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On Meaningful Assessment of 'Motivation' : Steps Toward More Detailed Causal Modeling and Measurement

William J. Schmelzer

ON MEANINGFUL ASSESSMENT OF 'MOTIVATION':

STEPS TOWARD MORE DETAILED CAUSAL MODELING AND MEASUREMENT

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William J. Schmelzer
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ABSTRACT

This study was a continuance of prior research and theory on the nature and assessment of motivation. The focus was on the academic performance situation. Existing empirical and theoretical work was utilized to formulate a complex causal model which identifies constituent elements related to motivation and performance, and which explicates their respective relationships. The theoretical model was employed to create an operational model for measurement and prediction of collegiate grade performance, a cumulative index of performance.

Three main fields of theory and inquiry were incorporated in the model: Attribution theory, self-system theory and metacognition theory. Literature dealing with pertinent knowledge in these areas and their interfacings was discussed in the process of outlining the theoretical model. Measures were selected on this basis to form the operational model. Measures included indices of effort, ability, locus of control, self-esteem and study style.

Regression analyses were used to determine which elements were useful as collective predictors of grade-point average. Reliability and validity were investigated for the

individual measures. Finally, the operational model was investigated using the LISREL-VI program.

Results indicated that some twenty-five percent of the variance in grade-point average was accounted for by the model. Most useful predictors were ability, effort and study methodology, respectively. Reliability and validity estimates were concordant with known characteristics in the literature.

The operational model was found to have been mismapped onto the theoretical model initially, with the result being a model which could not be analyzed by the LISREL program due, in part, to very poor fit with the data. After reformulation, without statistical aid, the model succeeded in accounting for about ninety-one percent of the total variance in the data. The fit of the model to the data was good.

Overall, while the model was well-specified in terms of internal relationships, there is need to specify additional parameters in future studies. Possibilities were discussed.

Results were generally encouraging, despite observable weaknesses. These weaknesses and means of coping with them were discussed. Also, this study was placed in reference to other research and directions for future study were considered.

INTRODUCTION AND BACKGROUND

Motivation is a term which has long been theorized to refer to a complex construct, composed of multiple interrelated dimensions or sub-constructs. The various concepts which have been postulated to comprise this nexus of factors are numerous in the history of psychology. Over time, gradual convergences of ideas have taken place, drawing formerly diverse efforts at inquiry into several main streams of research and theory. The result has been clearer thinking and greater knowledge about the natures of these constructs and their interrelations. Meaningful measurement of this construct may now be within reach.

The purpose of this paper is to identify the lines of thought which have come together to make this possible, and then to propose the construction of such a measure, based on these origins and previous work by this author.

The origins and confluence of three major forces will be discussed: attribution theory, self-system theory and metacognition theory. The way in which the last of these may afford a framework for measurement will be outlined and connected with the model forwarded by Schmelzer (1991). The rationale for this study will then be described in that context.

Three Lines of Thought and Inquiry

Early motivation theory was characterized by attempts to root behavior in an identifiable biological substrate. The thinking of the time was influenced strongly by Darwin's (1871) formulation of instincts, and his influence is reflected in the works of many later theorists such as McDougall, Hull, Piaget and White (Brody, 1983). In these and related approaches, motivation was opined to be a built-in property, arising from the nature of the body's hard wiring. Unfortunately, these theories could not fully address the complexity of the human condition, especially in the particular way we experience it. Darwin's injection of instincts into the human equation resulted in a diversion of interest away from these classic problems of goal-directed behavior for quite some time, especially as these problems pertain to humans (Russell, 1970).

Attribution Theory

Viewed retrospectively, a major cornerstone of modern motivation theory - which does match more amenably with our experience - was laid with the work of Heider (1958). In his "naive analysis of action", Heider introduced the concept of causal unit formation, in which the tendency to reduce the diversity of multitudinous stimuli leads to the connection of individual objects and events - a process called attribution. This process became central to what has

mushroomed out into the broadly influential, cognitive realm of modern attribution theory.

One of the most prolific disciples of attribution theory has been Bernard Weiner. Through a steady stream of theoretical and research contributions over the past two and a half decades (Weiner, 1979, 1980a, 1980b, 1982, 1983, 1985; Weiner & Kukla, 1970; Weiner, et al, 1971; Weiner, et al, 1976; Weiner, et al, 1978; Weiner, et al, 1979; Weiner, et al, 1982; Weiner, Graham & Chandler, 1982; Weiner & Graham 1984; Weiner & Handel, 1985) Weiner has provided the massive trunk of a tree of thought and inquiry, the branches of which touch or include perceived competence (Harter, 1982a; Nicholls, 1984), mastery (Ames & Archer, 1988),social cognition (Maehr & Stallings, 1972), self-worth (Covington, 1984), self-serving attributional biases (Nicholls, 1976; Pyszczynski & Greenberg, 1983; Jagacinski & Nicholls, 1990) and learned helplessness (Abramson, et al., 1978; Arkin & Baumgardner, 1985; Fincham & Cain, 1986), and which now enmesh closely with self-system theory, another major research tradition anchored by Bandura's notion of self-efficacy (1974, 1977).

Weiner's explanation of the process of attribution explicitly acknowledges two familiar concepts. The first is the concept of mastery, as introduced by White (1959). The second, the search for functional links, descends from Heider's early introduction of causal unit formation, and

serves the ends of mastery. The apparent ubiquitousness of these concepts across time and cultures led Weiner to regard them as apt foundation blocks for a theory of motivation (Weiner, 1985).

Weiner embraced the partition of causes along the internal-external dimension described by Rotter (1966) but pointed out that especially within internal factors, some may be considered as either stable or variable in nature (Weiner, et al 1971; Weiner 1985). For instance, ability may be conceived of as a stable inherent factor or, if learning is possible, as a varying inherent factor; effort may be considered as a momentary state or as a trait, like "lazy". He proposed a second "stability" dimension to address such possibilities.

The addition of this distinction was not wholly sufficient however, since internal causes could also vary in terms of their accessibility to volitional control. Laziness is considered to be more under volitional control than, say, math ability, for example. Hence, a third property of causes was added to the attribution model, controllability (Weiner,1979). Within this three-dimensional taxonomy then, were three causal properties: locus, stability and controllability. These three dimensions have been found to be reliable, general across situations, and meaningful (Weiner, 1985).

Self-system Theory

William James (1890/1963) was one of the first in psychology to discuss self-concept, or more specifically, the sense of self. He distinguished between the "self as knower" and the "self as object," with the latter defined as an individual's self-concept. However, research along these lines dwindled when the behavioral paradigm dominated in psychology, until interest resurged in the 1970's - partly kindled by the social learning theory of Bandura (1974, 1977, 1978).

Within the context of the reciprocal determinism of interacting cognitive, behavioral and environmental factors Bandura sees the self-system as referring to primarily cognitive structures that regulate behavior (Hall & Lindzey, 1985). A key component of the self system is self-efficacy, which is defined as " People's judgements of their capabilities to organize and execute courses of action required to attain designated types of performance (Bandura, 1986, p. 391). The motivational quality arises from the resultant ability to anticipate future reinforcement on this basis. Since the introduction of this concept in his seminal article (Bandura, 1974), much research has articulated and extended the role of self-efficacy as an underlying mechanism in the generalization, maintenance and change of behavior (Schunk, 1991).

Self-efficacy theory postulates that people gather information from numerous sources to appraise efficacy (Bandura, 1986). From within this perspective, attributions constitute one of myriad types of data which contribute to individuals' efficacy appraisals (Schunk, 1991). Naturally, personal experience with one's own performance outcomes provides the most direct means of assessing efficacy. However, both actual and observed success may improve the sense of efficacy and failure can diminish it. Yet, if a strong sense of efficacy is established, failure may not have great impact (Bandura, 1986). This is because multiple cognitive appraisals mediate efficacy evaluation. Efficacy appraisal is said to be an inferential process in which persons assess the combined, reciprocal contributions of personal and situational factors such as their perceived ability, task difficulty, effort expenditure, success/failure configurations, perceived similarity to models, assistance received and persuader credibility (Schunk, 1989).

Attribution and Self-efficacy

Just as Bandura said about self-efficacy (Bandura, 1986), Weiner (1985) - having given the three-dimensional foundation of attributions, and in turn, focusing on achievement motivation - also proposed that causal attributions in this realm are intimately dependent upon perceptions of success and failure. This interface between

the two approaches has been proceeding extensively since their introductions - representing as they do two somewhat differing levels of functional analysis in the same domain.

This difference, as well as the ease of the interface, is exemplified in Weiner's (1985) discussion of the emotion pride, in which pride, or positive self-esteem, is postulated to result from attributing positive outcomes to the self, and negative self-esteem is fostered when negative results are attributed in this same way (Stipek, 1983; Weiner, et al., 1978). Pride and self-esteem are said to be self-reflective emotions, linked to the locus of causality (Weiner, 1985) of the attributed event.

Further, Weiner (1985) and Harvey and Weary (1981) point to a vast attributional literature which documents what is referred to as self-serving attributional bias (also called hedonic bias), or the tendency to ascribe success to internal causes and failure to external causes.

The self-serving attributional bias literature is a synergistic fusion of cognitive-attributional and self-theory approaches, showing pretty clearly how the two levels of analysis interlock. Concepts such as "self-concept," "self-worth," "mastery" and "perceived competence" - which had become central to formulations descending from social learning theory (Bandura, 1977), self-perception theory (Bem, 1972), social cognition (Lepper & Greene, 1978) and theories of competence and intrinsic motivation (de Charms,

1968; Deci, 1975; Harter, 1978, 1981a, 1981b; White, 1959, 1963) - figure prominently alongside the various cognitive attributional constructs. Reviews in this area (Bradley, 1978; Zuckerman, 1979) indicate that certain self-esteem protecting strategies are pervasive, especially the tendency to deny blame for failure. Numerous theorists have even postulated anticipatory maneuvers which shield the self-system, or elements in it, from unfavorable feedback in the face of anticipated failure (Nicholls, 1976; Berglas & Jones 1978; Covington & Omelich, 1981; Snyder & Wicklund, 1981; Pyszczinski & Greenberg, 1983; Jagacinski & Nicholls, 1990).

Since characteristically, constructs such as self-concept and self-esteem (see Wigfield & Karpathian, 1991, for a detailed discussion of these concepts) are vaguely defined at the basic conceptual level and therefore do not point to any clear operational definitions (Harter, 1982a), instruments designed to tap these self-evaluative processes are often seriously affected (Robinson & Shaver, 1973; Wylie, 1974, 1979). Although we know that concepts like self-efficacy can predict academic performance to some extent, problems with definition and measurement make it difficult to incorporate previous measures of such constructs into a generalized academic motivational assessment battery without a clear rationale regarding their fit with other motivational constructs.

Fortunately, recent developments in the field of metacognition may provide the missing link; in particular, the work of Borkowski, et al. (1990). One of the real values of this reference, in the perception of this author, is the way in which it recognizes the differing levels of analytic applicability of three approaches and ties them together to form a more meaningful, useful whole by explicating their interrelatedness. The following discussion briefly outlines its basic ideas.

Theory in Metacognition, Attribution & Self-esteem

The essential premise, or theme followed by Borkowski, et al. (1990), is that while motivational states often guide and impel human behavior, "they also play more subtle roles in determining the actual strength, shape, or functioning of cognitive processes." They explicitly advance the position that metacognition theory is especially well suited for understanding more about the interface of motivation, attitudes and cognition. Their basic stance is that actions based on the knowledge and implementation of strategies directly influence self-concept, attributions about personal control, and attitudes about learning. These "personal-motivational states" influence metacognitive development and the likelihood of strategy generalization (Borkowski, et al., 1987; Oka & Paris, 1987).

Metacognition may be referred to as self-understanding of the nature and function of mental processes. Borkowski,

et al. (1990) conceptualize metacognition in terms of three interactive, mutually-related components identified earlier (Pressley, et al., 1985): Specific Strategy Knowledge, General Strategy Knowledge and Metamemory Acquisition Processes (MAPs). General Strategy Knowledge was expanded to include motivational properties that seem relevant to academic performance (Borkowski, et al., 1990). The following descriptions of each are excerpts from that article (pp. 55-58).

> **Specific Strategy Knowledge.** At the core of the model is specific strategy knowledge. Each strategy has a base of knowledge associated with it. The child with well-developed specific strategy knowledge knows the task demands that dictate the use of particular strategies but not others, when to use these strategies, and how to apply them efficiently with the least effort. From this perspective, the appearance of a strategy on a transfer test suggests that the learner possessed sufficient information about its attributes so that the new task was recognized as solvable through the application of one of several available strategies (Borkowski, 1985).
>
> **Metamemory Acquisition Procedures.** Metamemory acquisition procedures (MAPs) are strategies that operate on strategies. Thus, learners can compare strategies with one another or conduct personal
>
> experiments, extending strategies that they know to new situations. MAPs allow the on-line regulation and monitoring of strategies, so that effective and efficient strategies are maintained but strategies detected as ineffective and inefficient are discarded...
> ...Metacognitive acquisition procedures boil down to self-experimentation. As such, they represent extremely sophisticated approaches to deliberate reflection about strategies.

General Strategy Knowledge and Attributional Beliefs. One form of general strategy knowledge is the child's understanding that effort is required to apply strategies, with an eventual payoff in improved performance. Another is the general understanding that well-chosen strategies produce efficient performance. A third form is understanding that rudimentary strategic plans should be made before trying to carry out a task, with the additional recognition that the plan may need to be modified as the task proceeds. These aspects of general strategy knowledge increase the likelihood that an individual will search for, modify, and apply appropriate strategies. (Clifford, 1984).

General knowledge about the efficacy of strategies can be facilitated in various ways (Borkowski & Cavanaugh, 1979; Borkowski & Krause, 1985; Borkowski, Levers & Gruenenfelder, 1976; Kennedy and Miller, 1976; Lawson & Fuelop, 1980), and has been conceptualized as having motivational qualities (Borkowski & Krause, 1985). The motivational correlates of metacognition include positive self-esteem, an internal locus of control and constructive attributional beliefs about the causes of success and failure (Borkowski, et al., 1990). Borkowski, et al. (1990), believe that general strategy knowledge, and its associated motivational factors, are bidirectionally related and mutually influential.

Further, research indicates that the self-system - including constructs like self-esteem, attributions, self-efficacy and achievement motivation - is an interdependent nexus, supporting metacognitive functions and academic performance alike (McCombs, 1986). It is known, for example, that the accretion of attributions is linked to

attitudes about self-efficacy (Eccles, 1983; Harter, 1982a) and self-esteem (Watkins, 1984; Weiner, 1985). Self-esteem and related self-system constructs in turn predict achievement (Bandura, 1986; Calsey & Kenney, 1977; Marsh, 1986; Oka & Paris, 1987; Purkey, 1970).

This being the case, and since metacognition seems to be a useful and powerful explanator of the self-system's influence through skilled learning (Borkowski, et al., 1990), the overall model is useful in describing how affective, motivational and attributional constructs converge to affect academic performance. "From the perspective of the metacognitive model, children who feel good about themselves and their ability - those who are intrinsically motivated to learn and who have effort-related attributions - are more likely to believe in strategic behavior and to develop complete, mature strategy knowledge (Borkowski, et al., 1990)"

Borkowski, et al. (1990), believe that high degrees of academic attainment are typified by personal conditions of high self-esteem, intrinsic motivation and effort-related attributional beliefs. These characteristics combine with perceptual efficiency and sharper specific strategy knowledge to promote higher-order MAPs, the establishment of which is expected to set gifted students apart from average students (Borkowski & Kurtz, 1987). Successful students believe that effort is central to their successes. On the

other hand, children who have inaccurate, immature beliefs about success and failure (such as attributing good outcomes to luck and failure to ineptitude) may tend to show deficits of strategic behavior in the face of difficulty (Dweck, 1987; Kurtz & Borkowski, 1984). These students often fail to develop functional self-systems that would facilitate their progress through school (Borkowski et al., 1990) and which, along with a lack of corresponding metacognitive development, is likely to result in poor performance.

The Metacognition Model & Measurement of Motivation

Based on the assumptions that the motivational correlates of metacognition include positive self-esteem, an internal locus of control and constructive attributional beliefs about the causes of success and failure, and that high degrees of academic attainment are typified by personal conditions of high self-esteem, intrinsic motivation and effort-related attributional beliefs (Borkowski, et al., 1990), this author proposes that an adequate test instrument based on these constructs is feasible. This position is founded in part on the author's retrospective reanalysis of a previous work of his own on the Collegiate Academic Motivation Test (Schmelzer, 1991), which suggests the possible presence of self-esteem, locus of control, and effort attribution dimensions infused in its factor-based scales. A discussion of the background and nature of this instrument follows.

Prediction of Performance - The Collegiate Academic Motivation Scale

Despite its abundance in theories interrelating motivation with thought, learning and performance (Bower & Hilgard, 1975), the history of psychology is rather less than replete with reports of practical measures by which to quantify it.

While this is certainly true of the field in general, it is eminently clear in the subarea which addresses academic performance. In an extensive search of the literature relating motivation and academic achievement, this author found no clear precedent to his effort (Schmelzer, 1991) to develop a measure which could be used in conjunction with intelligence estimates to predict school performance. Perhaps the nearest approximations to this were the works of Cattell's research team (Barton, et al., 1971, 1972; Cattell, et al., 1972; Dielman, et al., 1970, 1971; Schuerger, et al., 1970), using certain elements of the Sixteen Personality Factor Questionnaire (Cattell, et al, 1970) to predict school coursework performance. This small body of research indicated that large portions of the variance in school performance could be accounted for by motivational factors and sometimes these portions were greater than could be accounted for by intelligence measures alone. Two reports (Barton, et al., 1972; Dielman, et al., 1972) claim portions of variance accounted for by motivation

ranging from fifteen to forty-three percent (depending on the grade level of the subjects), suggesting that the utility of motivational measures could be great.

The Schmelzer (1991) prospective study was motivated in part by these promising results, as well as by a belief in the need for a sound but tractable measure of this construct, with which to more fully address matters of predicting and evaluating academic performance. Having no clear precedent in the literature, and not having found the Borkowski, et al. article (1990) cited extensively above, the measure was constructed from an atheoretical stance, using a large pool of rationally-derived items subjected to empirical evaluation. The items were initially constructed to reflect the content of significant past and current theoretical schools of thought in the area of motivation - especially in the realm of attribution theory, including the works of Heider (1958), Weiner (Weiner & Kukla, 1970; Weiner, et al., 1971; Weiner, 1985), Rotter (1966), Nicholls (1976, 1984; Jagacinski & Nicholls, 1990) and numerous related others (Maehr & Stallings, 1972; Bandura, 1974, 1977; Calder & Staw, 1985; Deci 1975; Kruglanski, 1975; Abramson, et al., 1978; Harter, 1981, 1982; Pyszczynski & Greenberg, 1983; Covington, 1984; Arkin & Baumgardner, 1985; Fincham & Cain, 1986; Ames & Archer, 1988; Pintrich & DeGroot, 1990).

Scales were then composed through empirical selection, via factor analyses, with the exclusion of items having factor loadings of less than .30. This resulted in five factor-based subscales. Internal consistencies for the subscales ranged from .07 to .81. Three of the five scales were useful predictors of the criterion measure, grade point average, accounting for about thirteen percent of the variance. Since the Cattell team's findings (Barton, et al., 1971, 1972; Cattell, et al., 1972; Dielman, et al., 1970, 1971; Schuerger, et al., 1970) related motivation to grade performance in specific subjects, and the Schmelzer study used more generalized indices, the results appeared to be fairly encouraging. Unfortunately, observed relationships among other marker elements in the broader performance model in which the Schmelzer measure was imbedded were weak, thus making conclusive evaluations of the results untenable.

Nonetheless, reexamination of the three useful subscales does reveal some interesting directions to proceed in. Table 1 shows the item composition, factor loadings and internal consistencies of the three latent factors upon which the subscales were based, and is excerpted from the reported results (Schmelzer, 1991, pp. 17-18).

The first factor appeared to address the topic of performance attributions, in a way that looks much like Weiner's (1985) variability-stability dimension. This factor accounted for 16.6% of the common variance of items

or Schmelzer's Collegiate Academic Motivation Test. Its equal-length Spearman-Brown estimate of factor reliability was given as .60. Its internal consistency, however, was somewhat lower (alpha=.42; see Table 1). The factor-based subscale was correlated fairly strongly with each of the others, ranging from .52 to .72 (see Table 2), suggesting the possibility of similar content. It included 24 items with factor loadings ranging from .32 to .61 (see Table 1).

High scores on this scale seemed to suggest individuals who attribute successes to personal factors rather than outside forces; low scorers feel helpless and may attribute successes to features such as luck. The items with highest loadings were, "I feel helpless at school," "I won't be able to raise my grades," and "I feel capable enough in school." However, with a brief perusal of the other items in the subscale, the reader can readily identify aspects of each of the major schools of thought discussed earlier. Neither the scale nor the items themselves appear to be unidimensional. Further, the constructs involved have already been acknowledged above as interrelated, conceptually nondiscrete.

This lack of conceptual discreteness in the items was observed by Schmelzer during the construction of the instrument, but was not addressed in a systematic way, partly due to the assumption that the analytic procedures employed would produce a clearer organization of content in the results. As can be seen here, and in examination of the

Table 1

The Collegiate Academic Motivation Test:

Factor Loadings and Internal Reliabilities*

Factors	Factor Loadings	Alpha
FACTOR 1		.42
I feel helpless at school.	.61	
I won't be able to raise my grades.	.54	
I feel capable enough in school.	-.54	
I feel bad about myself at school.	.52	
If I am having trouble, I give up.	.52	
I expect to fail in things I do at school.	.51	
I fail because I don't have enough ability.	.49	
I reduce my effort on something if I think I may fail at it.	.48	
If I think I may fail, I try harder.	-.48	
The causes of my academic troubles are permanent.	.47	
I have bad days at school.	.43	
I feel good about myself at school.	-.42	
I am not in good health at school.	.42	
In the past, when I have succeeded, it was because I got lucky, rather than because I meant to succeed.	.41	
On an important task, if I think it is too hard, I will spend less energy on it.	.41	
I feel smart during school.	-.40	
I encounter tasks at school that seem impossible.	.39	
In the past, when I have succeeded, it was because I meant to, and not because of good luck.	-.38	
I wish I could disappear when I'm at school.	.36	
I expect successes at school.	-.38	
I intend to succeed and do succeed.	-.41	
If I am having trouble, I try harder.	-.36	
The causes of my academic successes are not under my control.	.32	

* Numeric labels retained from Schmelzer (1991).

Table 1 (continued)

Factors	Factor Loadings	Alpha
FACTOR 3		.81
If I think I may fail, I try harder.	.39	
I feel good about myself at school.	.36	
I feel smart during school.	.30	
I don't [illegible] at school.	.2	
I intend to do the best I can with academics.	.71	
Doing well in academics is important to me.	.63	
My performance in school has a strong effect on how I see myself.	.50	
I intend to get higher grades.	.48	
I expect successes at school.	.48	
I intend to succeed and do succeed.	.46	
If I am having trouble, I try harder.	.45	
Good school performance will help me get ahead in life.	.44	
I want to learn.	.39	
I want to understand what I study.	.37	
Learning, in school, is useful.	.32	
FACTOR 4		.17
I fail because I don't have enough ability.	-.32	
Good school performance will help me get ahead in life.	.32	
If I am failing it is my own fault.	.58	
When I fail, it is because I wasn't trying hard enough.	.55	
How well I do in school is in my own hands.	.51	
The causes of my academic troubles are under my control.	.49	
What I do determines my grades.	.44	
If I am failing it is not my fault.	-.44	
The causes of my academic successes are not under my control.	-.41	
My grades are controlled by someone else.	-.35	
My failures happen due to lack of interest on my part.	.31	

other two useful scales, this did not prove to be the case. The reasons could be manifold; however, it seems that one reasonable conclusion is that the factor-analytic

approach is insufficient to sensitively address the complex, bidirectional interrelations of the constructs involved.

Factor 3 seemed to address achievement orientation. It accounted for 3.8% of the common variance. This factor's unequal-length Spearman-Brown estimate of factor reliability was given as .78; its internal consistency, .81 (see Table 1). Its subscale also correlated with each of the others, ranging from .35 to .72 (see Table 2). It included 15 items with factor loadings from .30 to .71 (Table 1). The highest loading items included, "I intend to do the best I can with academics," "Doing well in academics is important to me" and "My performance in school has a strong effect on how I see

Table 2

Intercorrelations Among 3 CAM Test Factor-based Subscales*

Subscale	1	3	4
1	1.00		
3	-.72	1.00	
4	-.52	.35	1.00

* Numeric labels retained from original report (Schmelzer, 1991).

myself" (see Table 1). High scores indicate a general devaluing of academic achievement, while low scorers are very achievement-oriented.

Again, multiple constructs can be recognized within the scale, including achievement valuation, effort attribution, self system constructs and affective components.

The fourth factor was seen to address locus of control, especially in regard to failure. High scorers tended to externalize failure while low scorers made self-referent attributions. This factor accounted for 2.5% of the items' common variance. The unequal-length Spearman-Brown estimate of factor reliability was .23. Its internal consistency was similarly low (alpha=.17; see Table 1). This factor's subscale correlated moderately to well with the other two useful factors (correlations of -.52, .35). It was composed of 11 items. Factor loadings ranged from .31 to .58 (Table 1). Highest loading items were, "If I am failing, it is my own fault," "When I fail, it is because I wasn't trying hard enough" and "How well I do in school is in my own hands" (Table 1). Just as with the other two scales that proved to be useful conjoint predictors, with the benefit of hindsight and the metacognitive theoretical model, multiple contributing concepts can be easily observed here.

The intercorrelations of these scales, as well as shared variances with intellective and strategy-use measures, suggest that part of the obscurity in the observed results was due to the fact that, despite efforts to the

contrary, items did not succeed in reflecting single, basic concepts.

It may be inferred then, that a test composed of unidimensional scales, for which the structure of functional interrelations is known or theorized a priori, would succeed more fully as a useful, comprehensible measure of motivation. The notable portion of variance accounted for by the CAM, despite its implementation difficulties and lack of conclusive results, suggests this to be a viable avenue of approach.

The Study

In light of this and the preceding discussion, this author proposed and undertook the construction of a generalized measurement battery for academic motivation, comprised of scales addressing locus of control, self-esteem and the tendency to attribute success to effort, based on the known relevance of these concepts to motivation and performance, as delineated by Borkowski, et al. (1990). The purpose of the test will be identical to that in Schmelzer (1991), which is ultimately to augment intelligence estimates in the prediction of academic performance. Recall that the motivational correlates of metacognition include positive self-esteem, an internal locus of control and constructive attributional beliefs about the causes of success and failure, and that high degrees of academic attainment are typified by personal conditions of high self-

esteem, intrinsic motivation and effort-related attributional beliefs (Borkowski, et al., 1990). Conversely, deficits in the areas might be expected in low achievers. Research supports this notion as well (Carr & Borkowski, 1987; Clifford, 1984; Covington, 1987; Covington & Omelich, 1981; Diener & Dweck, 1978; Dweck, 1987; Dweck & Repucci, 1973; Durr & Collier, 1968; Kurtz & Borkowski, 1984; Jacobsen, Lowery & DuCette, 1986). Taken together, these facts provide the rationale which guided the selection of scales for inclusion in the proposed battery.

The procedure for accomplishing this end will call for a single sample, for the performance of multivariate regressions and establishment of a weighted formula relating the scales. A subsample will be recalled to assess the reliability of the test battery and its subscale formula.

Measures Selected as Subscales

The selection of these scales or portions of scales has been, as indicated, theory-driven. The choice of topical areas was predicated primarily on a metacognitive formulation of motivation (Borkowski, et al., 1990) and secondarily on retrospective evidence suggesting the viability of those constructs (based on Schmelzer, 1991). In terms of the search for the scales, a priori criteria were generated, requiring brevity, already-known psychometric properties and relatively good validity. These criteria were applied to assure: (1) that the collective

number of predictor items did not exceed both the temporal and sampling scopes of the study, in terms of the number of subjects needed to afford sufficient statistical power in the subsequent analyses (use of existing extended tests of the identified subareas would require more than a thousand subjects for robust statistical results), (2) that the latent constructs do, in fact, have some known predictive utility when regarded singly, and (3) that the scales do, in fact, represent the constructs identified, namely: locus of control, self-esteem and attribution of success to effort. Following is a discussion of the measures to be used and evidence supporting their selection.

Table 3

Rotter's Locus of Control Items in the Brief Scale.*,**

Internal Items ("Internal Control")
When I make plans, I am almost certain that I can make them work.
Getting people to do the right things depends upon ability; luck has nothing to do with it.
What happens to me is my own doing.
External Items ("Chance")
Many of the unhappy things in people's lives are partly due to bad luck.
Getting a good job depends mainly of being in the right place at the right time.
Many times I feel that I have little influence over the things that happen to me.

*Five-point scale from strongly disagree (1) to strongly agree (5).

**Excerpted from Lumpkin (1985).

Locus of Control: The Abbreviated Rotter Scale (Lumpkin, 1985). This is a six-item rendition (Lumpkin, 1985) of the widely-accepted, original, 23-item, forced-choice Rotter (1966) scale. However, instead of using three forced-choice pairs of questions, three "internal" items and three "external" items were selected (see Table 3) and scored on a five point Likert format suggested by Levenson (1974). These sets allegedly (Lumpkin, 1985) reflect both the "chance" and "internal" dimensions identified by Levenson (1974). However, there is no concensus on the dimensionality of locus of control (Abrahamson, et al., 1973; Collins, 1974; Mirels, 1970; Reid & Ware, 1973).

The Lumpkin (1985) results were based on a sample of 4,720 subjects contacted by mail. Some 3,009 usable responses were obtained. The Cronbach's alpha coefficient of internal consistency (Cronbach, 1951) was .68, which reportedly compares favorably with the range of .65 to .79 reported by Rotter (1966) and the .66 for a six-item scale by Bugaighis & Schumm (1983). Support for the validity of the measure was substantiated by replication of previously-known relationships between measures of locus of control and other concepts such as Life Satisfaction and Perceived Risk,among others. Lumpkin concluded that the obtained results indicate that the scale has predictive validity.

Self-esteem: The Rosenberg Self-esteem Scale (Rosenberg, 1989). This is a ten-item Guttman scale which

is reportedly unidimensional (Rosenberg, 1989). Table 4 contains the items on this scale. The author states its reproducibility to be 92 percent and its scalability to be 72 percent. Correlations with constructs such as depression and ability to criticize one's self are cited to support the validity of the measure further. The scale has been used diversely and extensively over the years, gaining support of its validity through relationships to job-related attitudes (Mohan & Bali, 1988), self-evaluation (Hoelter, 1986) and psychopathology (Beck, 1990).

Table 4

Items on the Rosenberg Self-esteem Scale

1)	On the whole, I am satisfied with myself.
2)	At times I think I am no good at all.
3)	I feel that I have a number of good qualities.
4)	I am able to do things as well as most other people.
5)	I feel I do not have much to be proud of.
6)	I certainly feel useless at times.
7)	I feel that I am a person of worth, at leas on an equal plane with others.
8)	I wish I could have more respect for myself.
9)	All in all, I am inclined to feel that I am a failure.
10)	I take a positive attitude toward myself.

Attribution of success to effort: The Insufficient Effort subscale of the Levels of Attribution and Change Scale (Norcross, et al., 1985). This subscale is part of a 60-item instrument that assess the levels and loci of causal attributions about a self-selected problem. Research attests to the psychometric rigor of the whole scale (Norcross & Magletta, 1990; Norcross, et al., 1985).

The Insufficient Effort Subscale (see Table 5) contains six items with factor loadings ranging from .54 to .81, and with alpha coefficients of internal consistency reported at .83 (Norcross & Magletta, 1990) and .92 (Norcross, et al., 1985). Its test-retest coefficient was .84 at two weeks (Norcross & Magletta, 1990). Construct validity is evidenced by significant relationships with constructs such as social desirability, external chance and external others. The test is scored on a five-point response format (1 = strongly disagree, 3 = undecided, 5 = strongly agree) and the lead-in can be modified to fit various problems.

Table 5

Items on the Insufficient Effort Subscale of the Levels of Attribution and Change Scale

Item (My problem is partly due to:)
my lack of competence
the fact that I really don't try hard enough to change myself
my lack of willpower
the way I mess things up
the fact that I try hard enough to solve my problem
a simple lack of willpower on my part

The Modeled Context

The constructs underlying the three scales above have been described within a complex structure of bidirectionally interrelating concepts. Schmelzer (1991) outlined a basic

performance model involving motivation, ability, implementation and performance variables, as a contextual nest for the construction of the prototype Collegiate Academic Motivation Test. Figure 1 depicts directions of relationships posited in that model.

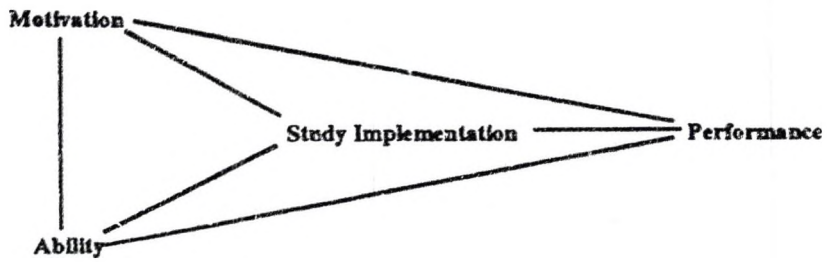

Figure 1. Basic Performance Model.

Using the Collegiate Academic Motivation Test, a brief intelligence estimate (Shipley, 1940) and an index of learning style (Schmeck, 1983) as operationalizations of the constructs, the model was subjected to evaluation via LISREL-VI analyses (Joreskog & Sorbom, 1983) which determined the extent to which the proposed relationships matched those existing in the data.

Results indicated that the fit of the overall model was not perfect. It left some fifteen percent of the variance unexplained - indicating that one or more parameters were left unspecified.

In light of the model forwarded by Borkowski, et al. (1990), it is easy to see that part of the problem was that

most of the paths in the Schmelzer (1991) model were unidirectional, rather than all being bidirectional.

A second problem was that the model lacked the benefit of a priori distinction of metacognitive, cognitive-attributional and self-system variables contributing motivational properties to the model. The structure of the motivational construct and the pathways of its operational sub-elements were insufficiently articulated.

Along these lines, another part of the problem was that a few major components were missing. Specific Strategy Knowledge should have been included, in bidirectional relationship to General Strategy Knowledge and unidirectional relationship to strategy selection, at least. A cognitive appraisal structure/process should also have been incorporated, either implicitly or explicitly, mediating relationships between ability (adopting the "incremental" perspective of Dweck, 1987), self-efficacy, strategy use, and task demands.

The Schmelzer (1991) study used the Inventory of Learning Profiles test (ILP, Schmeck, 1983; see Appendix C for the test; refer to the Method section description of measures for details) as representing the way motivation and intellectual ability are channelled to produce performance. Schmeck (1983) indicates that, as well as tapping strategy knowledge constructs, the ILP probably also reflects intelligence and motivation, expressed through the nature of

strategy use. This was supported by Schmelzer's (1991) LISREL analyses, which showed one ILP subscale pertaining to methodological study to load on both the motivation and intelligence constructs.

From this, it may be inferred that motivation and ability may have indirect pathways to performance via strategies. In particular, the differentiated motivational sub-constructs may not have a direct path to performance, as the global concept of motivation does in Figure 1. Rather, self-esteem will relate indirectly to what might be referred to as perceived effectance control (result of cognitive appraisal, includes locus of control) through self-efficacy beliefs and domain-specific (task-related) efficacy beliefs. Perceived effectance control will also be influenced by task characteristics and raw ability, and will relate directly and unidirectionally to strategy selection, since perceived locus of control will categorically affect strategy choice.

General- and Specific Strategy Knowledge are hypothesized to affect domain-specific self-efficacy, and thereby global self-efficacy and self-esteem, indirectly (due to their bidirectional relationships). General Strategy Knowledge and Specific Strategy Knowledge should relate through metacognitive processes inherent in their definitions, and Specific Strategy Knowledge should affect selection of learning strategies unidirectionally. The selection of strategies then affect overall performance

through strategy implementation in conjunction with effort. General Strategy Knowledge includes, by definition, attribution of success to effort, and thereby affects learning strategy implementation indirectly through effort. Effort may be anticipated to relate directly to overall academic performance as well, via effortful performance on evaluations such as exams.

Feedback on to-date performance will be looped back into the model, affecting domain-specific self-efficacy, General Strategy Knowledge and Specific Strategy Knowledge - all unidirectionally. Thus, the model may be regarded as having a temporal dimension of sorts, since the performance construct is cumulative, just as in academic life: the evaluation of overall performance at any point is how well the student has done in classes, collectively, up to that moment.

Finally, ability should have its expected direct effects on overall performance and strategy implementation (like effort). However, it is postulated that it will not directly affect strategy selection. Rather, it will affect it indirectly through the evaluative processes implicit in perceived effectance control.

Figure 2 depicts the more fully articulated model composed of these constructs and relationships, in replacement of the model in Figure 1.

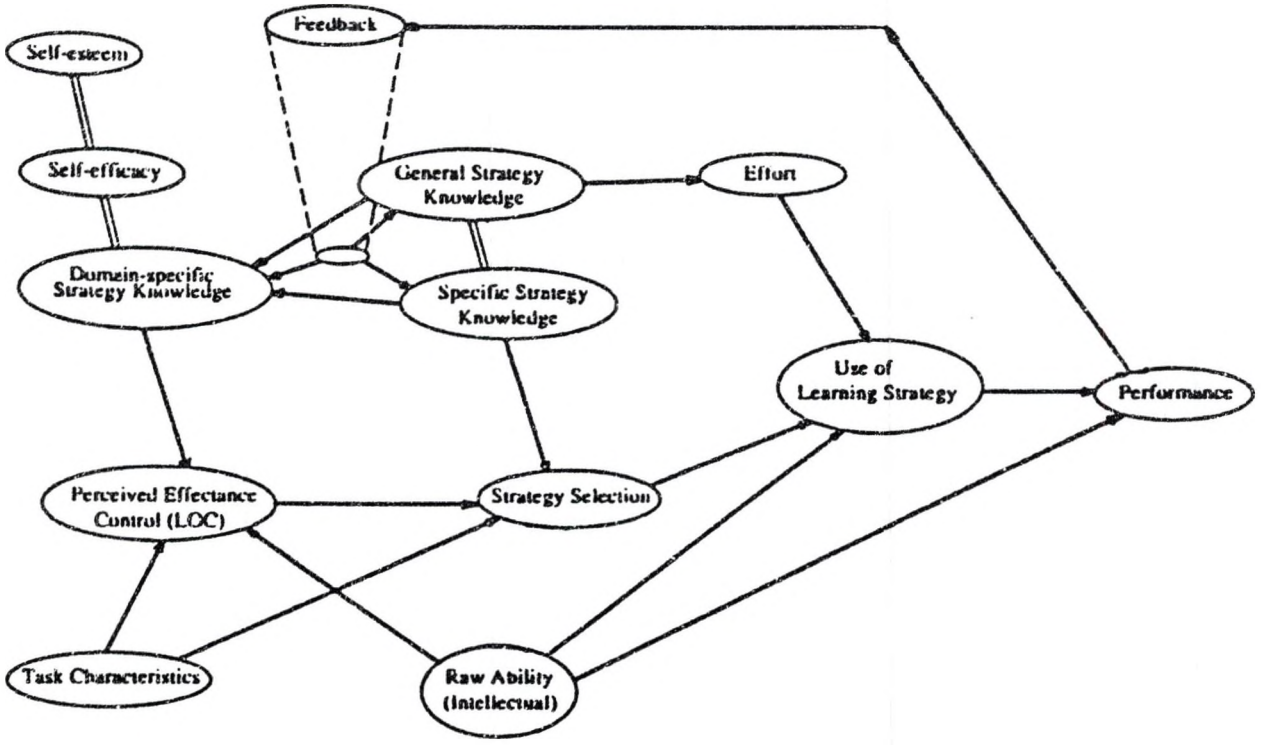

Figure 2. Present Theoretical Context.

The tests which were chosen for this study (including: Lumpkin 6-item Rotter, (L-6-R); Rosenberg Self-esteem Test, (RSE); Insufficient Effort subscale of the Levels of Attribution and Change Scale, (IES)) based upon indications by Borkowski, et al. (1990) in the earlier metacognition discussion, as well as the ILP and Shipley, can be examined within the context of this model and fitted into an operational counterpart.

Based on Figure 2, it can be inferred that the Shipley, as an operationalization of the raw ability/intellect construct, will relate unidirectionally to the self esteem measure (probably weakly), the locus of control measure (probably also weakly, since locus of control is only a part

of perceived effectance control), the learning style test (deep processing and fact retention subscales) and GPA.

The IES (Insufficient Effort subscale, see p. 26), as an index of the tendency to attribute success to effort, partly reflects General Strategy Knowledge (ala Borkowski, et al, 1990) and should relate to the self-esteem measure, the learning style test (methodological study and elaborative processing subscales), and the locus of control measure. The locus of control measure should show additional relationships with each of the other instruments, as well (with ILP: higher scores on all scales should correlate with increasing internality).

The postulated operational relationships are depicted in Figure 3, below.

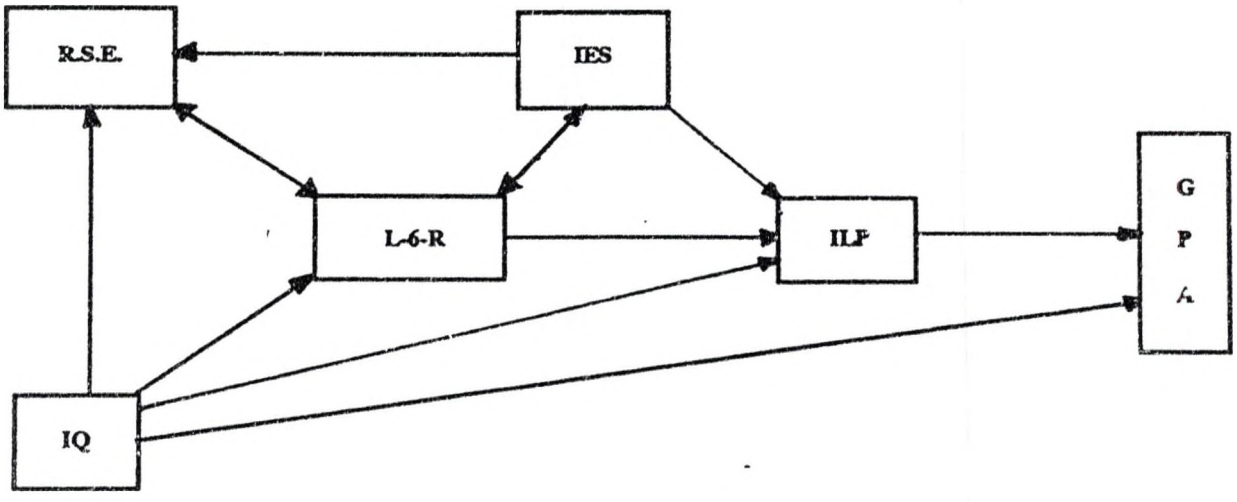

Figure 3. Postulated Operational Model.

METHOD

This was a single-sample study, using undergraduate students at the University of North Dakota. The main thrust is to use multivariate regression analyses to construct a weighted equation for the combination of the test battery's scales in the prediction of school performance. Then, a subsample of subjects will be recalled to verify the reliability of the battery scales.

Subject Sample

The sample was drawn from undergraduate psychology courses at the University of North Dakota. Subjects in the sample received course extra credit for participation in the study. This sample was drawn for the purpose of performing multivariate regression analyses to construct a weighted equation for the combination of the test battery's scales in the prediction of school performance, and for structural analysis of the postulated academic performance model.

All subjects were treated in accordance with the ethical guidelines set forth by the American Psychological Association regarding use of human subjects.

Measures

The Lumpkin (1985) abbreviated Rotter scale. This is a six-item rendition of the widely-accepted, original, 23-item, forced-choice Rotter (1966) scale. However, instead of using three forced-choice pairs of questions, three "internal" items and three "external" items were selected (see Table 3) and scored on a five-point Likert format suggested by Levenson (1974). These sets allegedly (Lumpkin, 1985) reflect both the "chance" and "internal" dimensions identified by Levenson (1974).

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The test is scored on a five-point response format (1 = strongly disagree, 3 = undecided, 5 = strongly agree) and

to be 92 percent and its scalability to be 72 percent. Correlations with constructs such as depression and ability to criticize one's self are cited to support the validity of the measure further. The scale has been used diversely and extensively over the years, gaining support of its validity through relationships to job-related attitudes (Mohan & Bali, 1988), self-evaluation (Hoelter, 1986) and psychopath-

the lead-in can be modified to fit various problems. In this study, the lead-in in Table 5 which reads "My problem is mostly due to...," will be altered to read "The quality of my academic performance is mostly due to...".

Inventory of Learning Processes (ILP). The ILP was derived by factor analyzing responses to a 121-item pool generated by three experts in learning and memory. The pool was compiled with the intent, on the part of each expert, of representing current knowledge and theory in their area.

The final inventory contains sixty-two items grouped into four scales (Schmeck, 1983): (1) Deep Processing - deals with the extent to which students organize and evaluate what they study; (2) Methodological Study - deals with the frequency of studying and the employment of systematic techniques; (3) Fact Retention - relates to careful processing of detail; (4) Elaborative Processing - addresses the extent to which students personalize and apply information. Test-retest reliability of the scales ranged from .79 to .88. Numerous validity studies, some of which are discussed in Schmeck (1983), have been conducted and point to considerable, though slightly differential, validity of the four scales.

Shipley Institute of Living Scale (SILS). The Shipley scale was initially developed to identify mild mental decrements in individuals of normal intelligence. According to Shipley (1940) it is also acceptable as a test of

intelligence. According to Bartz and Loy (1970), correlations between Shipley scores and Full Scale WAIS IQ's have been found to range from .73 to .90, in a number of studies. Mack (1970) reports concordant results, with a correlation of .76 between Shipley scores and WAIS Full Scale IQ; similarly, Paulson and Lin (1970) report a correlation of .78 between Shipley total raw scores and WAIS Full Scale IQ. Statistical formulas for enhancing the predictive value of the test have also been developed (e.g., Zachary, Paulson and Gorsuch, 1985).

The scale is comprised of a forty-item vocabulary test and a twenty-item abstract thinking test. Performance is often summarized in a C.Q. (Conceptual Quotient) score. This score is the ratio of the patient's Abstraction-age to that of the `normal' person receiving his vocabulary score. The ratio is multiplied by 100 to eliminate decimals (Shipley, 1940). However, since all individuals in this study are approximately the same age, only total raw scores will be used in analyses.

This instrument was standardized on 1,046 individuals, a group composed of students of fourth grade through college age. Mental-age equivalents were established, with students' available intelligence test data, for vocabulary, abstraction and composite scores. Reliability coefficients reportedly obtained from 322 army recruits were .87 for vocabulary, .89 for abstraction and .92 for the composite.

These measures already have known relationships to performance, and any of them can therefore serve as marker variables in their own right. As an example of the function of a marker as a red flag for sampling anomaly in the Schmelzer (1991) study, consider the intelligence estimate. The measure used was the Shipley Institute of Living Scale (Shipley, 1940). It is known that intelligence measures generally correlate about .50 with performance indices and that the Shipley correlates with the classic, Full Scale WAIS IQ (Wechsler, 1955) from .73 to .90 (Bartz & Loy, 1970; Mack, 1970; Paulson & Lin, 1970). However, the observed correlation between Shipley score and grade point average was only .26, suggesting an unspecified something amiss with the sample, which renders any inferences based on the results inconclusive.

Grade Point Average (G.P.A.). The criterion measure, subject.' ~mulative G.P.A.'s, was obtained during fall semester, 1992, with permission, from available records. G.P.A. is a year-to-date performance figure, reflecting the average grade obtained per credit-hour of study throughout a student's career.

Procedure

Data collection was done in group format, with each subject completing the six-item Lumpkin (1985) scale, the six-item Insufficient Effort subscale of the Levels of Attribution and Change Scale (Norcross, et al., 1985), the

ten-item Rosenberg (1989) Self-esteem Scale, the Inventory of Learning Processes test (Schmeck, 1983) and the Shipley Institute of Living Scale (Shipley, 1940). Written permission (see Appendix B for the consent form) was obtained to access G.P.A.'s (grade point averages) via computer. Subject data elements were identified and linked only by students' university identification numbers.

The battery's predictive validity was to be assessed through multiple regression analysis. Stepwise and backward multiple regression analyses of RSE, L-6-R, IES, and SILS scores and ILP subscale scores were conducted to determine which measures stayed in the equation and to provide a weighted formula for combining the subscale scores to best predict performance.

In the main sample, the reliability of the battery was evaluated by an internal consistency and split-halves designs. The test-retest reliability of the battery was investigated within two to four weeks by retesting of a randomly selected, sex-balanced subsample.

Finally, LISREL-VI analyses (Joreskog & Sorbom, 1983) were performed to evaluate the overall motivational/performance model by determining the extent to which the proposed relationships matched those existing in the data. The operationalized model is shown in Figure 3 (p.32).

The LISREL model was specified such that each item was free to vary only on the factor with which it correlated

most highly (all other correlations set to zero), and subscales were allowed to load only on their latent constructs. The ILP subscales were allowed to have residuals, but the residuals were not allowed to correlate. The other measures did not have residuals. Multiple indices were used to evaluate the adequacy of the posited model: chi-square test, goodness-of-fit index, chi-square/degrees-of-freedom ratio and the Tucker-Lewis index (Tucker & Lewis, 1973).

RESULTS

Criterion Validity

The motivation assessment battery's predictive validity was assessed through multiple regression analyses. Stepwise and backward multiple regression analyses of RSE, L-6-R, IES, and SILS scores and ILP subscale scores were conducted to determine which measures remained in the equations and to provide a weighted formula for combining the subscale scores to best predict performance. All analyses were conducted using SPSSx.

Stepwise regression analysis (N=226) revealed that, when the three motivational subscales and the four ILP subscales were all introduced as possible predictors, only SILS score, ILP subscale Methodological Study and the Insufficient Effort Scale were retained in the final regression equation. Collectively, these three indices accounted for about twenty-four percent of the variance in the criterion measure, G.P.A. (see Table 6).

The standard error of estimate was .587, indicating that to be 68% confident of including a subject's true grade-point average, one must add and subtract .587 from the predicted grade-point average. In other words, if a

student's predicted G.P.A. was 3.00, one could be 68% confident that his or her true grade-point average would fall between 2.413 and 3.581.

The greatest relative contribution in this regression was made by the Shipley (SILS) score, with a beta weight of .316 (see Table 6). This was followed, in respective order by Methodological Study (beta wt.=.232) and Insufficient Effort (beta wt.=.173). All elements of the correlation matrix were observed to be less than .50.

Table 6

Stepwise Regression of SILS, RSE, L-6-R & ILP Scales on G.P.A.

R=.490 R2=.240 Std. Error=.587
F=23.414 Signif. F=.0000

Variable	B	SE B	Beta	T	Sig. T
SILS Total Raw Score	.026	.005	.316	5.299	.000
ILP: Method. Study	.042	.012	.232	3.614	.000
Mot.: Insuff. Effort	.021	.008	.173	2.658	.008
Constant	.944	.325		2.901	.004

Interestingly, the backward regression of the same elements yielded slightly different results. In this analysis, SILS score, Methodological Study and Insufficient Effort were accompanied by ILP subscale Deep Processing as useful predictors of G.P.A. However, the amount of variance in grade performance accounted for by these four was only

twenty-five percent (Table 7), as opposed to 24%, found in the stepwise analysis. Deep Processing made the smallest relative contribution to predicting grades. Its inclusion in the final equation of the backward regression, but not in the stepwise procedure may reflect the arbitrary significance cutoffs utilized in each (.10 v. .05), or may suggest that Deep Processing may share variance with another variable.

The standard error of estimate was .583. Thus, if a student's predicted grade point average was 3.00, one could be 68% certain that his or her true G.P.A. would fall between 2.42 and 3.58.

Table 7

Backward Regression of SILS, RSE, L-6-R & ILP Scales on G.P.A.

R=.502 R2=.251 Std. Error=.583
F=18.663 Signif. F=.0000

Variable	B	SE B	Beta	T	Sig. T
ILP: Method. Study	.043	.012	.239	3.741	.000
SILS Total Raw Score	.022	.005	.274	4.331	.000
Mot.: Insuff. Effort	.016	.008	.134	1.959	.051
ILP: Deep Processing	.023	.012	.126	1.895	.059
Constant	.910	.324		2.807	.005

Reliability

Reliabilities were computed individually for each of the motivation battery's subscales, using split-halves and internal consistency designs. Table 8 shows the results of these analyses. Test-retest figures are shown in Table 9.

The results of the initial reliability analyses were not entirely similar to those reported by previous investigators. Most noticeably, the L-6-R - with a Cronbach's alpha coefficient of internal consistency (Cronbach, 1951) =.23 - was not close to the .68 alpha reported by Lumpkin in 1985. However, the Lumpkin scale is composed of two sets of "internal" and "external" locus of control items, which theoretically indicate opposite content dimensions. This clearly contributes to the poor internal consistency. A more meaningful statistic is the Spearman-Brown estimate of split-halves reliability. Based on the polarity of content

Table 8

Reliability Estimates for Motivation Battery Subscales

Subscale:	L-6-R	RSE	IES
Int. Consis. Ests. Alpha:	.23	.75	.79
Split-halves Ests. Spearman-Brown:	-.71	.79	.84

just mentioned, an investigator would expect this statistic to yield a strong negative correlation between the two

halves, and this is in fact the case. Split-halves reliability was -.71, which is consistent with the reliability figures given by Lumpkin (1985).

The IES (alpha=.79) result was somewhat lower than those obtained by Norcross & Magletta (1990; alpha=.83) and Norcross, et al. (1985; alpha=.92), though, perhaps, not vastly so.

Similarly, the Rosenberg scale (RSE) obtained an alpha of .79, which was fairly close to the scalability of 72 percent initially indicated by Rosenberg (1968).

Test-retest reliabilities were also conducted. These results were rather interesting and are printed in Table 9. After the initial data gathering was conducted, a randomly selected, sex-balanced subsample of 40 individuals was

Table 9

Test-Retest Indices of Reliability for Motivation Battery Scales.*

Scale	r	p
Lumpkin 6-Item Locus of Control Scale	-.014	.465
Rosenberg Self-esteem Scale	.973	.000
Levels of Attribution & Change Scale Insufficient Effort Subscale	.677	.000

assembled and retested within three to four weeks of the first testing. On retesting, subjects completed only the

twenty-two items, total, in the three subscales of the motivation battery. Pearson correlation coefficients were computed for the simple correlation between the two testings, as an indication of reliability. As can be seen from Table 9, the subtests varied in their stability across time. The two testings of the locus of control index had a surprising near-zero correlation, while the remaining two scales showed much more substantial reliability (RSE: $r=.973$, $p=.000$; IES: $r=.677$, $p=.000$).

The Model

Finally, the operational model was tested by implementing LISREL-VI (Joreskog & Sorbom, 1983) analyses to examine how well observed relationships in the data matched those specified in the model. The reader will recall that the theoretical model (Figure 2, page 30) was fairly complex, whereas the operational model (Figure 3, page 32) was much less so. Although the theory provided pretty firm bases for constructing the operational model as depicted in Figure 3, there was still room left for some doubt as to how well measures in the operational model mapped onto constructs or pathways in the theoretical model. In essence then, the possibility remained that the operational model was not stipulated correctly. Indeed, this was the case; for, using structural relations specified in the operational model, the LISREL program was unable to perform the necessary analyses to evaluate the goodness of the model.

The reader will recall that the LISREL model was specified such that each element was free to vary only on the factor with which it correlated most highly (all other correlations set to zero), and subscales were allowed to load only on their latent constructs. The ILP subscales were allowed to have residuals, but the residuals were not allowed to correlate. The other measures did not have residuals. Multiple indices were to have been used to evaluate the adequacy of the posited model: chi-square test, goodness-of-fit index, chi-square/degrees-of-freedom ratio and the Tucker-Lewis index (Tucker & Lewis, 1973).

Part of the problem was inferred to be related to the recursiveness inherent in the operational model by dint of the bidirectional relationships posited between the RSE, the L-6-R and the IES. In a sense, this creates a situation characterized by too many unknowns and too few equations with which to solve for them. Thus, on this premise several attempts were made to simplify the number of calculations to be done in the analysis, by restricting various error matrices associated with the factorial and structural aspects of the model, without altering the postulated relationships. All of these attempts failed. Goodness of fit findings were very poor, suggesting that the operational model was inadequate or too complex and in need of reexamination.

No data was available to indicate clearly whether or how the model should be modified. It seemed that the most probable source of difficulty might be the mapping question regarding how well constructs and relationships from the theoretical model were represented in the operational model. Close analysis of the contents of each subscale, and comparison of these contents with the corresponding theoretical constructs revealed that some mismapping may have occurred.

To summarize these findings briefly, the two bidirectional relationships previously stipulated (the RSE to L-6-R and IES to L-6-R relationships) were found not to be appropriate since the content of the measures did not reflect theoretical constructs as fully as had initially been presumed, and the IES to RSE relationship was found to be posited in the wrong direction, on similar ground. This latter point matters little to the LISREL program and so was not an especially substantial change. However, alteration of the bidirectional relationships eliminated the recursiveness of the model altogether. The unidirectional relationships and new operational model can be seen in Figure 4 (next page), overlaid with LISREL final parameters (akin to path coefficients in path analysis). Since reformulation was effected without reference to statistical information, it is inferred that idiosyncrasies in the subject sample were not potentiated in the new model.

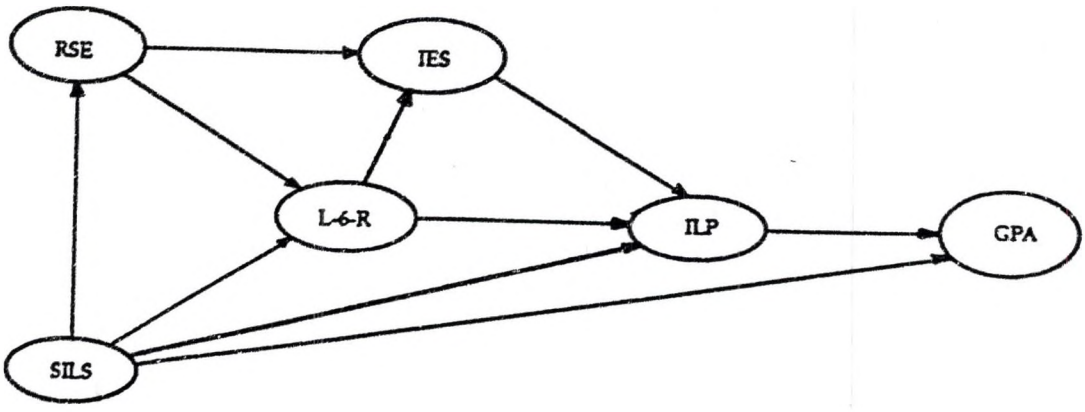

Figure 4. Reformulated Operational Model.

It is interesting to note that the bidirectional relationships were initially thought essential to an adequate representation of the theoretical model, but later found not to exist in the content of the measures used. If nothing else, this highlights both the difficulty of operationalizing complex models and the need to attend very closely to the precise nature of instrument content when doing so (recall Robinson & Shaver, 1973 and Wylie, 1974, 1979, mentioned earlier).

Inspection of the path estimates in Figure 4 reveals essentially zero-order relationships between the intelligence, self-esteem and locus of control measures, as well as between locus of control and effort indices. This may partly reflect the limited utility of the locus of control construct in this context, as well as the possibility that some of the other underlying constructs may not relate as theorized. Other relationships were significantly greater than zero, in concordance with

previous work, as exemplified by the relationship between Mehodological Study and grades for instance.

The forementioned multiple indices were then applied to evaluate the adequacy of the reformulated operational model: chi-square test, goodness-of-fit index, chi-square/degrees-of-freedom ratio and the Tucker-Lewis index (Tucker & Lewis, 1973).

The chi-square for the new operational model - heretofore referred to simply as the operational model, was significant ($X2=86.43$, $p=.000$). In this test, significance is undesirable since it suggests that the model does not fit the data - it leaves some of the variance unexplained. However, because the chi-square is a test with a great deal of statistical power and a known tendency to produce spurious indications of significance with high N's, the other indices were used to cross validate the chi-square test result.

The goodness of fit index for the operational model was .914. The adjusted goodness of fit index (adjusted for degrees of freedom) was .824.

The chi-square/degrees-of-freedom ratio was also computed for the model. A frequently utilized range of acceptable values for this statistic is 2.0-5.0. The chi-square/degrees-of-freedom ratio for the operational model was 3.93.

Finally, the Tucker-Lewis Index (TLI) was employed, which involves the comparison of the proposed model to a null model which posits no relationships in the data. This index is an incremental fit index which shows how much better the model accounts for the data than does the null. TLI=.589 for the model.

In summary, the fit of the operational model was good, but not perfect. It left approximately seven to eight percent of the total variances and covariances found in the data unexplained. Although this represents a probable gain in comparison to the way the model was specified previously (Schmelzer, 1991), it still may suggest the need for the specification of additional parameters in further conceptual refinements. The LISREL analyses which were used to assess the general fit of the model to the data also included analyses which were utilized to determine the adequacy of the parameters which were included.

This process is facilitated by modification indices (Table 10), provided by the LISREL program, in which values of 5.0 or greater indicate problems in construct specification. Scrutiny of the modification indices revealed ILP subscale Methodological Study to have the highest index with a value of 25.595. In parallel to findings by Schmelzer (1991) in which this subscale was found to load on the constructs of grade performance, motivation and intelligence, these analyses indicated that

Methodological Study tends to load on grade performance, effort and intelligence (indices of 9.94, 25.60 and 5.12, respectively).

Table 10

LISREL Normalized Residuals*

	G.P.A.	L-6-R	RSE	IES	SILSTot
G.P.A.					
L-6-R	-0.565				
RSE	0.070				
IES	0.902				
SILSTot	0.043	-0.096	0.493	-1.173	0.055
ILP: A	-0.651	0.132	2.967	-0.402	0.949
B	2.340	0.271	-0.275	3.525	-1.708
C	-0.368	-0.868	0.498	-0.589	0.402
D	-0.366	1.565	-0.026	-0.190	0.125

	ILP-A	ILP-B	ILP-C	ILP-D
ILP: B	-2.076			
C	1.100	-1.294		
D	0.226	1.630	-1.124	

*Zero values not printed.

The LISREL program also provides tabulation of normalized residuals (Table 10), which refer to that part of a relationship between two specified variables which is not addressed by the model. Commonly, values of 2.0 or greater are regarded as indicative of specification problems. Review of the residuals revealed significant normalized residuals for Methodological Study in reference to G.P.A., IES and ILP subscale Deep Processing. These residuals were 2.34, 3.53 and -2.08, respectively. In addition, a significant residual of 2.97 was found for the relationship

between Deep Processing and the RSE. No other significant normalized residuals were present.

DISCUSSION

Predictive Validity

The reader will recall that multiple regression was employed to evaluate the predictive utility of the motivational assessment battery within the operational model. Stepwise and backward regressions were conducted (N=226) incorporating the battery measures (RSE, L-6-R & IES), SILS total raw score and the four subscale scores of the ILP. Three indices accounted for about twenty-four percent of the variance in grade-point average in the stepwise regression, with a standard error of estimate of .587: SILS score, ILP scale Methodological Study and the IES (see Table 6, page 41). The same indices were retained in the backward regression, with the addition of ILP subscale Deep Processing. Total variance accounted for was incremented by only about one percent however, and the standard error of estimate was still high at .583. The two ILP scales evidently share some variance, based on these results - which is consistent with previous findings (Schmelzer, 1991).

Overall, the regression analyses suggest that, while the operational measurement model does succeed in addressing

a substantial part of the variance in collegiate grade-point average, there remains a larger portion which is unaddressed. A portion of the unexplained variance is attributable to chance error, but it is probable that much is due to the presence of other unspecified variables at work. Further, any variable may contribute differentially to various courses or types of course. The question of the relative contribution of chance versus that of an unspecified other variable or variables may not be directly answerable, but some benefit can be derived from examining the issue somewhat further.

Reliability

An issue which has some bearing on that of error is reliability, especially retest reliability. Internal consistency, split-halves and test-retest reliability estimates were obtained for the scales in the motivational assessment battery (Tables 8 & 9). The internal consistency and split-halves statistics also relate to validity in that they essentially reflect the combined effects of the degree of content consistency across items, and the consistency of a subject's responses to those items.

The results of the internal consistency and split-halves analyses (Table 8) were very comparable to those stated by other researchers, so it is inferred that validity in this sample is good and that the contribution of error, or chance variation, is proportionally small. This would

lend support to the inference that, if the operational model is correct and adequate in terms of the constituents and relationships specified therein, other parameters exist which have not been identified and included.

However, the test-retest correlations (Table 9) appear to raise some questions about the role of error in the general results. The main concern seems to be the L-6-R, which yielded a near-zero correlation between testings ($r=-0.14$, $p=.465$). This correlation is so poor that a computer programming or scoring error was suspected. Inspection revealed that this was not the case. Further consideration led this investigator to speculate that the retest data could conceivably have been skewed by a lackadaisical approach to testing on the second test date, due to familiarity of content, fewer items and lateness in the academic semester. This hypothesized effect may also be enhanced by small size of the retest sample, as well as by the cumulative nature of the grade-point statistic.

If this simple supposition of an overall poor approach to retesting had indeed been the case, then one would expect to see similarly poor retest results for the other two scales. The results did not coincide with this expectation. To the contrary, the figure for the IES was fairly good ($r=.677$, $p=.000$) and that of the RSE was almost too high ($r=.973$, $p=.000$). Given the goodness of the other reliability results from both testings however, the weakness

in the L-6-R retest reliability is anomalous and requires some other explanation.

Aside from questioning the psychometric quality of the Lumpkin measure, the only other apparent simple explanation is that perhaps the `sloppy retesting attitude' hypothesis was initially in effect since the L-6-R does not evoke strong ego-related self-attributions, but that the remaining tests were too ego-involving to sustain a lax approach, thus resulting in higher effort and better consistency.

Nonetheless, the preponderance of the reliability data allows the inference that the portion of the unexplained variance in grade-point average is probably not largely error, but rather some unidentified variable or variables. Again, this is allowing, for the moment, the questionable assumption that the operational model is not inherently flawed.

Adequacy of the Operational Model

The operational model (Figure 3, p.32) was tested by using LISREL-VI (Joreskog & Sorbom, 1983) analyses to examine how well the empirical relationships in the data matched those specified in the model. It was inferred that the match was not good initially, since, as mentioned in the Results section, above, it was not even possible to run the analyses at that time. It was found, after numerous other approaches had been made, that the operational model did not map onto the theoretical model as had been originally

concluded. Careful assessment of subscales' item content revealed how the mismapping had occurred and yielded indications as to how the model should have been specified. The result is depicted in Figure 4 (p. 50) and reproduced below without path coefficients (Figure 3 may be found for comparison on page 33).

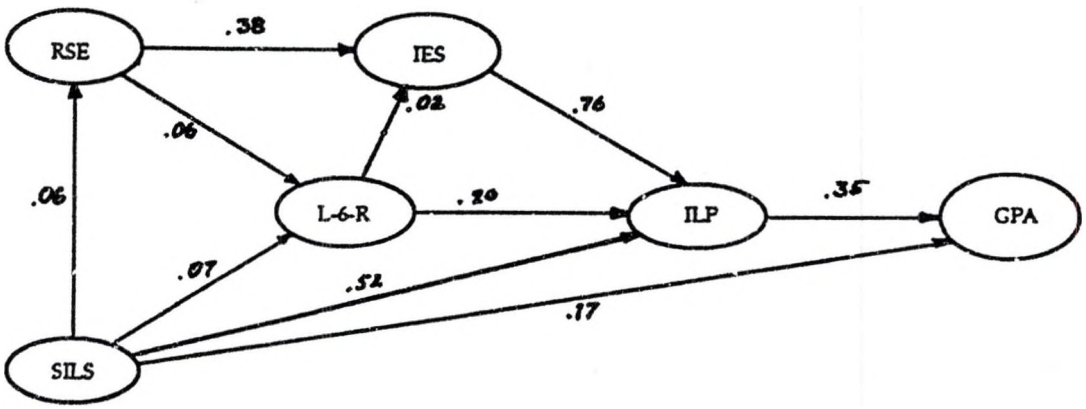

Figure 4. Reformulated Operational Model (reproduction).

As a result of the model modification, it became possible to perform the LISREL analyses. The chi-square test, goodness-of-fit index, chi-square/degrees-of-freedom ratio and the Tucker-Lewis index (Tucker & Lewis, 1973) were applied to evaluate the adequacy of the operational model.

The chi-square was found to be significant ($X^2=86.43$, $p=.000$), which means that the model does not fit the data perfectly. This finding was not especially troubling since

the chi-square is known to be overly sensitive with high N's, due to its tremendous statistical power.

The unadjusted goodness-of-fit index was .914, which suggests that the model accounts for about ninety-one percent of the total variances and covariances in the sample data, or conversely that only about eight or nine percent of the total variances and covariances in the data were not addressed by the model as specified. This is to be expected given the limited extent to which the operational model has been developed, especially with respect to the complex relationships included in the theoretical model.

The TLI was .589 for the model. Usually, results equal to or greater than .90 suggest model adequacy, whereas values below this cutoff are considered indicative of a need for model enhancement.

The LISREL program provides modification indices which can be used to identify weaknesses or trouble spots in model specification, and these results, in parallel to Schmelzer (1991), indicated that important relationships had not been specified with respect to ILP subscale Methodological Study and the latent constructs effort, intelligence and grade performance (indices of 9.94, 25.60 and 5.12, respectively). In addition, the index associated with the relationship between ILP scale Deep Processing and the latent construct self esteem was also substantial at 13.50.

Of first interest here is the relationship between Methodological Study and effort. This relationship is intuitively evident and in operational terms would probably point to a correlation between Methodological Study and the IES. In fact, examination of the normalized residuals in Table 10 indicates that this is a significant relationship needing specification in the model. This would be expected since the items on Methodological Study largely address effortful activities such as outlining, rehearsing or paraphrasing. On a theoretical level, this doubtless reflects the relatedness of specific strategy knowledge to the general strategy knowledge that effort is central to success.

Significant residuals were also observed between Methodological Study and Deep Processing. This probably reflects an overlap between the two processes addressed by these scales and highlights a lack of discreteness in those scales. It also points to a need to determine more precisely how the ILP subscales map onto the overall theoretical model, since it is clear that the subscales occasionally incorporate multiple constructs and do not all map onto the same constructs.

Finally, Deep Processing and self-esteem were highlighted by the modification indices and the relationship between the scale representing self-esteem, the RSE, and Deep Processing had a significant normalized residual

(2.967). On the face of it, this seems a peculiar association, but to understand it the reader may recall the earlier discussion of the metacognition/self-system interface. The relationship may be supportive of the belief on the part of Borkowski, et al (1990) that general strategy knowledge and positive self-esteem are bidirectionally related and mutually influential. Research does indicate that the self-system supports metacognitive functions and academic performance alike (Mccombs, 1986).

Conclusions

The results of this study have been encouraging in several respects. LISREL analyses have shown that, after correctly mapping measures to constructs in the process of operationalizing the theoretical model, the model succeeded very well in addressing the relationships found in the data. Ninety-two percent of the variance in the data was accounted for by the model. Need for modification within the model is relatively little, with possibilities including specification of only a few additional relationships. These are primarily corresponding to scales on the ILP, which need to be examined more closely with respect to their fit in the overall model.

In addition, the model succeeded in accounting for about one quarter of the variance in grade point average, which is a sizeable portion. Indices of intelligence, study

habits and effort were the most useful elements in predicting grade performance, though some of the relationships were weaker than had been expected. A larger portion of the variance in grade-point average was unexplained in the multiple regressions, and scrutiny of all the data leads to the conclusion that the operational model needs expansion and additional indices may need to be incorporated as predictors. It may also be that some of the included predictors were not potentiated, due to design features.

Several considerations support the probability that the relationships between some of the predictors in the study and the criterion may have been attenuated. A case in point is the correlation between SILS score and grade-point average. As a measure or intelligence, one would expect the SILS score to correlate around .50 with grade performance, since most such indices do so. However, the correlation observed here was only .35.

It is inferred that this weaker-than-expected correlation may point to a broad attenuation of relationships throughout the data set. This weakening of correlations may rest in part in the manner of presentation of the instruments. It may well be that presentation of multiple instruments to subjects alters the testing and response context. Subjects may become involved with trying to understand or discern what the investigation is about,

and with presenting consistently with respect to this perception, rather than with simply providing information. Thus, subjects may have different perceptions of the nature of the task due to the context which is created by simultaneous presentation.

Another source of weakness may be the criterion measure itself. This becomes apparent if the reader considers the nature of college grade-point average as a criterion measure. Curricula vary with each student as a function of various factors including interest, anticipated proficiency, career choice and discipline requirements. Then too, the interaction of various intrapersonal variables, such as intelligence, stage of personal development, achievement orientation and study style - to mention only a few - can affect performance uniquely as well. For instance, bright students may enroll in hard classes, such as advanced physics or multivariate calculus, which may result in relatively lower grades; or performance-oriented students, regardless of ability, may drop all but the classes in which they can perform with excellence; students with undecided majors may take a variety of classes, doing well in some, poorly in others. Thus, examination of different students with identical G.P.A.'s is a comparison of apples and oranges, in a certain sense. Practically speaking, it means that the prediction of the grade-point criterion will be loose regardless of the predictor or predictors used. Work

by Cattell and others (Barton, et al., 1971, 1972; Cattell, et al., 1972; Dielman, et al., 1970, 1971; Schuerger, et al., 1970) suggests that prediction of grade performances might be better if the criterion index were individual class grades, although many of the same arguments would apply.

A third source of weakness may reside in the interaction of context with developmental considerations. College students doubtless vary in terms of the ways in which they attribute, rationalize or justify their performances, their personal abilities and their preferences. However, they probably compartmentalize things far more than younger students would. It is reasonable to expect that college students have quicker, more diversified means of maintaining positive self-esteem - as indicated by research evidence on perceived competence (Harter, 1982a; Nicholls, 1984), mastery (Ames & Archer, 1988),social cognition (Maehr & Stallings, 1972), self-worth (Covington, 1984) and self-serving attributional biases (Nicholls, 1976; Pyszczynski & Greenberg, 1983; Jagacinski & Nicholls, 1990). Therefore, self-reports of college students may not directly reflect their true characteristics, but may instead reflect the extent to which they try to "present good" to themselves and others.

This effect may interact with the way in which the subject perceives the nature of the data collection situation, which is to say, the "extra" or "beyond-face-

value" meaning that the student attributes to various measures as a result of their simultaneous presentation. Clearly, such a method will yield highly idiosyncratic results across subjects, depending on how each subject assesses the situation and how their self-system is mobilized in response to that appraisal.

This format of presenting multiple self-report instruments, which might be described as a "context inviting" design, probably represents a design weakness here, but is not rare in the research literature. In all instances, this design consideration needs to be considered seriously and addressed systematically.

Directions for Future Research

It should be clear then, that regardless of what parameters are included in studies subsequent to this one, the "invited context" will need to be compensated for or addressed in some way, if college students are used.

Of course, one viable possibility is not to use college students, but rather, to use students in the elementary grades where questions of motivation and ability are more pertinent and the answers more significant. This is a more appropriate direction in which to proceed, the good sense of which becomes more evident when one considers the value of being able to discriminate low ability from motivational or metacognitive deficits in a school-age child. The

cumulative effects of correct versus incorrect intervention on this regard could be astonishing, whereas for a college student the point is almost moot.

While study of younger students may lessen the deleterious, confounding impact of the "invited context" problem, the assumption that the effect is eliminated by use of a younger, presumably simpler population is dubious. The question still needs to be addressed to assure clear results.

One possible methodology might involve having the various measures completed by students in a more naturalistic setting, one instrument at a time. For, instance, the invited context might be eliminated simply by having students complete one subscale every day or so during regular class time. Using this technique might raise some minor questions about time delay, but it will certainly reduce the tendency to "size up" the global testing context. Instead students would very likely see each measure as "just another one of those tests," and approach each individually. Clearly the time delay becomes a factor when more measures are involved.

If more parameters need to be specified to enhance the accuracy of prediction, a question arises as to what may be added without making the battery of subscales too cumbersome or lengthy to be used. Reference to the theoretical model developed so far suggests that additional constructs can be

identified for inclusion. However, it also brings to mind some other considerations. In particular, measures did not map onto constructs well in this study to begin with. It may have been that appropriate constructs were included in this study, but that they were not identified and specified.

A good example - which is substantiated by the LISREL modification indices - is the scales of the ILP, where multiple constructs could be seen in each subscale. A number of relationships should be added to the operational models in future inquiries. Future efforts should probably also include a parallel effort to clarify the ILP's factor structure with reference to the metacognitive, self-system and attributional factors identified here.

Of course, clarification of the nature of the ILP subscales represents another level of analysis. Research is being conducted continuously by various investigators inquiring into the nature of what might be referred to as different `paths' to the academic performance criterion, namely grades. Borkowski, et al.(1991), for instance, represent a level of analysis similar to that of this study, in which the goal is the advancement of empirically supported theoretical models of elusive concepts, through successive iterations of theory, research and further articulation. In a Kuhnian sense, this is roughly equivalent to deliberate search for a paradigm. The goal is synthesis, or perhaps even synergy of ideas. In comparison,

other lines of work on differing levels of analysis may represent "normal science" in the sense of fleshing out the relationships between what - with reference to the theoretical model here - might be called path elements. Ready examples are the research programs which investigate the relationships or natures of slightly narrower concepts such as in attribution theory (e.g. Weiner: Weiner, 1979, 1980a, 1980b, 1982, 1983, 1985; Weiner & Kukla, 1970; Weiner, et al, 1971; Weiner, et al, 1976; Weiner, et al, 1978; Weiner, et al, 1979; Weiner, et al, 1982; Weiner, Graham & Chandler, 1982; Weiner & Graham 1984; Weiner & Handel, 1985). Within this area alone, even further levels of focus can be identified which represent investigation more basic constructs and their constituents - such as the self-serving attributional bias literature (e.g. reviews: Harvey and Weary, 1981; Weiner, 1978) which even includes study of possible anticipatory mechanisms which trigger the process (Nicholls, 1976; Berglas & Jones 1978; Covington & Omelich, 1981; Snyder & Wicklund, 1981; Pyszczinski & Greenberg, 1983; Jagacinski & Nicholls, 1990).

Finally, it should be clear from the various discussion and diagrams in this and the preceding discourse that some of the constructs involved are in heirarchial relationships, by level of analysis or specificity. A good example is the pathway between self-esteem and perceived effectance control, which goes from the higher-order, more global

construct of self-esteem to the lower-order, more situation-specific concept of perceived efficacy - with a few intermediate levels of analysis in between. Bidirectional relationships and recursive series of relationships are also probably present, as in the interface between self- and metacognitive systems. Clearly, future investigations in this vein of inquiry will require that due consideration must be given, when a priori statistical analysis decisions are made, to the possibility that heirarchial, recursive and mutually influential factor structures may be present in the data.

APPENDICES

Appendix A

COLLEGIATE ACADEMIC MOTIVATION (CAM) TEST
Initial Item Pool
Assessment of School Motivation

The following is an initial pool of items which will be used in the construction of an instrument to assess school motivation. Your answers here will be used to determine which items will be retained in the final form of the test, so it is important that you respond to every item and do not omit any.

Respond to each item according to how much that statement characterizes you in general, in regard to school and academic issues. Remember to answer based on your overall thoughts, beliefs, or feelings and not in terms of your temporary state of mind.

Blacken the dot that corresponds to your response (1-almost always/ 2-often/3-sometimes/4-not often/5-almost never).

	1	2	3	4	5
I enjoy school.	O	O	O	O	O
My school studies are boring.	O	O	O	O	O
Learning, in school, is useful.	O	O	O	O	O
I feel forced to be in school.	O	O	O	O	O
I want to understand what I study.	O	O	O	O	O
How well I do in school is in my own hands.	O	O	O	O	O
I want to learn.	O	O	O	O	O
My grades are controlled by someone else.	O	O	O	O	O
I am at school against my will.	O	O	O	O	O

	1	2	3	4	5
School is useless.	O	O	O	O	O
I am very curious about things.	O	O	O	O	O
I'd rather work or play than have to learn something.	O	O	O	O	O
What I do determines my grades.	O	O	O	O	O
I enjoy learning for learning's sake.	O	O	O	O	O
I feel good about myself at school.	O	O	O	O	O
I feel smart during school.	O	O	O	O	O
I wish I could disappear when I'm at school.	O	O	O	O	O
I feel capable enough in school.	O	O	O	O	O
I feel bad about myself at school.	O	O	O	O	O
If I am failing it is my own fault.	O	O	O	O	O
My successes are because of my natural ability.	O	O	O	O	O
When I fail, it is because I wasn't trying hard enough.	O	O	O	O	O
When I succeed at something, it is because I was very interested in it.	O	O	O	O	O
If I succeed I have put a lot of effort into it.	O	O	O	O	O
My failures happen due to lack of interest on my part.	O	O	O	O	O
I fail because I don't have enough ability.	O	O	O	O	O
If I am failing it is not my fault.	O	O	O	O	O
If I am having trouble, I try harder.	O	O	O	O	O
It is hard for me to pay attention in class.	O	O	O	O	O

	1	2	3	4	5
I encounter tasks at school that seem impossible.	O	O	O	O	O
If I am having trouble, I give up.	O	O	O	O	O
I won't be able to raise my grades.	O	O	O	O	O
I expect successes at school.	O	O	O	O	O
I feel helpless at school.	O	O	O	O	O
I expect to fail in things I do at school.	O	O	O	O	O
Doing well in academics is important to me.	O	O	O	O	O
Good school performance will help me get ahead in life.	O	O	O	O	O
I don't care about school.	O	O	O	O	O
I work for good grades just to get a better job after I graduate.	O	O	O	O	O
I prefer to answer a question in class only if I am sure I am right.	O	O	O	O	O
I only like to ask "good" questions.	O	O	O	O	O
I will ask a question even if others might think it is dumb.	O	O	O	O	O
I prefer easy tasks.	O	O	O	O	O
I like assignments that seem challenging.	O	O	O	O	O
I prefer tasks that seem impossible.	O	O	O	O	O
I will pick a task at which I know I can easily succeed.	O	O	O	O	O
My performance in school has a strong effect on how I see myself.	O	O	O	O	O
I reduce my effort on something if I think I may fail at it.	O	O	O	O	O
If I had a choice, no one could force me to go to school.	O	O	O	O	O

	1	2	3	4	5
If I think I may fail, I try harder.	O	O	O	O	O
If I had a choice, I sure wouldn't do school work.	O	O	O	O	O
I intend to do the best I can with academics.	O	O	O	O	O
I am not in good health at school.	O	O	O	O	O
I intend to get higher grades.	O	O	O	O	O
I am well-rested when I get to school.	O	O	O	O	O
On an important task, if I think it is too hard, I will spend less energy on it.	O	O	O	O	O
The causes of my academic troubles are under my control.	O	O	O	O	O
The causes of my academic troubles are permanent.	O	O	O	O	O
I intend to succeed and do succeed.	O	O	O	O	O
The causes of my academic successes are not under my control.	O	O	O	O	O
The causes of my academic successes are permanent.	O	O	O	O	O
In the past, when I have succeeded, it was because I got lucky, rather than because I meant to succeed.	O	O	O	O	O
The causes of my academic troubles are temporary.	O	O	O	O	O
In the past, when I have succeeded, it was because I meant to, and not because of good luck.	O	O	O	O	O
School is just a means to an end, for me.	O	O	O	O	O
I find that I don't want to pay attention in class.	O	O	O	O	O
I find it easy to pay attention in classes.	O	O	O	O	O

Appendix B

Sample consent form.

STUDY DESCRIPTION & STATEMENT OF CONSENT

The purpose of this research is to develop a test battery to assess academic motivation. Ultimately, when used with appropriate intelligence and study strategy measures, it should help to provide better estimates of how well students will do in school. It will also be useful for identifying motivational deficiencies, as opposed to lack of ability, in students who don't do well.

You are invited to assist in this effort by contributing to the data needed for this battery to be developed. You will be asked to complete four subtests about your perceived control, self-esteem, study habits and how you attribute your academic performance. You will also be asked to complete a quick intelligence measure. It should take less than an hour to complete them. In addition, we ask your permission to access your cumulative grade point average, via the university mainframe. Only your NAID number will be used to link this information to your data in our analyses. Some of you will be randomly selected to retest in about two to four weeks. The procedure will be the same.

Any identifying materials will be destroyed after the data has been collected, so that confidentiality can be assured. You may have a copy of this consent form for your records, upon request.

Agreement to Participate

I have read all of the information above regarding the purpose and nature of this research effort and willingly agree to participate. I am aware that my grade point average statistic is needed and hereby give my consent for the researcher to obtain it, with the understanding that confidentiality is assured.

_____ _____ _____/_____/_____

Student's Signature Date

Appendix C

Individual Learning Processes

This instrument has been designed to determine how individuals differ on some important aspects of their study behaviors. Some items reflect how a student might feel about the success of his/her study efforts and other items ask about certain study behaviors. No attempt has been made to hide the true intent of this questionnaire. You may find that you are being asked about certain study behaviors you realize are appropriate, but that such behaviors may not reflect how you actually attempt to learn. Your answers should reflect what your actual behavior is like. Please indicate whether each item is mostly a true or false description of your behavior in this type of course (a course covering facts and concepts through lecture and reading).

___ 1. I find it difficult to handle questions requiring comparison of different concepts.

___ 2. I maintain a daily schedule of study hours.

___ 3. I can usually formulate a good guess even when I do not know the answer.

___ 4. I would rather read the original article than a summary.

___ 5. While studying, I attempt to find answers to questions I have in mind.

___ 6. I have regular weekly review periods.

___ 7. I daydream about things I have studied.

___ 8. I increase my vocabulary by building lists of new terms.

___ 9. I have trouble making inferences.

___ 10. I am very good at learning formulas, names, and dates.

___ 11. I get good grades on term papers.

___ 12. I always make a special effort to get all the details.

___ 13. I try to convert facts into "rules of thumb."

___ 14. I have trouble remembering definitions.

___ 15. I think fast.

___ 16. I generally write an outline of the material I read.

___ 17. I am usually able to design procedures for solving problems.

___ 18. I generally read beyond what is assigned in class.

___ 19. I do well on essay tests.

___ 20. I make simple charts and diagrams to help me remember material.

___ 21. When learning a unit of material, I usually summarize it in my own words.

___ 22. I do well on examinations requiring factual information.

___ 23. I have difficulty learning how to study for a course.

___ 24. I work through practice exercises and sample problems.

___ 25. I learn new words and ideas by associating them with words and ideas I already know.

___ 26. I cram for exams.

___ 27. I read critically.

___ 28. I make frequent use of a dictionary.

___ 29. I look for reasons behind the facts.

___ 30. I spend more time studying than most of my friends.

___ 31. Even when I know that I have carefully learned the material, I have trouble remembering it for an examination.

___ 32. For examinations, I memorize the material as given in the text or class notes.

___ 33. I learn new words or ideas by visualizing a situation in which they could occur.

___ 34. Getting myself to begin studying is usually difficult.

___ 35. I find it difficult to handle questions requiring critical evaluation.

___ 36. New concepts usually make me think of similar concepts.

___ 37. I can usually state the underlying message of films and readings.

___ 38. I usually refer to several sources in order to understand a concept.

___ 39. I often have difficulty finding the right words for expressing my ideas.

___ 40. I review course material periodically during the term.

___ 41. After reading a unit of material, I sit and think about it.

___ 42. I have a regular place to study.

___ 43. I have trouble organizing the information I remember.

___ 44. When necessary, I can easily locate particular passages in a textbook.

___ 45. I learn new concepts by expressing them in my own words.

___ 46. I do well on tests requiring definitions.

___ 47. I have difficulty planning work when confronted with a complex task.

___ 48. Even when I feel I have learned the material, I continue to study it.

___ 49. I learn new ideas by relating them to similar ideas.

___ 50. I frequently use the library.

___ 51. I often memorize material I do not understand.

___ 52. Toward the end of a course, I prepare an overview of all material covered.

___ 53. While learning new concepts, practical applications often come to mind.

___ 54. My memory is actually pretty poor.

___ 55. I ignore conflicts between the information obtained from different sources.

___ 56. I prepare a set of notes integrating the information from all sources in a course.

___ 57. When I study something I devise a system for later recalling it.

___ 58. When studying for an examination, I prepare a list of probable questions and answers.

___ 59. Most of my instructors lecture too fast.

___ 60. I do well on completion items.

___ 61. I have trouble seeing the difference between apparently similar ideas.

___ 62. I carefully complete all course assignments.

BIBLIOGRAPHY

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Abrahamson, D., Schludermann, S., & Schludermann, E. (1973). Replication of dimensions of locus of control. Journal Clinical and Consulting Psychology, 41, 320.

Abramson, L. Y., Seligman, M. E. P., & Teasdale, J. (1978). Learned helplessness in humans: Critique and reformulation. Journal of Abnormal Psychology, 87, 49-74.

Ames C., & Archer, J. (1988). Achievement goals in the classroom: Student learning strategies and motivation processes. Journal of Educational Psychology, 80, 260-267.

Arkin, R. M., & Baumgardner, A. H. (1985). Self-handicapping. In J.H. Harvey & G. Weary (Eds.), Attribution: Basic issues and applications (pp. 169-202). New York: Academic Press.

Bandura, A. (1974). Behavior theory and the models of man. American Psychologist, 29, 859-869.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review, 84, 191-215.

Bandura, A. (1978). The self-system in reciprocal determinism. American Psychologist, 33, 344-358.

Bandura, A. (1986). Social foundations of thought and action: a social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall.

Barton, K., Dielman, T. E., & Cattell, R. B. (1971). The prediction of school grades from personality and IQ measures. Personality, 2, No. 4, 325-333.

Barton, K., Dielman, T. E., & Cattell, R. B. (1972). Personality, motivation and IQ measures as predictors of school achievement and grades: A nontechnical synopsis. Psychology in the Schools, 9, 47-51.

Bartz, W. R., & Loy, L. L. (1970). The Shipley-Hartford as a brief I. Q. screening device. Journal of Clinical Psychology, 26(1), 74-75.

Beck, A. T., Steer, R., Epstein, N., & Brown, G. (1990). Beck Self-perception Test. Psychological Assessment, 2(2), 191-197.

Bem, D. J. (1972). Self-perception theory. In L. Berkowitz (Ed.), Advances in experimental social psychology, Vol. 6. New York: Academic.

Berglas, S., & Jones, E. E. (1978). Drug choice as a self-handicapping strategy in response to non-contingent success. Journal of Personality and Social Psychology, 36, 405-417.

Borkowski, J. G. (1985). Signs of intelligence: Strategy generalization and metacognition. In S. Yussen (Ed.), Development of reflection in children (pp. 105-144). San Diego, CA: Academic.

Borkowski, J. G., Carr, M., Rellinger, E., & Pressley, M. (1990). Self-regulated cognition: Interdependence of metacognition, attributions and self-esteem. In J. Jones & L. Idol (Eds.), Dimensions of thinking and cognitive instruction. Hillsdale, NJ: Erlbaum.

Borkowski, J. G., Johnston, M. B., & Reid, M. K. (1987). Metacognition, motivation and controlled performance. In S. Ceci (Ed.), Handbook of cognitive, social and neurological aspects of learning disabilities (Vol. 2, pp. 147-174). Hillsdale, NJ: Erlbaum.

Borkowski, J. G., & Krause, A. J. (1985). Metacognition and attributional beliefs. Un G. d'Ydewalle (Ed.), Proceedings of the XXIII International Congress of Psychology (pp. 557-568). Amsterdam: Elsevier.

Borkowski, J. G., & Kurtz, B. (1987). Motivation and executive control. In J. Borkowski & J. D. Day (Eds.), Cognition in special children (pp. 123-150). Norwood, NJ: Ablex.

Borkowski, J. G., Levers, S., & Gruenenfelder, T. (1976). Transfer of mediational strategies in children: The role of activity and awareness during strategy acquisition. Child Development, 47, 779-786.

Bower, G. H., & Hilgard, E. R. (1975). Theories of learning (4th ed.). Englewood Cliffs, NJ: Prentice-Hall.

Bradley, G. W. (1978). Self-serving biases in the attribution process: A reexamination of the fact or fiction question. Journal of Personality and Social Psychology, 36, 56-71.

Bugaighis, M., & Schumm, W. (1983). Alternative measures of perceived locus of control. Psychological Reports, 52, 819-823.

Brody, N. (1983). Human Motivation. New York: Academic.

Calder, B. J. & Staw, G. M. (1975). Self-perception of intrinsic and extrinsic motivation. Journal of Personality and Social Psychology, 31, 599-605.

Calsey, R. J., & Kenney, D. A. (1977). Self-concept of ability and perceived evaluation of others: Cause or effect of academic achievement. Journal of Educational Psychology, 69, 136-145.

Carr, M., & Borkowski, J. G. (1987). The importance of attributional retraining for the generalization of comprehension strategies. Paper presented at the annual meeting of the American Educational Research Association, Washington, DC.

Cattell, R. B., Eber, H. W., & Tatsuoka, M. M. (1970). Handbook for the Sixteen Personality Factor Questionnaire (16PF). Champaign, IL: Institute for Personality and Ability Testing.

Cattell, R. B., Barton, K., & Dielman, T. E. (1972). Prediction of school achievement from motivation, personality and ability measures. Psychological Reports, 30, 35-43.

Clifford, M. M. (1984). Thoughts on a theory of constructive failure. Educational Psychologist, 19, 108-120.

Collins, B. (1974). Four components of the Rotter internal-external scale: belief in a difficult world, a just world, a predictable world, and a politically responsive world. Journal of Personality and Social Psychology, 29, 381-391.

Covington, M. V. (1984). The motive for self-worth. In R. Ames and C. Ames (Eds.), Research on motivation in education (Vol. 1, pp. 77-113). Orlando, FL: Academic Press.

Covington, M. V., & Omelich, C. L. (1981). As failures mount: Affective cognitive consequences of ability demotion in the classroom. Journal of Educational Psychology, 73, 796-808.

Cronbach, L. (1951) Coefficient alpha and the internal structure of tests. Psychometrika, 16, 297-334.

Darwin C. R. (1871). The descent of man, and selection in relation to sex. J. Bonner & R. May (Eds.) Princeton, NJ: Princeton University Press, 1981.

de Charms, R. (1968). Personal causation: the internal affective determinants of behavior. New York: Plenum.

Deci, E. L. (1975). Intrinsic motivation. New York; Plenum Press.

Dielman, T. E., Barton, K., & Cattell, R. B. (1971). The prediction of junior high school achievement from objective motivation tests. Personality, 2, No. 4, 279-287.

Dielman, T. E., Schuerger J. M., & Cattell, R. B. (1970). Prediction of achievement from IQ and the objective-analytic personality factors U.I. 21, U.I. 23, U.I.24, and U.I. 25. Personality, 1, No. 2, 145-152.

Diener, C. & Dweck, C. (1978). An analysis of learned helplessness: Continuous changes in performance, strategy, and achievement cognitions following failure. Journal of Personality and Social Psychology, 97, 161-168.

Dweck, C. (1975). The role of attributions and expectations in the alleviation of Learned Helplessness. Journal Personality and Social Psychology, 31, 674-685.

Dweck, C. (1987). Children's theories of intelligence: Implications for motivation and learning. Paper presented at the annual meeting of the American Educational Research Association, Washington, DC.

Eccles, J. (1983). Expectancies, values, and academic behaviors. In J. R. Spence (Ed.), Research on motivation in education: The classroom milieu (pp. 77-113). San Francisco: Freeman.

Fincham, F., & Cain, K. (1986). Learned helplessness in humans: A developmental analysis. Developmental Review, 6, 25-86.

Hall, C., & Lindzey, G. (1985). Introduction to theories of personality. New York: Wiley.

Harter, S. (1978). Effectance motivation reconsidered: toward a developmental model. Human Development, 1, 34-64.

Harter, S. (1981a). A model of intrinsic mastery motivation in children: individual differences and developmental change. Minnesota symposia on child psychology, Vol. 14. Hillsdale, NJ: Erlbaum.

Harter, S. (1981b). A new self-report scale of intrinsic versus extrinsic orientation in the classroom: Motivational and informational components. Developmental Psychology, 17, 300-312.

Harter, S. (1982a). A developmental perspective on some parameters of self-regulation in children. In P. Karoly & F. Kanfer (Eds.), Self-management and behavior change: From theory to practice (pp. 165-204). Elmsford, NY: Pergamon.

Harter, S. (1982b). The Perceived Competence Scale for Children. Child Development, 53, 87-97.

Harvey, J. H., & Weary, G. (1981). Perspectives on attributional processes. Dubuque, IA: Wm. C. Brown.

Heider, F. (1958). The psychology of interpersonal relations. New York: Wiley.

Hoelter, J. (1986). The relationship between specific and global evaluations of self: A comparison of several models. Social Psychology Quarterly, 49(2), 129-141.

Jacobsen, B., Lowery, B., & DuCette, J. (1986). Attributions of learning disabled children. Journal of Educational Psychology, 78, 59-64.

Jagacinski, C. M., & Nicholls, J. G. (1990). Reducing effort to protect perceived ability: "They do it but I wouldn't". Journal of Educational Psychology, 82(1), 15-21.

Joreskog, K. G., & Sorbom, D. (1983). LISREL: Analysis of linear structural relationships by the method of maximum likelihood. Chicago: International Educational Services.

Kennedy, B., & Miller, D. (1976). Persistent use of verbal rehearsal as a function of information about its value. Child Development, 47, 566-569.

Kruglanski, A.W. (1975). The endogenous-exogenous partition in attribution theory. Psychological Review, 82, 387-406.

Kurtz, B., & Borkowski, J. (1984). Children's metacognition: Exploring relationships among knowledge, process, and motivational variables. Journal of Experimental Child Psychology, 3, 335-354.

Lawson, M., & Fuelop, S. (1980). Understanding the purpose of strategy training. British Journal of Educational Psychology, 50, 175-180.

Lepper, M. R. & Greene, D. (1978). Overjustification research and beyond: toward a means-end analysis. In M. R. Lepper & D. Greene (Eds.), The hidden cost of reward. Hillsdale, NJ: Erlbaum.

Lumpkin, J. R. (1985). Validity of a brief locus of control scale for survey research. Psychological Reports, 57, 655-659.

Mack, J. L. (1970). A comparative study of group test estimates of WAIS Verbal, Performance and Full Scale IQs. Journal of Clinical Psychology, 26(2), 177-179.

Maehr, M. L., & Stallings, W. M. (1972). Freedom from external evaluation. Child Development, 43, 177-185.

Mahon, J., & Bali, S. (1988). A study of job-satisfaction of doctors in relation to their personality, values and self-esteem. Journal of Personality and Clinical Studies, 4(1), 63-68.

Marsh, H. (1986). Verbal and math self-concepts: An internal-external frame of reference model. American Educational Research Journal, 23, 129-150.

McCombs, B. (1986). The role of the self-system in self-regulated learning. Paper presented at the annual meeting of the American Educational Research Association, San Francisco.

Mirels, H. L. (1970). Dimensions of internal versus external control. Journal of Consulting and Clinical Psychology, 34, 226-228.

Nicholls, J. G. (1976). Effort is virtuous, but it's better to have ability: Evaluative responses to perceptions of effort and ability. Journal of Research in Personality, 10, 306-315.

Nicholls, J. G. (1979). Quality and equality in intellectual development. American Psychologist, 34(11), 1071-1084.

Nicholls, J. G. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. Psychological Review, 91, 328-346.

Norcross, J. C., & Magletta, P. (1990). Concurrent validation of the Levels of Attribution and Change (LAC) Scale. Journal of Clinical Psychology, 46(5), 618-622.

Norcross, J. C., Prochaska, J., & Kanbrecht, M. (1985). Levels of Attribution and Change (LAC) Scale: Development and Measurement. Cognitive Therapy and Research, 9(6), 631-649.

Oka, E. R,. & Paris, S. C. (1987). Patterns of motivation and reading skills in underachieving children. In S. Ceci (Ed.), Handbook of cognitive, social and neurological aspects of learning disabilities (Vol. 2, pp. 115-145). Hillsdale, NJ: Erlbaum.

Paulson, M. J., & Lin, T. (1970). Predicting WAIS IQ from Shipley-Hartford scores. Journal of Clinical Psychology, 26(4), 453-461.

Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. Journal of Educational Psychology, 82(1), 33-40.

Pressley, M., Borkowski, J. G., & O'Sullivan, J. R. (1985). Children's metamemory and the teaching of memory strategies. In D. L. Forrest-Pressley, F. E. MacKennon, & T. G. Waller (Eds), Metacognition, cognition and human performance (p. 111-153). San Diego, CA: Academic.

Purkey, W. (1970). Self-concept and school achievement. Englewood Cliffs, NJ: Prentice-Hall.

Pyszczynski, T., & Greenberg, J. (1983). Determinants of reduction in intended effort as a strategy for coping with anticipated failure. Journal of Research in Personality, 17, 412-422.

Reid, D. W., & Ware, E. (1973). Multidimensionality of internal-external control: implications for past and future research. Canadian Journal of Behavioral Science, 5, 264-271.

Robinson, J. P., & Shaver, P. R. (1973). Measures of social psychological attitudes. Ann Arbor, MI: Institute for Social Research.

Rosenberg, M. (1968, 1989). Society and the adolescent self-image. Revised edition. Middleton, CT: Wesleyan.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. Psychological Monographs, 80, 1-28.

Russel, W. A. (1970). Milestones in Motivation: Contributions to the Psychology of Drive and Purpose. New York: Meredith Corp.

Schmeck, R. R. (1983). Learning styles of college students. In R. Dillon and R. Schmeck, Individual Differences in Cognition. Academic Press.

Schmelzer, W. J. (1991). Development of the Collegiate Academic Motivation Test. Unpublished master's thesis. University of North Dakota.

Schuerger, J. M., Dielman, T. E., & Cattell, R. B. (1970). Objective-analytic personality factors (U.I. 16, 17, 19, and 20) as correlates of school achievement. Personality, 1, No. 2, 95-101.

Schunk, D. (1989). Self-efficacy and cognitive skill learning. In C. Ames & R. Ames (Eds.), Research on motivation in education: Vol. 3. Goals and cognitions (pp. 13-44). San Diego: Academic.

Schunk, D. (1991). Self-efficacy and motivation. Educational Psychologist, 26(3 & 4), 207-231.

Shipley, W. C. (1940). A self-administering scale for measuring intellectual impairment and deterioration. Journal of Psychology, 9, 371-377.

Snyder, M., & Wicklund, R. (1981). Attribute ambiguity. In J. H. Harvey, W. J. Ickes, & R. F. Kidd (Eds.), New directions in attribution research, Vol. 3. Hillsdale, NJ: Erlbaum.

Stipek, D. J. (1983). A developmental analysis of pride and shame. Human Development, 26, 42-54.

Tucker, L. R., & Lewis, C. (1973). The reliability coefficient for maximum likelihood factor analysis. Psychometrika, 38, 1-10.

Watkins, D. (1984). Student learning processes: an exploratory study in the Philippines. Human Learning, 3, 33-42.

Wechsler, D. (1955). Manual for the Wechsler Adult Intelligence Scale. New York: Psychological Corporation.

Weiner, B. (1985). An attributional theory of achievement motivation and emotion. Psychological Review, 92, 548-573.

Weiner, B. (1979). A theory of motivation for some classroom experiences. Journal of Educational Psychology, 71, 3-25.

Weiner, B. (1980a). A cognitive (attribution)-emotion-action model of motivated behavior: An analysis of judgements of help-giving. Journal of Personality and Social Psychology, 39, 186-200.

Weiner, B. (1980b). May I borrow your class notes? An attributional analysis of judgements of help-giving in an achievement related contest. Journal of Educational Psychology, 72, 676-681.

Weiner, B. (1982). The emotional consequences of causal ascriptions. In M. S. Clark & S. T. Fiske (Eds.), Affect and cognition: The 17th Annual Carnegie Symposium on Cognition (pp. 185-200). Hillsdale, NJ: Erlbaum.

Weiner, B. (1983). Some methodological pitfalls in attributional research. Journal of Educational Psychology, 75, 530-543.

Weiner, B. (1985). "Spontaneous" causal search. Psychological Bulletin, 97, 74-84.

Weiner, B., Frieze, I. H., Kukla, A., Reed, L., Rest, S., & Rosenbaum, R. M. (1971). Perceiving the causes of success and failure. Morristown, NJ: General Learning Press.

Weiner, B., & Graham, S. (1984). An attributional approach to emotional development. In C. Izard, J. Kagan, & R. Zajonc (Eds.), Emotion, cognition and behavior (pp. 167-191). Cambridge, MA: Cambridge University Press.

Weiner, B., & Graham, S., & Chandler, C. (1982). Causal antecedents of pity, anger and guilt. Personality and Social Psychology Bulletin, 8, 226-232.

Weiner, B., & Graham, S., Stern, P., & Lawson, M. E. (1982). Using affective cues to infer causal thoughts. Developmental Psychology, 18, 278-286.

Weiner, B., & Handel, S. (1985). Anticipated emotional consequences of causal communications and reported communication strategy. Developmental Psychology, 21, 102-107.

Weiner, B., & Kukla, A. (1970). An attributional analysis of achievement motivation. Journal of Personality and Social Psychology, 15, 1-7.

Weiner, B., Nierenberg, R., & Goldstein, M. (1976). Social leaning (locus of control) versus attributional (causal stability) interpretations of expectancy of success. Journal of Personality, 44, 52-68.

Weiner, B., Russell, D., & Lerman, D. (1978). Affective consequences of causal ascriptions. In J. H. Harvey, W. J. Ickes, & R. F. Kidd (Eds.), New directions in attribution research (Vol. 2, pp. 59-88). Hillsdale, NJ: Erlbaum.

Weiner, B., Russell, D., & Lerman, D. (1979). The cognition-emotion process in achievement-related contexts. Journal of Personality and Social Psychology, 37, 1211-1220.

White, R. W. (1959). Motivation reconsidered: The concept of competence. Psychological Review, 66, 297-333.

White, R. W. (1963). Ego and reality in psychoanalytic theory. Psychological Review, 3(3). (Monograph)

Wigfield, A., & Karpathian, M. (1991). Who am I and what can I do? Children's self-concepts and motivation in achievement situations. Educational Psychologist, 26, (3 & 4), 233-261.

Wylie, R. C. (1974). The self-concept. Vol. 1. A review of methodological considerations and measuring instruments. Lincoln: University of Nebraska Press.

Wylie, R. C. (1978). The self-concept. Vol. 2. Theory and research on selected topics. Lincoln: University of Nebraska Press.

Zuckerman, H. (1979). Attribution of success and failure revisited, or: The motivational bias is alive and well in attribution theory. Journal of Personality, 47, 245-287.