ASSESSING THE IMPORTANCE OF TEACHING EFFECTIVENESS ON STUDENT EFFORT

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ABSTRACT

This paper examines the importance of teaching behaviors on student effort. Higher education research has documented the primary role of student effort in a host of student outcomes, including student learning. And yet, recent studies have identified declines in the levels of effort by college students, making the instructor's role in creating learning environments that foster student success and promote student effort even more important. The key research question in this study is to assess the importance of teaching behaviors on levels of student effort.

Motivation theories suggest teacher behaviors that fulfill student needs lead to student effort. Considerable research has documented what students describe as effective teaching behaviors, but little research has connected student observations of effective teaching behaviors to the fulfillment of student needs. This study expands on previous research through its conceptualization of teaching effectiveness as the gap between student rating of a teacher behavior and student-indicated importance of that behavior. A positive gap, when teacher behavior exceeds student-indicated importance of that behavior, represents a student need that has been met. Based on a review of literature, the multidimensionality of teaching behaviors is reduced to two factors reflecting those of teaching involvement and teaching structure. Teaching involvement refers to teaching behaviors of interpersonal support, caring, and rapport while teaching structure refers to behaviors of professional competency and teaching skill.

Survey responses from students in multiple sections of a college business finance course are used to measure student effort, teaching effectiveness gaps, prior academic success, gender, and perceptions of course challenge. Regression results on student effort suggest teaching effectiveness involvement gap has the largest impact, followed by student overall GPA and level of course challenge. Further analysis suggests the importance of teaching behaviors on student effort is greater among lower-GPA students than higher-GPA students.

Key words: Student Effort, Teaching Behaviors, Teaching Effectiveness, College Students

INTRODUCTION

Over the course of one's teaching career, many if not most college instructors will be faced with the challenge of motivating student effort toward academic learning. College faculty have deep training within their academic disciplines, and many have additional instruction in

pedagogies such as active and engaged learning. While instructors work to create a learning environment that will foster student success, they also realize that, without effort on the part of students, learning will not take place. In the end, "only the learner can learn" (Hammond, 2015, p. 115) and "all learning and development require an investment of time and effort by the student" (Pace, 1984, p. 5).

Student effort is not a new subject of study in higher education. Broadly defined as the extent or degree to which students exert time and effort in educationally purposeful activities, student effort has been examined in the context of student involvement (Astin, 1993b), integration (Tinto, 1993), and engagement (Kuh, Kinzie, Buckley, Bridges, & Hayek, 2006). Importantly, student effort has been linked to student learning, including student self-reports (Astin,1993b), critical thinking assessments (Pascarella & Terenzini, 2005), test scores and course grades (Gupta & Maksy, 2014; Johnson, Joyce, & Sen, 2002) and overall academic development (Kuh et al., 2006), as well as linked to student satisfaction (Kuh, 2009) and persistence (Tinto, 1997; Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008).

Astin's (1993a) interactional framework provides a useful means of organizing the relationship between the relative contributions of student "Inputs" and college "Environment" on these student "Outcomes." Research confirms the importance of student effort in this I-E-O equation can hardly be overestimated. Based on their extensive review of the literature, Pascarella and Terenzini (1991, p. 610) concluded, unequivocally, that "the impact of college is largely determined by the individual's quality of effort and level of involvement" while Pace (1979) identified student effort as perhaps the most significant determinant of academic success. Yet, even given this prime importance of student effort in any equation concerning student outcomes, recent studies identify declines in the levels of effort by college students (Arum, Roksa, & Cho, 2011; Babcock & Marks, 2011; Hamilton, 2018) making the study of student effort ever more timely and vital.

In framing the question that is the focus of this paper, how college instructors impact levels of student effort, the same I-E-O framework (Astin, 1993a) that helps organize the study of student outcomes at the institutional level can also structure the evaluation of student outcomes at a course level. While instructors may have less influence on the student "Inputs" to their course save through course prerequisites, instructors have significant influence on the learning "Environment" particularly through their choice of course structure and teaching behaviors. While past research has examined the relationship of student effort with teacher behaviors (Campbell, Eichhorn, Basch, & Wolf, 2009; Skinner & Belmont 1993; Weaver & Cottrell, 1988), few have incorporated student expectation of teacher behavior in evaluating student effort (Geier, 2022), and none have examined the gap between student-indicated importance of teacher behavior and observed teacher behavior when examining impact of teacher behaviors on student effort. The goal of this study is to build upon earlier research connecting student effort with teacher behaviors by examining the impact of this gap in perceived teaching effectiveness on levels of student effort.

REVIEW OF LITERATURE

Several higher education studies have documented linkages between student effort and important student outcomes. Referring to students' commitment of time and effort in educationally purposeful activities, student effort can include time on task (Kuh et al., 2006), number of hours spent studying (Astin, 1993b; Gupta & Maksy, 2014; Pascarella & Terenzini, 2005), and amount of personal effort invested in learning (Pace 1998; Pascarella & Terenzini, 2005). As previously described, student effort has been linked to important outcomes of learning (Astin, 1993b; Pascarella & Terenzini, 2005) and academic development (Kuh et al., 2006), as well as measures of student satisfaction (Kuh, 2009) and persistence (Tinto, 1997).

For purposes of this study, student effort is conceptualized as a quality dimension (Pace, 1984). Specifically, student effort refers to the quality and intensity of behavior directed toward learning (Pass & Neu, 2014) and is consistent with Skinner and Belmont's (1993) concept of "student engagement" reflecting both intensity and concentration of effort. The influence of "Input" and "Environment" factors on student effort is outlined next.

TEACHING EFFECTIVENESS

Studies on what teacher behaviors are important to students suggest effective teaching is multidimensional (Buskist, Sikorski, Buckley, & Saville, 2002; Delaney, Johnson, Johnson, & Treslan, 2010; Feldman, 1976; Frey, 1978; Jackson et al., 1999; Marsh, 1982, 1983; Weaver & Cottrell, 1998). For example, Feldman's (1976) synthesis of research on student perceptions of good teaching identified 19 behaviors, Marsh's (1982, 1983) analysis of Student Evaluation of Educational Quality (SEEQ) confirmed nine factors of effective teaching, Jackson et al.'s (1999) analysis of Students' Perceptions of Teaching Effectiveness (SPTE) revealed six factors, Buskist et al. (2002) identified 28 behaviors of master teachers at the college or university level, while Delaney et al.'s (2010) work with college students resulted in nine teaching behaviors considered important in effective teaching. Numerous teaching behaviors appear repeatedly including, to name a few, behaviors that are enthusiastic, knowledgeable, organized, prepared, helpful, approachable/personable, communicative, positive/humorous, respectful, interesting, responsive, realistic, understandable, engaging, and rapport. Further synthesis of these lists reveal two broader categories of teacher behaviors: one category of behaviors serves to clarify expectations and convey course content and a second which reflects quality of interpersonal relationships and context. Frey (1978) synthesized these teaching behaviors into the categories of teacher competence/skill and teacher empathy/rapport. Along a similar demarcation, Buskist et al. (2002) suggests teacher behavior effectively convey content and reflect a personal, supportive relationship. In their factor analysis of Buskist et al.'s (2002) 28 teacher behaviors, Keeley, Smith and Buskist's (2006, p. 86) rotated two-factor solution identified teacher behaviors as "caring and supportive" and as "professional competency and communication skills." Similarly, Lowman's (1995, p. 31) two-dimensional model of effective college teaching includes behaviors

of interpersonal rapport (encouraging, helpful, accessible, caring, friendly) and intellectual excitement (knowledgeable, prepared, clear, organized).

Important to this current study are the mechanisms by which teacher behaviors influences student effort. Studies of such mechanisms are rooted in motivational research, including both psychological and educational approaches. A psychological approach to student motivation results in "the profile of student beliefs and attitudes that predict motivation" while an educational approach focuses on "the teacher behaviors that should be effective in promoting student motivation" (Skinner and Belmont, 1993, p. 571). Self-determination theory is at the intersection of these psychological and educational approaches and suggests teacher behaviors can facilitate student intrinsic motivation toward learning by satisfying students' needs for relatedness, competence and autonomy (Ryan & Deci, 2000; Skinner & Belmont, 1993). Teacher behaviors that fulfill student needs lead to student effort. As such, effective teaching are those behaviors that meet student needs.

Several research findings link teaching behaviors to student effort. Based on college student surveys on which teacher behaviors helped stimulate and sustain students' academic effort, Weaver and Cottrell (1988) recommend teachers clearly outline course goals and outcomes helping students know what to expect, show enthusiasm for both the content and the students, demonstrate a sense of humor, and interact with the students. In research by Campbell et al. (2009, p. 448), teacher confirmation behaviors that "endorsed, recognized, and valued" students increased college student effort to levels higher than the general level across all their classes. Similarly, Jones, Krost and Jones (2021) found teaching attributes such as caring were strong predictors of student effort. Using the Teacher Behavior Checklist (TBC), Geier (2022) identified three behaviors to positively impact student effort, including teacher behaviors of being creative and interesting, enthusiastic about teaching, and promoting critical thinking. And in their study of elementary students and teachers, Skinner and Belmont (1993, p. 574) identified teacher behaviors of involvement (an affective dimension) and teacher behaviors of structure (instrumental help and support) were associated with students being more engaged in the classroom and putting forth higher effort.

H_1: Student effort will be associated with teaching effectiveness.

COURSE CHALLENGE

Studies that examine the link between course challenge and student effort reflect a nuanced relationship. While higher academic standards have been associated with greater effort in high school students as measured by time spent on homework (Natriello & McDill, 1986), other research suggest student effort is a reflection of both course challenge as well as student background characteristics. Jones et al. (2021) found lower student effort associated with student perception of courses as easy as well as courses perceived as time consuming and difficult. Heckert, Latier, Ringwald-Burton and Drazen (2006) identified a positive relationship between student effort and class difficulty appropriateness while Campbell et al. (2009) identified a significant negative correlation between course challenge and student effort. Because student

perception of course challenge is anticipated to vary based on student background and preparation, a direct association between course challenge and student effort is not anticipated.

H_2: Student effort will not be associated with course challenge.

Further, findings by Campbell et al. (2009) suggest an interaction between students' perception of course difficulty and teacher confirmation behaviors. The more a teacher practices confirmation behaviors (recognizing, endorsing, valuing students), the lower was students' perception of course difficulty.

H_3: Course challenge will be negatively associated with teaching effectiveness.

PRIOR ACADEMIC SUCCESS

Prior academic success represents part of the background, or "Inputs," that students bring to their educational environment. Such success is anticipated to be positively related to student effort and perceptions of teaching effectiveness. Academic preparation, specifically GPA, has been linked to student effort through research at both an organizational level (Hu & Kuh, 2002) and course level (Heckert et al., 2006). Prior academic success is anticipated to be associated with measures of teaching effectiveness, primarily through student-indicated importance of such teacher behaviors. Consistent with past research on motivation and self-efficacy (Komarraju, 2013), a student's prior academic success would reasonably reduce their need perception of competence, which in this study would be reflected in lower student-indicated importance of certain teaching behaviors.

Prior academic success is anticipated to be negatively associated student perception of course challenge, primarily through the concept that earlier learning serves as the foundation for learning progression and more advanced concepts. Research findings connect student performances in prerequisite courses with performance in subsequent courses (Terry, de La Harpe, & Kontur, 2016), supporting the notion of learning progression.

H_4: Student effort will be associated with prior academic success.

H_5: Teaching effectiveness will be associated with prior academic success.

H_6: Course challenge will be negatively associated with prior academic success.

Gender

Gender is entered as a control variable. It is not expected to be associated with student effort, course challenge or teaching effectiveness.

TEST OF THE OVERALL MODEL

H_7. Student effort can be predicted with measures of academic preparation, gender, course challenge, and teaching effectiveness.

METHODOLOGY

Data Collection

The subjects for this study were students enrolled in multiple sections of a face-to-face, junior-level business finance course at an upper-Midwest state university. The curriculum, instructor, and course requirements were the same across all sections. A total of 196 students completed the course, and 169 students participated in the study.

MEASURES

Measures for this study were collected via student responses to a survey administered through the course's course management platform, Desire2Learn. Descriptions of measures follow.

Student Effort. Student Effort is conceptualized as both the quality and intensity of behavior directed toward learning activities and is measured through students' response to two survey questions that ask the degree to which students worked hard to meet the instructor's expectation and the extent to which they put forth effort in this class. Student Effort is computed as the mean of students' responses to the two measures: Work Hard and Putting Forth Effort.

Work Hard. Students responded to a survey question regarding how hard they worked in class. "As a student in this Financial Management class, how often have you engaged in the following behavior: I worked hard to meet the instructor's expectations." Response categories included: 1 = "never"; 2 = "rarely"; 3 = "occasionally"; 4 = "often"; and 5 = "very often".

Putting Forth Effort. Students responded to a second survey question regarding how much effort they put forth for this class. "While considering your experiences in this class, please indicate the degree to which putting forth effort describes you." Response categories included: 1 = "not at all characteristic of me"; 2 = "not really characteristic of me"; 3 = "moderately characteristic of me"; 4 = "characteristic of me"; and 5 = "very characteristic of me."

Teaching Effectiveness. As student effort is expected to be impacted by student perception of a fulfilled need, the measure of teaching effectiveness for this study considers not only the teaching behavior, but the importance of that behavior as assigned by the student. Further, the measure for teaching effectiveness must accommodate the multidimensionality of teaching behaviors described earlier.

The measures of teaching effectiveness developed by Delaney et al. (2010) serve as the foundation for the multidimensionality of teacher behaviors used in this research. Delaney et al. (2010) worked with college students to identify the teaching behaviors students considered important in an effective teacher. These results suggest students find the following behaviors in effective teachers: *respectful, knowledgeable, approachable, engaging, communicative, organized, responsive, professional and humorous.* To measure both the teacher behavior as well as importance of that behavior to the student, importance and rating measures were created for each teaching behavior. First, students were asked to indicate the importance of a teacher

behavior on a 7-point scale, 1= "not important at all" to 7 = "very important." Second, students were asked to rate their instructor's behavior on a 7-point scale, 1= "not at all characteristic of her" to 7 ="very characteristic."

Next, Delaney et al.'s (2010) nine behaviors are combined to reflect two dimensions of teaching effectiveness, based on the results of prior research. The first behavioral dimension of teaching effectiveness is labeled teaching "involvement." Involvement refers to a teacher's "quality of interpersonal relationships" (Skinner and Belmont, 1993), and is consistent with Keeley et al.'s (2006) care and support, Lowman (1995) interpersonal rapport, and Frey's (1978) teacher empathy and rapport. Teaching involvement behaviors help to meet student needs of relatedness (Ryan & Deci, 2000; Pass & Neu, 2014). The involvement scale is computed as the mean of a student's response to "supportive," "approachable," "engaging," and "humorous" measures of teaching effectiveness, and has a scale reliability, measured by Cronbach's Alpha, of .734.

The second dimension of teaching effectiveness is labeled teaching "structure". Structure reflects teacher behaviors that provide clarity of expectations and instrumental help (Skinner and Belmont, 1993). Teaching structure behaviors support student competence needs (Ryan & Deci, 2000; Pass & Neu, 2014). Teaching structure behaviors are consistent with professional competence and communication skills (Keele at al, 2006), intellectual excitement (Lowman, 1995) and teacher skill and competence (Frey, 1978). The structure scale is computed as the mean of a student's response to "knowledgeable," "responsive," "organized," "professional," and "communicative" measures of teaching effectiveness, and has a scale reliability of .738 as measured by Cronbach's Alpha.

Finally, a "gap" (rating minus importance) in teaching effectiveness was computed. A positive gap represents rating exceeding importance. A negative gap represents the importance exceeding rating. In this way, a positive gap indicates a fulfilled need and a negative gap an unfulfilled need. The resulting two measures of teaching effectiveness for this study include a *Teaching Effectiveness Involvement Gap* and *Teaching Effectiveness Structure Gap*.

Course Challenge. Course challenge is measured via student response to the survey question: "The expectations of this course have been challenging." Response categories included: 1= strongly disagree; 2= moderately disagree; 3= somewhat disagree; 4=somewhat agree; 5=moderately agree; 6=strongly agree.

Prior Academic Success. Prior academic success includes two measures: Overall GPA and Prerequisite GPA. *Overall GPA* represents student's response to the following survey question: "While you are taking this class, what would you estimate is your GPA?" Response categories include: 0=less than 2.0; 1=2.0-2.4; 2=2.5-2.9; 3=3.0-3.4; 4=3.5-3.9; 5=4.0. *Prerequisite GPA* is measured as student's grade in the prerequisite course Principles of Accounting II. Although failure to complete Principles of Accounting II should have prevented enrollment in the current course, the survey question was written in such a way as to accommodate all possible situations. Students responded to the following survey question: If you completed Principles of Accounting II, what grade did you receive in that class? Response categories included: 4="A"; 3="B"; 2="C"; 1="D"; 0=F"' I="incomplete"; Z = I am currently enrolled in Accounting II; NA = I have not enrolled in Accounting II.

Gender. Gender is being used as a control variable and is measured as follows: Male (1), Female (2).

ANALYSES

Correlations measure the relationship between variables and were used to test the univariate hypotheses (***H1, H2, H3, H4, H5, H6***). Multiple regression, using block (sequential) entry, was used to test the overall model (***H7***). Multiple regression provides a description of a model's overall fit as well as the relative contribution of each of the independent variables in explaining the model's total explained variance (Tabachnick & Fidell, 2019). Grouping explanatory variables in sequential blocks associated with the overall model allows for the evaluation of each block's unique contribution to the explained variance remaining at its point of entry. Block entries were made in the following sequence: Academic Preparation and Gender, followed by Course Challenge, and concluding with Teaching Effectiveness Gaps. Homogeneity of variance was evaluated through scatterplot of the regression residuals (Tabachnick & Fidell, 2019) as well as Levene's test (Field, 2014), $F(153,14) = .585$, $p=.941$). Multicollinearity did not emerge as a concern in the resulting regression models as the Variance Inflation Factor (VIF) values of the independent variables were well below the level of five (Field, 2014).

RESULTS

The descriptive statistics for the subjects of this study, including Astin's (1993a) measures designated as "Inputs", "Environment" and "Outcomes," are available in Table 1.

Table 2 presents correlations used to test the univariate hypotheses. The test on the hypothesis regarding Teaching Effectiveness and Student Effort (**H_1**) indicates a positive correlation between Teaching Effectiveness Involvement Gap and Student Effort ($r=.266$, $p<.01$) but a nonsignificant correlation between Teaching Effectiveness Structure Gap and Student Effort ($r=.126$, n.s.). Thus, *H_1 is partly supported*. The test on the hypothesis regarding Course Challenge and Student Effort (**H_2**) indicates no significant correlation ($r=.108$, n.s.), thus *H_2 is supported.* The test on the hypothesis regarding Course Challenge and Teaching Effectiveness (**H_3**) indicates significant negative correlation ($r= -.246$, $p<.01$) between Course Challenge and Teaching Effectiveness Involvement Gap as well as a significant negative correlation ($r= -.305$, $p<.01$) between Course Challenge and Teaching Effectiveness Structure Gap, thus, *H_3 is supported.* The test of the hypothesis regarding student prior academic success and Student Effort (**H_4**) indicates a positive correlation between Overall GPA and Student Effort ($r=.391$, $p<.01$) as well as Prerequisite Grade and Student Effort ($r=.367$, $p<.01$). Thus, *H_4 is supported.* The test of the hypothesis (**H_5**) regarding student prior academic success and Teaching Effectiveness indicates two significant correlations. The correlations with Overall GPA with both Teaching Effectiveness Involvement Gap ($r=.187$, $p<.05$) and Teaching Effectiveness Structure Gap ($r=.218$, $p<.01$) are significant. However, neither the correlation of Prerequisite Grade with Teaching Effectiveness Involvement Gap ($r=.106$, n.s.) nor Teaching Effectiveness Structure Gap ($r=.106$, n.s.) is significant. Thus, *H_5 is partly supported.* Finally, although the correlations are negative as anticipated, neither the correlation between Overall GPA and Course Challenge

(r=-.077, n.s.) nor between Prerequisite Grade and Course Challenge (r=-.057, n.s.) are significant thus, this test of the hypothesis regarding Course Challenge and prior academic success (**H_6**) *is not supported.*

Table 1 **Descriptive Statistics (n=169)**	
Input Variables:	
Prior Academic Success	
Overall GPA	
4.0	6.0%
3.5-3.9	29.8%
3.0-3.4	33.3%
2.5-2.9	25.6%
2.0-2.4	5.4%
Prerequisite Grade	
A	38.5%
B	46.2%
C	13%
D	2.4%
Male/Female	65.1%/34.9%
Environment Variables:	
Course Challenge	4.62(1.01)
Teaching Effectiveness Involvement Importance	6.069(.756)
Teaching Effectiveness Involvement Rating	6.015(.850)
Teaching Effectiveness Involvement Gap	-.054(.858)
Teaching Effectiveness Structure Importance	6.458(.618)
Teaching Effectiveness Structure Rating	6.540(.671)
Teaching Effectiveness Structure Gap	.081 (.609)
Outcome Variable:	
Student Effort	4.11(.710)

Table 2 **Spearman's Rho Correlations (n=169)**					
	1	2	3	4	5
1. Student Effort	--				
2. Overall GPA	.391**				
3. Prerequisite Grade	.367**	.604**			
4. Course Challenge	.108	-.077	-.057		
5. Teaching Effectiveness Involvement Gap	.266**	.187*	.106	-.246**	
6. Teaching Effectiveness Structure Gap	.126	.218**	.106	-.305**	.516**
Note: **p<.01. *p<.05.					

Multiple regression with block entry was used to measure the degree the overall model accounted for the variance in Student Effort (**H_7**). The first block entered was the Input variables of Overall GPA, Gender, and Prerequisite Grade. In the second block, student perception of

Course Challenge was entered. In the third block, both measures of Teaching Effectiveness Gaps were entered. The regression results for the final model with all three blocks (Table 3) show good fit of the variance in Student Effort (R^2 = .260) and a model that was highly significant (F(6,161)=9.412, p<.001). Change statistics evaluating each block's unique contribution to the variance explanation indicate the Teaching Effectiveness block explained significant variability (an additional 6.7% in Student Effort) after the explanation offered by variables in first and second block were entered. Of the 26 percent of variance in Student Effort accounted for in the full model, 6.7 percent is explained by the Teaching Effectiveness variables.

Looking more closely at the relative contribution of each of the independent variables in explaining the model's total explained variance, the variables that emerged as significant predictors of Student Effort included Teaching Effectiveness Involvement Gap (b=.299, p=.001), Overall GPA (b=.289, p<.001), and Course Challenge (b=.186, p=.010). Prerequisite Grade, Teaching Effectiveness Structure Gap, and Gender were not significant predictors of Student Effort. Thus, **H_7 is partly supported.**

Table 3
Multiple Regression Predicting Student Effort (n=168)

Variable	*Standardized Coefficients*	*t-Statistic*	*P-value*
Constant		7.150	.001
Overall GPA	.289	3.370	.001
Gender	.030	0.427	.670
Prerequisite Grade	.144	1.745	.083
Course Challenge	.186	2.612	.010
Teaching Effectiveness Involvement Gap	.299	3.515	.001
Teaching Effectiveness Structure Gap	-.062	-0.708	.480
Dependent variable: Student Effort; Total model R^2= .260; Total model F value = 9.412; Total model p>F=.001.			

FURTHER ANALYSIS

Given the significance of the "Input" variable, Overall GPA, in predicting Student Effort (Table 3), further analysis was conducted to evaluate how differences in Overall GPA might impact predictors of Student Effort. To structure this further analysis, students were divided into two groups of as close to equal size as possible given the distribution of Overall GPA values. The resulting groups included students with cumulative GPAs of 3.5 or higher on a 4.0 scale (n=60) and those with cumulative GPAs of lower than 3.5 (n=108).

A comparison of means is provided in Table 4 for the two student groups. On average the lower-GPA students put forth less effort (t=4.186, df=166, p=.001), described the course as more challenging (t=1.896, df=166, p=.030), and reported lower levels of teaching effectiveness measured as both Teaching Effectiveness Involvement Gap (t=2.225, df=166, p=.014) and Teaching Effectiveness Structure Gap (t=2.952, df=166), p=.022) than did higher-GPA students.

Separate regression analyses on Student Effort also were conducted for the two student groups. Table 5 provides the results for students with overall GPAs less than 3.5 (R^2 = .187, F(6,101) = 3.869, p<=.002) and students with overall GPAs greater than or equal to 3.5 (R^2 = .31, F(6,53) =3.980, *p*=.002). For students with Overall GPAs less than 3.5, the variables that predict Student Effort included Teaching Effectiveness Involvement Gap (b=.284, p=.010) and Overall GPA (b=.225, p=.018). For the higher-GPA students, the variables that emerged as predictors of Student Effort included Gender (b=.279, *p*=.019), Course Challenge (b=.269, p=.032) and Prerequisite Grade (b=.249, *p*=.037).

Table 4
Mean Comparison by Overall GPA

	GPA>=3.50	GPA<3.50	t-score (df=166)	Sig. (2-tailed)
	n=60	n=108		
Student Effort	4.408(.621)	3.954(.702)	4.186	.001
Prerequisite Grade	3.767(.427)	2.907(.717)	8.476	.001
Male(n=109)/Female(n=59)	30/30	79/29	3.078	.001
Course Challenge	4.42 (1.094)	4.72 (.946)	-1.896	.030
Teaching Effectiveness Involvement Gap	0.142(.751)	-.162(.897)	2.225	.014
Involvement Rating	5.992(.884)	6.028(.834)	-.263	.793
Involvement Importance	5.850(.697)	6.190(.763)	-2.850	.005
Teaching Effectiveness Structure Gap	0.263(.770)	-.020(.473)	2.952	.002
Structure Rating	6.600(.706)	6.506(.652)	.869	.386
Structure Importance	6.337(.595)	6.526(.622)	-1.918	.057

Table 5 **Multiple Regression Predicting Student Effort by GPA Group**			
Overall GPA>=3.5 (n=60)			
Variable	***Standardized Coefficients***	***t-Statistic***	***P-value***
Constant		.368	.714
Overall GPA	.212	1.821	.074
Gender	.279	2.412	.019
Prerequisite Grade	.249	2.136	.037
Course Challenge	.269	2.199	.032
Teaching Effectiveness Involvement Gap	.243	1.479	.145
Teaching Effectiveness Structure Gap	-.075	-.436	.664
Dependent variable: Student Effort; Total model R^2= .31; Total model F value = 3.980; Total model p>F=.002.			
Overall GPA<3.5 (n=108)			
Variable	***Standardized Coefficients***	***t-Statistic***	***P-value***
Constant		5.787	.001
Overall GPA	.225	2.408	.018
Gender	-.084	-.919	.360
Prerequisite Grade	.112	1.199	.233
Course Challenge	.148	1.594	.114
Teaching Effectiveness Involvement Gap	.284	2.608	.010
Teaching Effectiveness Structure Gap	.021	.192	.848
Dependent variable: Student Effort; Total model R^2= .187; Total model F value = 3.869; Total model p>F=.002.			

DISCUSSION

This study examined student effort levels across multiple sections of an on-campus, business finance course at a state university in the upper-Midwest region of the U.S. The key research question was to assess the impact of teaching effectiveness, conceptualized as the gap between student rating of teacher behavior and student-indicated importance of that teacher behavior, on levels of student effort. Astin's (1993a) I-E-O framework for assessment served as the conceptual model to structure the analysis.

The measures for teaching effectiveness were conceptualized as the gaps between student rating of teacher behavior and student-indicated importance of that teacher behavior. A positive gap indicated observed teacher behaviors exceeded student perception of importance of the behavior, or a met need, while a negative gap indicated observed behaviors fell short of student perception of importance, or an unmet need. Based on a review of the literature, Delaney et al.'s (2010) nine measures of teaching effectiveness were reduced to two factors, reflecting teaching involvement and teaching structure. Teaching involvement included teaching behaviors that reflect interpersonal support, caring, and rapport while teaching structure behaviors reflect

professional competency and teaching skill. The results suggest teaching involvement gap was significantly correlated to student effort while the correlation between teaching structure gap and student effort was positive but not statistically significant. Expected correlations between student effort and the remaining variables of the model held, including anticipated positive correlations between student effort with overall GPA and prerequisite grade as well as anticipated non-association between course challenge and student effort.

Multiple regression on student effort was conducted using a block, sequential entry. Astin's (1993a) I-E-O framework again established the block entry sequencing. Input variables of overall GPA, gender, and prerequisite grade were entered first, followed by the measure of course challenge, and finally by the two measures of teaching effectiveness gaps. The regression analysis revealed significant predictors of student effort included overall GPA, teacher involvement gap, and course challenge. Unexpectedly, teacher structure gap did not emerge as a significant predictor of student effort.

Given the focus of this research has been to identify those teaching behaviors within the course experience that positively influence student effort in the course, the emergence of an "Input" variable, overall GPA, as a significant predictor of student effort in the regression analysis prompted further analysis to examine how teaching effectiveness might be experienced differently by lower-GPA students and higher-GPA students. As shared in Table 4, lower-GPA students reported lower levels of teaching effectiveness as measured by both involvement gap and structure gap. Importantly, the difference in teaching effectiveness gaps between higher-GPA and lower-GPA students was due to significantly higher levels of student-indicated importance of teaching behavior by lower-GPA students. Specifically, the difference in student-indicated importance of teaching involvement between lower-GPA students (m=6.190, sd=.763) and higher-GPA student (m=5.850, sd=.697) is significant (t=2.850, df=166, p=.005). Similarly, the difference in student-indicated importance of teaching structure between lower-GPA student (m=6.526, sd=.622) and higher-GPA students (m=6.337, sd=.595) is moderately significant (t=1.918, df=166, p=.057). In the end, the difference in teaching effectiveness gaps (rating minus importance) between higher- and lower- GPA students is being driven by the higher importance assigned to these teaching behaviors by lower-GPA students.

Comparison of the regression results for the two student groups underscores that the importance of teaching effectiveness on student effort rests with the lower-GPA student. As shown in Table 5, student effort for lower-GPA students was explained by teaching effectiveness involvement gap and overall GPA, while the explanation of student effort for higher-GPA students included neither measure of teaching effectiveness.

This study builds on previous research that connects teacher behaviors to student effort. These results largely agree with the previous findings that teacher behaviors of involvement (Skinner and Belmont, 1993), confirmation (Campbell et al., 2009), caring (Jones et al., 2021) and enthusiasm (Grier, 2022) were associated with student effort. However, the current study found teacher behaviors of structure did not explain student effort. Further thoughts on this lack of finding will be offered under Conclusions and Implications.

This study builds on previous research that connects student needs to student effort. Consistent with research guided by self-determination theory which posits innate psychological

needs serve as the foundation for self-motivation toward effort (Ryan & Deci, 2000; Skinner & Belmont, 1993), this study posits that fulfillment of competence and relatedness needs are met with teacher behaviors labeled, of this study, structure and involvement, and contribute to the quality of student effort. Unlike the approach taken by Pass and Neu (2014) in which importance of needs is assumed, in this work, students are explicitly asked to indicate the importance of instructor behaviors to them. Need fulfillment was established as teacher behavior exceeding student-indicated importance.

This study expands previous research and contributes to the literature through the novel conceptualization of teaching effectiveness as gaps between student-indicated importance of teacher behavior and student ratings of that behavior. In this way, the resulting gap in teaching effectiveness essentially indicates met and unmet student needs in teaching behaviors, thus expanding upon previous work where observed teacher behavior (involvement, for example) met an assumed student need (i.e., relatedness) (Pass and Neu, 2014; Ryan and Deci, 2000; Skinner and Belmont, 1993).

Finally, this study expands on previous research by identifying the differing impact of teaching behaviors on student efforts for higher- and lower-GPA students. The additional analysis revealed significant differences between higher- and lower-GPA student measures of effort, course challenge, and teaching effectiveness involvement and structure gaps. The analysis also revealed the impact of teaching effectiveness on student effort was concentrated on lower-GPA students. Such results expand our understanding of how the importance of teaching effectiveness differs by background characteristics of student in one's class.

CONCLUSIONS AND IMPLICATIONS

Student effort remains a primary determinant of student success, and teachers can impact student effort through effective teaching behaviors and course design. The results of this study suggest the behaviors of teacher involvement (behaviors students perceive as supportive, approachable, engaging, and humorous) have the largest impact on student effort, followed by student overall GPA and level of course challenge.

The results of this study also suggest teaching effectiveness is more important for some students than others. The overall model predicted teaching effectiveness involvement gap helped explain levels of student effort. In the subsequent analysis separating higher- and lower-GPA students, the impact of teaching effectiveness on student effort was attached to the lower-GPA students, while course challenge and prerequisite grade predicted student effort for higher-GPA students. Combined, these results may seem intuitive. Highly successful students have demonstrated they know how to learn, have past academic success under their belts, and likely have high independent learning skills. Motivation for student effort among higher-GPA students seems to come from past successes (they are good at getting good grades) as well as the levels of course challenge (challenge increases their levels of effort). On the other hand, motivation for student effort among lower-GPA students was impacted by faculty supportiveness and engagement and may reflect the needs of a more dependent learner.

LIMITATIONS AND FUTURE STUDY

This study focused on student effort in a course with quantitative content. Repeating the study with students from a broader range of courses may allow for cross validation of the results. Also, this study focused on student effort among students in an on-campus, face-to-face course structure. It is reasonable to assume teacher behaviors that explain student effort might differ in an online setting. Comparing the results of this study to the results of a study with online students may provide critical insights to motivation of student effort across learning modalities.

Finally, only teaching effectiveness involvement gap predicted student effort while teaching effectiveness structure gap did not. Future research may wish to consider whether there might be two continuums for the construct of teaching effectiveness, rather than one as assumed in this study. Future research may reveal that teacher behaviors covered by the structure gap are considered the "norm" or "minimum" and go unnoticed except in their absence or deficit. A teacher who is "organized" may not serve to motivate effort; and yet, if the teacher is "unorganized" that may interfere with what otherwise would be student progress. In their work on factors that do or do not stimulate student effort, Weaver and Cottrell (1988) hinted that while an organized approach does not stimulate student effort, the lack of sufficient organization might give rise to student complaint. In the same way that Herzberg (1966) challenged the assumption that satisfaction and dissatisfaction were on two ends of one continuum but, rather, were on separate continuums, perhaps teaching effectiveness and ineffectiveness are on separate continuums with the effectiveness continuum (teacher involvement) being distinct from the ineffectiveness continuum (teacher structure).

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