Nation Association of Student Personnel Administrators. (1997). *Principles of good practice for student affairs*. Washington DC: Author.

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology, 84*, 261 – 271.

Astin, A. W. (1984). Student Involvement: A Developmental theory for higher education. *Journal of College Student Personnel*, *25*, 297-308.

Astin, A. W. (1993). *What matters in college? Four critical years revisited*. San Francisco Jossey-Bass.

Bean, J. P., & Kuh, G. D. (1984). The relationship between student-faculty interaction and undergraduate grade point average. *Research in Higher Education, 21*, 461–477.

Bembenutty, H., McKeachie, W. J., Karabenick, S. A., & Lin, Y.G. (2001). *Teaching effectiveness and course evaluation: The role of academic delay of gratification*. Seattle, WA: American Educational Research Association. (ERIC Document Reproduction Service No. ED455277)

Bryk, A. S., & Raudenbush, S. W. (1992). *Hierarchical linear models: Applications and data analysis methods*. Newbury Park, CA: Sage.

Chemosit, C. C. (2004). *Predictors and Correlates of Student Academic Achievement: Student-Faculty Interaction, Active Learning Strategies, and Academic Rigor*. Unpublished Master's Thesis, Illinois State University, Normal.

Cokley, K. (2000). Perceived faculty encouragement and its influence on college students. *Journal of College Student Development, 41*, 348–352.

Covino, E. A., & Iwanicki, E. F. (1996). Experienced teachers: Their constructs of effective teaching. *Journal of Personnel Evaluation in Education, 10*, 325-363.

Cronbach,. L.J., & Meehl, (1955). Construct validity in psychological tests. *Psychological Bulletin, 53*, 281-302.

DiCintio, M. J., & Stevens, R. J. (1997). Student motivation and the cognitive complexity of mathematics instruction in six middle grades classrooms. *Research in Middle Level Education Quarterly,* 27-42.

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 41*, 1040–1048.

Ellett, C. D., Culross, R. R., McMullen, J. H., & Rugutt, J. K. (1996). *Student Assessment of Teaching and Learning (SATL) (Short-Form)*. Baton Rouge: College of Education, Louisiana State University.

Ellett, C. D., Loup, K. S., Culross, R. R., McMullen, J. H., & Rugutt, J. K. (1997). Assessing enhancement of learning, personal learning environment, and student efficacy: Alternatives to traditional faculty evaluation in higher education. *Journal of Personnel Evaluation in Education. 11,* 167-192.

Flowers, C. P., Hancock, D. R., & Joyner, R. E. (1999). *Enhancing students' motivation to learn by matching conceptual level with in structional type*. Montreal, Canada: American Educational Research Association. (ERIC Document Reproduction Service No. ED430988)

Flowers, C. P., Hancock, D. R., Joyner, R. E. (2000). Effects of instructional strategies and conceptual levels on students' motivation and achievement in a technology course. *Journal of Research and Development in Education, 33*, 187–194.

Fullerton, S. (2002). *Student Engagement with School: Individual and School-level Influences Longitudinal Surveys of Australian Youth*. (Research Report No. LSAY-27). Victoria, Aust.: Australian Council for Educational Research. (ERIC Document Reproduction Service No. ED470 798)

Gambrell, L. B. (2001). What we know about motivation to read. In R. F. Flippo (Eds.), *Reading Researchers in Search of Common Ground* (pp. 129–143). Newark, DE: International Reading Association.

Good, T. L., & Brophy, J. E. (1987). *Looking in classrooms*. New York: Harper & Row.

Hancock, D. R. (2000). Impact on verbal praise on college students' time spent on homework. *The Journal of Educational Research, 93*, 384–389.

House, J. D. (1995). Cognitive-motivational variables and prior achievement as predictors of grade performance of academically underprepared students. *International Journal of Instructional Media, 22*, 293-304.

House, J. D. (1997). The relationship between self-beliefs, academic background, and achievement of adolescent Asian-American students. *Child Study Journal*, *27*, 95-109.

Hox J. (2002). *Multilevel analysis: Techniques and applications*. Mahwah: NJ. LEA, Inc. Institutional Benchmark Report. (2002). *National survey of student engagement*. Illinois State University.

Juarez, A. (2001). *Enhancing student performance through classroom motivation*. Chicago, IL: Chicago Public Schools; Little Village Academy. (ERIC Document Reproduction Services No. ED458298)

Kanfer, R., & Ackerman, P. L., (1989). Motivation and cognitive abilities: An integrative/aptitude-treatment interaction approach to skill acquisition. *Journal of Applied Psychology, 74*(4), 657-687.

King, J. E. (2002). *Crucial choices: How students' financial decisions affect their academic success* (Report No. 309419). Washington D.C.: ACE

Fulfillment Service. (ERIC Document Reproduction Service No. ED469585)

Kuh, G. D., Douglas, K. B., Lurd, J. P., and Ramin, G.J. (1994*). Student learning outside the classroom: Transcending Artifical Boundaries.* ASHE-ERIC Higher Education Report No. 8. Washingtonn D.C: The George Washington University, School of Education and Human Development.

Kuh, G. D. (2001). Assessing what really matters to student learning: Inside the national survey of student engagement. *Change, 33*(3)*,* 10-17, 66.

Kuh, G. D., & Hu, S. (2001). The effects of student-faculty interaction in the 1990s. *The Review of Higher Education, 24*, 309–332.

Lamport, M. A. (1993). Student-faculty informal interaction and the effect on college student outcomes: A review of the literature. *Adolescence, 28*, 971–991.

Marlowe, J., Koonce, J., Lee, J., & Cai, Y. (2002). An examination of the impact of student's work on academic performance. *Consumer Interests Annual, 48*, 1-9.

Mayer, R.E. (1998). Cognitive, metacognitive, and motivational aspects of problem solving. *Instructional Science*, *26*, 49-63.

McDevitt, T. M., & Ormrod, J. E. (2004). *Child development: Educating and working with children and adolescents* (2nd ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Nastasi, B. K., & Clements, D. H. (1994). Effectance motivation, perceived scholastic competence, and higher order thinking in two cooperative computer environments. *Journal of Educational Computing Research, 10*(3), 249-275.

Pace, C. (1984). *Measuring the quality of college student experiences.* Los Angeles: University of California, Higher Education Research Institute.

Pascarella, T. E.; Terenzini, T. P. (1976). How informal interaction with faculty and freshman ratings of academic and non-academic experience of college. *Journal of Educational Research, 70,* 35-41

Pascarella, E., & Terenzini, P. (1991). *How college affects students*. San Francisco: Jossey-Bass.

Pascarella, E., Edison, M., Nora, A., Hagedorn, L. & Braxton, J. (1996). Effects of teacher organization/preparation and teacher skill/clarity on general cognitive skills in college. *Journal of College Student Development, 37*(1) 7-19.

Pascarella, E. T. (2001). Identifying excellence in undergraduate education: Are we even closer? *Change*, *33*(1), 18-23.

Patrick, B. C., Hisley, J., Kempler, T., & College, G. (2000). What's everybody so excited about?: The effects of teacher enthusiasm on student intrinsic motivation and vitality. *Journal of Experimental Education, 68*, 217–237.

Plecha, M. (2002). *The impact of motivation, student-peer, and student-faculty interaction on academic self-confidence.* New Orleans, LA: American Educational Research Association. (ERIC Document Reproduction Service No. ED464149)

Raudenbush, S. W., Bryk, A. S., & Congdon, R. (2001). HLM 5.05: *Hierarchical linear and nonlinear modeling*. Chicago: Scientific Software International.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods.* (2nd ed.). Thousand Oaks: Sage.

Rugutt, J. K., Ellett, C. D., & Culross, R. (2003). Discriminating student learning and efficacy levels in higher education: Contributions of classroom environment and teaching and learning effectiveness. *Planning and Changing, 34*(3), 229-249.

Singer, J. D. (1998). Using SAS proc mixed to fit multilevel models, hierarchical models, and individual growth models. *Journal of Educational and Behavioral Statistics, 24*, 323-355.

Singh, R., & Singh, P. (1994). Prediction of performance using motivation and ability information: New light on integrational capacity and weighting strategies. *Cognitive Development, 9*, 455-496.

Snijders, T. A. B., & Bosker, R. (2000). *Multilevel analysis: An introduction to basic and advanced multilevel modeling*. Thousand Oaks: CA. Sage.

Tavani, C. M., & Losh, S. C. (2003). Motivation, self-confidence, and expectations as predictors of the academic performances among our high school students. *Child Study Journal*, *27*, 95-109.

Terenzini, T. P., & Pascarella, T. E. (1994). Living with myths: Undergraduate education in America. *Change*, *26*(1), 28-32.

Tinto, V. (1987). *Leaving college: Rethinking the causes and cures of student attrition*. Chicago: The University of Chicago Press.

Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition* (2nd ed.). Chicago: University of Chicago Press.

Weiner, B. (1990). History of motivational research in education. *Journal of Educational Psychology, 92*, 616 – 622.

Wigfield, A. (1994). *Dimensions of children's motivations for reading: An initial study*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, Louisiana.

Woodside, B. M. (1999). The effects of student academic achievements and self concept. *Education (chula Vista, California), 119*(4) 730-734.

APPENDIX A

Factors and Sample Items Operationalizing Each Factor
(Survey Adapted from Rugutt, Ellett, & Culross, 2004)

Teacher Student Relations (TSR)
- The teacher takes a personal interest in me.
- The teacher considers my feelings.
- The teacher helps me when I have trouble with the work.
- The teacher talks with me.

Higher Order Thinking Skills (HOTS)
- Learning factual information.
- Developing concepts.
- Understanding and applying principles and rules.
- Understanding and applying theories.
- Critical analysis and/or problem solving.

Active Learning Strategies (ALS)
- I make friendships with other students.
- I know other students.
- I do favors for members of this class.
- Students help me with my learning.
- I help other class members who are having trouble with their work.
- In this class, I am able to depend on other students for help.
- I explain my ideas to other students.
- Students discuss with me how to go about solving problems.
- I discuss different answers to questions.
- I cooperate with other students when doing assigned work.

· I share my books and resources with other students when
   doing assignments.
· I learn from other students in this class.
· I work with other students in this class.
· I cooperate with other students on class activities.
· I work in groups in this class.

Motivational (MI)
· Encouragement for students to express their own ideas.
· Encouragement for students to participate in discussions.
· The extent to which students are encouraged to compare and contrast
   ideas.
· The extent to which students are involved in discussions among
   themselves.
· The extent to which students learn from one another.

Student Satisfaction with Course Contribution to their Learning (SATISFY)
· How would you grade the quality of teaching in this course?
· What was the contribution of the course to your personal learning?
· How would you grade this course overall?

Quality of Teaching and Learning (QTL)
· Clarity with which the course objectives are communicated.
· Clarity with which student responsibilities and expectations are
   explained.
· Use of class time.
· Outside assignments and integration of outside assignments with other
   course activities.
· Teaching and learning techniques used during the course.
· The instructor's enthusiasm for teaching, learning and the subject
   taught.
· The interpersonal climate in the classroom (e.g., patience, courtesy,
   respect).
· Encouragement for students to express their own ideas.
· Encouragement for students to participate in discussions.
· Clarity and understandability of the instructor's speech.
· Directions and explanations given for course content.
· The kind and number of thought-provoking questions asked.

- The extent to which students are encouraged to compare and contrast ideas.
- The degree to which the instructor helps students organize information and understand relationships among various topics.
- Explanation(s) given for difficult material/ideas.
- Encouragement for students to ask questions.
- Feedback about learning provided <u>during</u> teaching and learning activities.
- The extent to which adjustments are made in a lesson when needed.
- The degree to which students are encouraged to apply course content to solve problems or to understand real life situations.
- The quantity/quality of feedback provided on graded work.
- The quantity/quality of feedback provided on tests given.
- The extent to which students are provided opportunities to determine their progress in the course.

APPENDIX B

Definitions of Study Terms and Variables

<u>Motivation</u>: Motivation has been defined as the energy that is innate within all individuals, and high levels directed toward a particular situation results in greater amounts of energy expended on that task. The greater desire and higher levels of energy targeted at accomplishing a goal the higher the levels of performance (McDevitt & Ormrod, 2004). Operationally, the terms "motivation" and "motivation involvement" will be considered equivalent. This includes encouragement for students to express their own ideas, encouragement for students to participate in discussions, the extent to which students are encouraged to compare and contrast ideas, the extent to which students are involved in discussions among themselves, and the extent to which students learn from each other

<u>Higher Order Thinking Skills</u>: In the literature review, higher order thinking skills are measured by tests of cognitive ability such as problem solving or integration of concepts (Kanfer & Ackerman, 1989). However, in this study the terms, "higher order thinking skills" and "emphasis on higher order thinking skills" are equivalent and refer to the operational definition

above. Higher order thinking skills involved student learning factual information, developing concepts, understanding and applying theories, and critical analysis and/or problem solving (Rugutt, Ellett & Culross, 2003).

Student-Faculty Interaction: the contact between the faculty and the student. This includes course related activities and activities other than the course work/outside the course work (Chemosit, 2004). The measure that describes student-faculty interaction includes activities such as teacher taking a personal interest in student, teacher considering student's feelings, teacher helping the student when he/she is trouble with the work, and teacher talking to with the student (Author).

Active Learning Strategies: activities in which the students are actively involved or engaged or are required to take an initiative in enhancing their own learning. Active learning strategies include how often the student worked with other students, student knowing other students in class, student explaining his/her ideas to other students, student learning from other students, student cooperating with other students on class activities, working in groups in class, and being involved in other vigorous action (individual/joint) in pursuit of knowledge or skills (Chemosit, 2004).