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ABSTRACT

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a virtual forum rather than privately if the students had poor coping skills.
Specifically, these students posted more messages to the program listserv
(R2=18.8) than the average ITMA student. Coping Skills were lower when
students' Locus of Control was external and when students exhibited Type A
Personality traits (R2=37.4). Academic achievement was independent of
psychosocial traits; however, a model containing students' Frequency of
Misunderstandings, Number of Assignment Re-submissions, Assignment Grades,
and Attitude predicted 68% of the variance in Achievement. QueenDom
Inventories (Jerabek, 1996b; 1996c; 1996g) were used to gather psychosocial
data. Regression analysis statistics, path model diagrams, and direct and
indirect effects are reported. (Contains 19 references, 17 tables, and 12
figures.) (Author)

Running head: LEARNER-CENTERED MODELS

Learner Characteristics, Behavior, and Achievement

Within Web-based Distance Education: Learner-Centered Models

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Abstract

Second year Instructional Technology masters (ITMA) students (N=49) in a three-year

web-based Instructional Technology program at Virginia Tech chose to communicate

with faculty, support staff, and other students via a virtual forum rather than privately if

the students had poor coping skills. Specifically, these students posted more messages to

the program listserv (R^2= 18.8) than the average ITMA student. Coping Skills were

lower when students' Locus of Control was external and when students exhibited Type A

Personality traits (R^2= 37.4). Academic achievement was independent of psychosocial

traits; however, a model containing students' Frequency of Misunderstandings, Number

of Assignment Re-submissions, Assignment Grades, and Attitude predicted 68% of the

variance in Achievement. QueenDom Inventories (Jerabek, 1996b; 1996c; 1996g) were

used to gather psychosocial data. Regression analysis statistics, path model diagrams, and

direct and indirect effects are reported.

The American Federation of Teachers (AFT) released guidelines in May, 2000, proposing that a full 50% of undergraduate education should be provided at a distance, primarily through web-based delivery systems (The Higher Education Program and Policy Council of the American Federation of Teachers, 2000). This growth gives rise to emergent policy issues. Equity, costs, accreditation, quality assurance, copyright and intellectual property rights, and changes facing faculty and institutions were identified and discussed within the National Center for Education Statistics statistical analysis report *Distance Education at Postsecondary Education Institutions: 1997-98*. Missing from their list, however, was the issue of learner characteristics and their interaction with the web-based learning environments. Specifically, their report did not address learner characteristics that might identify a distance education learner as a candidate for at-risk status.

There can be little doubt that delivery at a distance will take an important place within the overall scheme of education in the United States and in the world. There is question, however, as to motivation: What goal drives this impetus toward delivery at a distance? Our institutions of higher education are our guardians of human learning and knowledge. In the interests of our civilization, let us hope their goal is effect and wholesome human learning environments. In order to design effective learning environments, it seems essential to begin by an analysis of learners' characteristics.

Instructional designers consider analysis of learner characteristics preliminary and essential within the instructional design process (Dick & Carey, 1996; Smith & Ragan, 1993). The importance of learner analysis would appear to increase when the intent is to deliver instruction within a non-traditional educational space such as distance education: Typically, a classroom teacher will pace, space, and adapt a lesson to learners based upon observations of the learner behavior during instruction. Within web-based environments, there is no live, synchronous instructor to observe and respond to learner cues (Wang & Newlin, 1999). A number of studies indicate that attrition rate for distance education students is larger than attrition rate for students enrolled within traditional classes (Phipps & Merisotis, 1999). In an educational environ in which student attrition is a great concern, within a virtual classroom that does not afford the teacher an opportunity to informally assess learner characteristics, psychometric analysis of learner characteristics such as Locus of Control may allow programs to define descriptive models that link student characteristics to at-risk behaviors exhibited within the distance education environment. Adequate and validated models could allow designers to develop effective instructional and/or support interventions.

To this end, the preliminary investigation reported within this paper identifies several learner characteristics salient to learner citizenship and achievement within a web-based learning environment. The results suggest that graduate programs delivered at a distance should profile incoming students for characteristics found to place distance

learners at-risk. Entry-level identification would allow programs to provide interventions

before students develop and reinforce dangerous learner habits. Within this discussion, a

program that identifies and provides intervention for at-risk behavior is labeled a learner-

centered model using a learner-centered approach.

ITMA: A Web-based Graduate Program in Instructional Technology

ITMA, an acronym for Instructional Technology MAsters, is a distance education

program offered by Virginia Tech. Each program iteration, from student admission to

graduation, takes 3 years. This review was conducted during 2000 and 2001, studying

data collected from the first group of ITMA students, ITMA-I. At that juncture, program

administrators paused to consider both (a) the characteristics of that original population

of students (ITMA-I) and (b) the behavior patterns they exhibited during their final two

years in the program. Program administators and faculty had observed, for example, that

students who were high-profile communicators posted four times as many messages to

the program listserv as the average ITMA-I student. Additionally, for each E-mail

evidencing a misunderstanding of a class or the program posted by the average student,

frequent misunderstanders posted 3. These observations led to this preliminary report,

which investigates the relationships between 4 behaviors qualitatively identified by staff

and faculty over two years:

1. "high-profile" listserv posting

2. "frequent misunderstander" listserv postings

3. psychosocial traits: Type A Personality, Coping Skills, and Locus of Control

4. achievement.

More specifically, review of ITMA's initial years suggested three questions:

1. Do Type A Personality, Locus of Control and Coping Skills, and Locus of Control

predict type and conditions of student usage of a public forum such as a class listserv?

2. Do those same learner characteristics account for the variance in the numbers of

misunderstandings posted by students?

3. Finally, how do learner characteristics, misunderstandings, and propensity to

communicate via a public forum affect student attitude and achievement?

These questions, driving a study of learner characteristics within virtual

educational environs, are significant because of the dramatic growth in the number and

scope of distance education programs throughout the United States. Between 1995 and

1998, the percentage of higher education institutions offering distance education courses

increased from 33 percent to 44 percent, and the number of course offerings and the

number of degree and certification programs offered approximately doubled (Lewis,

Snow, Farris, & Levin, 1999). Public Law 105-224 (enacted October 7, 1998) extended

the authorization of the Higher Education Act to evaluate the quality of distance

education programs; support partnerships between colleges, employers, and technology

companies; and assess postsecondary educational software. Within that milieu, it is

noteworthy that "the percent of institutions using asynchronous Internet-based

technologies . . . nearly tripled, from 22 percent of the institutions in 1995 to 60 percent

of the institutions in 1997-98" (Lewis et al., p. vi). Internet-based delivery of rigorous

content is a relatively new challenge for our students. Policymakers and instruction

developers are also challenged; they have the responsibility of creating and distributing

that web-based instruction. Their decisions will impact our students and our civilization.

If decisions are informed by a systematic study of learner characteristics and their

relationship to learners' behaviors, designers and policymakers can proceed with

confidence that theirs is a student-centered approach.

Models of Learner Characteristics May Determine Interventions

Distance education is a new field, developing faster than many institutions can set

policy (Phipps & Merisotis, 1999). Therefore, the research base is young. Reviews of the

literature indicate that many reports on distance education learner characteristics have

relied annecdotal evidence (Lewis et al., 1999; Wang & Newlin, 1999) and papers appear

to "consist of only a small body of original research" (Phipps & Merisotis, 1999). Within

their Executive Summary to Congress and the President, the Web-based Education

Commission recommended that the government create a new framework of how people

learn in the Internet age, calling for research, development, and innovation (Web-based

Education Commission, 2000, p. v). In fact the Commission describes it as a "call to action" . . . for "national mobilization" (p. iv).

The learner-centered approach (i.e., screening and intervention for learner charateristics that place a distance education student at-risk) is not universally supported. As an example, consider a report sponsored by the National Education Association (NEA) and Blackboard and prepared by the Institute of Higher Education Policy (2000). The report presented quality assurance benchmarks and their perceived importance and implementation within six higher-education institutions recognized for their successful and innovative distance education programs. The Institute began with a list of benchmarks culled from the literature and then edited the list based upon rating scores obtained from a survey and interview of faculty, administrators and students at six institutions that have established national reputations at delivering web-based instruction. Three of those benchmarks, grouped under the category of course development (see Table 1), dealt with consideration of student learning style within the instructional design and assessment process:

1. During course development the various learning styles of students are considered.

2. Assessment instruments are used to ascertain the specific learning styles of students, which then determine the type of course delivery.

3. Courses are designed with consistent structure, easily discernable to students of varying learning styles.

Although the Institute deleted these learner characteristics items before finalizing a list

of recommended benchmarks, they retained other items (specifically the faculty support

items, see Table 2), that earned equivalent scores. In fact, most of the originally

proposed items that dealt with accepted instructional design practice were deleted from

the finalized list of benchmarks. It should be noted that the rating scores were based upon

the opinions of faculty, administrators, and students. There was no mention of the

inclusion of instructional technologists or instructional designers within the sample.

There may be some disagreement between educators and the practioners of instructional

design on the importance of both learner analysis and instructional to the development

process.

Additionally, since these three items are the only benchmarks connected to learner

characteristics that the Institute considered—one wonders whether the term "learning

style" might not have been intended as a label for the more rigorous "learner

characteristics". Further, it is possible that interviewees' dismissal of learner

characteristics might be the result of the confusion over terminology. While learning

styles are not well validated and theorists tend to over-generalize their application (Smith

& Ragan, 1993), learner characteristics such as cognitive styles and individual's

psychosocial traits tend to be stable over time. The Locus of Control construct can be

identified as both a learning style and a psychosocial trait. It can serve us to illustrate the

difference between learner styles and more viable learner characteristics.

Locus of Control is an individual's perception of individual responsibility for life events. For example, does an individual consider herself responsible for a test grade (internal Locus of Control), or is the individual's grade the result of chance (external Locus of Control)? Analyzed as a trait, one can expect a learner's perception of their Locus of Control to remain fairly stable, but responsive to major changes in life circumstances. Considered as a learning style, an individual's Locus of Control can change from week to week, or even over the course of a day. However, an individual's general propensity to accept and expect internal or external responsibility for accomplishments and failures is a stable personality trait. It is easy to understand how policy-makers might reject consideration of learner characteristic benchmarks if those characteristics are centered about learning styles. But where those attributes are well substantiated and interpreted characteristics, when they are learning traits, analysis is essential to adequate instructional design.

Locus of Control has long been a staple construct employed in investigation of the relationships between learning environments, learner characteristics, and learner achievement. In his historic report *Equality of Educational Opportunity*, Coleman (1966) concluded that "attitudes such as a sense of control of the environment, or a belief in the responsiveness of the environment [Locus of Control], are extremely highly related to achievement. . . ." The basic style and content of Coleman's Locus of Control survey questions are still followed within major contemporary educational research efforts, such

as the Third International Mathematics and Science Study (TIMSS, International

Educational Association, 1995). Both the Coleman report and the TIMSS investigate the

effects of children's Locus of Control within teacher-delivered learning environments.

While this ITMA report studied adults participating in a web-based learning environment,

Coleman's comments are, nonetheless, illuminating:

> If a child feels that his environment is capricious or random or beyond his
>
> ability to alter then he may conclude that attempts to affect it are not worthwhile
>
> and stop trying. Such a response to ones environment may be quite unconscious,
>
> but merely a general attitude that has developed through long experience.
>
> (Coleman et al., 1966, p. 288).

If Locus of Control exhibits a similar effect within web-based learning environments,

then this learner trait could also contribute toward students' attitude, misunderstandings,

achievement, and attrition within web-based instructional environments.

In their studies of the distance education environment, Wang and Newlin (1999)

reported that internal Locus of Control is one of a linear combination of factors that

predicted 51% of the variance in the academic success of their web-based learners. The

model also included Need for Cognition and Total Hits on the class website. Wang and

Newlin did not report further variance partitioning, although they did report zero-order

correlations between each of the variables and achievement (final grade in the class):

$r_{External Locus of Control} = -.41$, $p < .01$, $r_{Need for Cognition} = .48$, $p < .01$, and $r_{Homepage Hits} = .38$, $p < .01$.

In the case of this ITMA study, weekly analysis of students' behaviors, exhibited through their interactions with ITMA faculty and staff, led the investigators to add learner's degree of Type A Personality and learners' Coping Skills to a path model hypothesized to explain the variance in students' listserv postings (positive, neutral, and negative). In general, individuals who possess Type A Personality traits are driven to goal attainment by external recognition and advancement. Although these individuals can be powerful and high-achievers, type A's can be very demanding and critical of themselves and others. On the other hand, type B personalities are laid back, productive, team-players, and easy to get along with socially. Web-based learning communities with public forums (such as listservs) present a platform from which Type A's could attempt to use their skills and talents to sway group opinion and control a program.

Both Ability to Assess a Situation and Proactive Attitude, two of the Coping Skills subscales, were salient indicators for this group. An individual who has the Ability to Assess a Situation can estimate or judge the character of a situation. Presence of the trait is more than the ability to evaluate a situation (Flexner, 1996). Such individuals trust their own judgement (Jerabek, 1996b). And this last characteristic may be the key component of the construct's variance within the ITMA-I students. Individuals with Proactive Attitude are "not hesitant to take action. [They] . . . realize that changing less than ideal situations requires modification of [their] behavior and plans" (1996b). Taking action means taking a risk, but individuals with Proactive Attitude will take the risk.

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Qualitative observations of the ITMA-I students over the course of the program suggested that many had difficulty following procedures or directions related to class or program activities or tasks. Examples might be (a) enrollment procedures for logging on to the class website or (b) file hierarchy and folder and file naming conventions to be followed in setting up and developing an online portfolio. Carroll and Mach (1999) had found that learners resist reading and following step-by-step procedures, preferring a more active role. Directions and procedures might be important in any situation. For example, laboratory procedures could be important for safety reasons. Directions and procedures are particularly important in a virtual learning environment because it does not afford immediate face-to-face interaction and reinforcement. In one case that occurred with the ITMA-I students, those students who failed to follow logon procedures were not counted as enrolled by the deadline in the online course. Therefore, they were not included within the class roster and did not receive the email messages essential for completion of the first assignment. In other cases, student assignments that were misnamed and mis-filed within the online portfolio hierarchy were overlooked during grading. Students had to return to the portfolio and revise the hierarchy, folder, and file names. In still another example, students who failed to follow directions had to resubmit assignments multiple times. Faculty and staff observations of such incidents and subsequent student reactions indicated that misunderstandings, caused by a very human

tendency to skim or skip instructions, might play a role in student frustration and

academic achievement within a web-based distance education program, such as ITMA.

The investigation reported within this paper is but a component of on-going

program evaluation of ITMA. As such, it is in accord with accepted practice. In May of

2000, the American Federation of Teachers (AFT) proposed a set of guidelines for

higher education distance learning programs. Those guidelines suggest that "all

institutions offering distance education coursework should become laboratories of

program evaluation" (p. 15). In elaboration of this guideline, the AFT stressed that

"areas for evaluation should include the characteristics of successful and unsuccessful

distance education students" (p. 15). Identification of the relationships between learner

characteristics and the web-based environment could help a program to design successful

web-based instructional environments. Such a program, then, would follow a learner-

centered approach to distance education.

Method and Procedures

Participants were 49 masters degree students enrolled in a primarily web-based

distance education master's degree program in instructional technology at Virginia Tech.

All but one of the students were practicing educators. Data were collected from four

sources: (a) psychosocial inventories, (b) students' messages posted to the program's

listserv, (c) students' grades on individual assignments, and (d) faculty and instructor

ratings of students' overall attitude and overall achievement. Five students did not submit

psychosocial data and were not included within the analyses that utilized that

information.

Psychosocial Traits

Data related to students' psychosocial traits were collected through student

submission of an on-line form near the completion of the students' second year in the

program. The form administered three inventories (see Table 3) to the students: Locus of

Control and Attributional Style Inventory (Jerabek, 1996c), with $\alpha = 0.6914$, $N > 19,000$

(1996e); Coping Skills (1996b) with $\alpha = 0.94$, $N = 811$ (1996d); and Type A Personality

(1996g) with $\alpha = 0.63$, $N = 3383$ (1996f). The form also contained additional items, such

as questions related to students' professional aspirations and self-assessment of

instructional technology proficiency. One student was unwilling to complete the survey.

Two completed the survey, but left all personality inventory items blank. Psychosocial

scores were not calculated for these students and they were excluded from the models

which examined the relationship between psychosocial traits and an individual's need to

communicate via a virtual forum.

Listserv Data

The ITMA program's 1344 pages of listserv messages dated September 22, 1999

through June 30, 2000 were printed. Each message was categorized as (a) positive E-mail

messages (appreciation expressed about ITMA program, faculty, instructional content,

and staff and positive support or assistance of other ITMA students), (b) neutral E-mail

messages, and (c) negative E-mail messages (negative criticism of content, program, staff

and/or faculty; complaints; deliberate lies; sarcasm; and foul language). All messages

were also evaluated for evidence of misunderstandings. In addition to the initial

categorization, some messages were also coded as misunderstandings if they contained

(a) statements indicating that students hadn't followed and/or understood program or

course procedural or instructional direction, (b) statements in which students were late for

a deadline, (c) questions that were duplicates of listserv questions that had already been

posted and answered, or (d) incompetence at a basic instructional technology task for

which instruction had been provided (e.g., a student could not correctly access the

required ITMA Portfolio webpages that he or she had developed and posted to the

Internet). The number of messages that recorded technology failures was also tallied.

Grade Variable

Most ITMA course work is criterion-based, and students can often resubmit

assignments to improve grades. Therefore, there is often little variability in both

assignment and course grades. Faculty reviewed their records to identify assignments that

did evidence student variability. All assignments that did exhibit variability were

averaged to create a composite variable, Grade, which was utilized in the model that

analyzed academic achievement.

Misunderstanding Variable

After two years in the program, and one year after a course in instructional design,

ITMA students were required to employ instructional design principles to develop a

proposal for the development of a multimedia program. Students resubmitted the

proposal until it met specifications. The number of submissions was also employed

within the model of achievement. Theoretically, the researcher's intent was to link

students' propensity to misunderstand instructions and procedures with academic

achievement.

Number of Gradings

ITMA students completed an introductory course in instructional design during

the summer term of 1999. In the summer, 2000 term, students were required to submit an

instructional design for a unit of instruction to be developed as multimedia, computer-

assisted instruction. They were provided with a website that contained the design

specifications and submission instructions. Seventeen of the ITMA students submitted an

acceptable multimedia unit proposal. The remainder of the students re-submitted

proposals until they successfully meet the assignment requirements. The number of times

a student submitted the proposal provided the data for Number of Submissions. This

construct indicated how well a student followed narrative directions and procedures.

Theoretically, the authors suspected a great degree of correlation between

Misunderstandings and Number of Gradings. Number of Gradings would then contribute

toward student attitude, based, in part, upon a student's ability to read and follow written,

online directions and procedures.

Attitude and Achievement Rating Scales

ITMA faculty and support personnel rated each of the ITMA students on two sets

of rating scales: overall attitude and overall academic achievement (see Table 4). Within

the faculty survey scale, an outstanding ITMA achiever (achievement scale rank 4) was

recognized as equal to the caliber of that produced by a professor's best on-campus

students. This student created instruction and/or products well beyond the criterion

expectations. It should be noted that this scale allowed the overall achievement variable

to evaluate student achievement more globally (comprehensively) than the individual

course or assignment grades represented within the Grade variable.

The investigator used SPSS to conduct a principal component analysis of the

faculty data on each of the two variables, achievement and attitude, for data reduction.

Achievement data loaded on one component, which explained 43% of the variance across

faculty members. One set of scores loaded lower than the others (.391). A follow-up

interview indicated that this faculty member had scored student tests through multiple

choice tests and remained unfamiliar with most of the individual students' academic

achievement in the course. When this faculty member's scorings were removed from the

achievement analysis, the one component explained 51%. All loadings were 6.0 and

above. The remaining variables were averaged to form the composite variable, Overall

Achievement. Overall Achievement was operationalized as program faculty's perception

of a student's Overall Achievement of the Virginia Tech Instructional Technology

Master's Degree standards. It served as the dependent variable in the final equation of the

Achievement Model.

Faculty attitude ratings also loaded on one factor, explaining 49% of the variance

in the faculty ratings of student attitude. All faculty attitude variables loaded above .6 and

were retained within the averaged composite variable labeled Attitude. Attitude served as

another endogenous variable within the Achievement Model, one of two dependent

variables within the penultimate equation.

Statistical Analysis

ITMA is an on-going, real-world program. The students are actually engaged in

earning a master's degree. Therefore, nonexperimental research employing regression

analysis was designed to examine salient models hypothesized to explain the variance in

achievement and listserv postings. Regression analysis allowed identification of path

coefficients, and these were used to calculate the indirect, direct, and total effects for each

model and its predictor variables. According to Pedhazur, "it is appropriate, and sometimes useful to compare the total effects of different variables in an effort to ascertain their relative effects on the dependent variable" (1997, p. 249). However, the reader should remember that a variable entered at a later stage of the model does not exclude that portion of their variance contributed to it by any earlier variable which travels along its path to the dependent variable (1997).

Results

Distribution of ITMA Students on Psychosocial Constructs

ITMA data collected from the QueenDom inventories was transformed into Z-scores, employing the QueenDom parameters for means and standard deviation (Jerabek, 1996d; 1996e; 1996f). The resultant histogram plots of these constructs afforded comparison between the ITMA group and the norming population (random samples of individuals who had navigated to the Queendom test site and completed the inventory).

In general, the ITMA students distribute normally along the Type A personality curve (see Figure 1). However, the ITMA mean is located at -.72, almost one standard deviation to the left of the norm. The ITMA z-scores range from +1 to –2.5 from the population mean. Most of the students score on the Type B side of the continuum, exhibiting Type B, rather than Type A, personality traits.

Locus of Control

Although two ITMA students scored very high on the Locus of Control (z-scores

of 1.5 and 2.0), the remaining students ranged between z-scores of -1.5 and 1.0 (see

Figure 2). Sixteen ITMA students scored from -1.0 to -1.5 standard deviations from the

mean. Eight students scored between 1.0 and 2.0 standard deviations from the mean.

These last two groups of students had learner characteristics that were salient to the most

of the models described within this study.

Coping Skills

As might be expected from the Type A Personality and Locus of Control scores,

on the average, the ITMA-I students had capable Coping Skills (see Figure 3). There was

a large jump in the number of students scoring at .5 and .75. Their scores range from

-1.25 to 2.25 on general Coping Skills, with a mean of 0.35. There were two salient

subscales for this group of students. They were Ability to Assess a Situation and

Proactive Attitude. Although most ITMA-I students fell along the normal curve between

z-scores of -1 and $+1$ for Ability to Assess a Situation, four of them scored between 1.5

and 2.5 (see Figure 4). The mean score was .25. Thirty-nine percent of the ITMA

students scored at 0.5 and above on Proactive Attitude (see Figure 5). The mean score on

this subscale was 0.4.

Correlations

It is possible that variables that do not correlate significantly are as important in providing insights into a learning environment as those that do (see Table 6). In the case of these ITMA students, none of the psychosocial traits correlated with any of the attitude or academic achievement variables. They did, however, correlate moderately and significantly within models developed to study interactions with the number of listserv messages. In these models, Coping Skills and Coping Skills subscales served as mediators between a linear combination of Type A Personality and Locus of Control and number of E-mail messages (total, neutral, positive, and negative).

Although the zero-order correlations indicated high correlations between subscale and subscales and between subscale scores and their traits, those correlations were not the theoretical interest of this investigation (see Table 6). The remaining correlations fell into categories defined by two types of models: (a) listserv activity and (b) academic achievement. One exception was Misunderstandings, which was moderately correlated with neutral listserv postings ($r = .45, p < .01$) as well as with the Grade Composite ($r = -.35, p < .05$) and Number of Gradings ($r = .36, p < .05$). The three psychosocial traits were not significantly correlated with achievement or attitude. Instead, they were moderately correlated with the variables that concern student postings to the ITMA listserv.

The models defined within this study aligned with the structure evident within the correlations. Regression analyses were run on two types of models:

1. Listserv Messages, as predicted by a linear combination of psychosocial traits and Misunderstandings

2. Achievement, as predicted by a linear combination of Number of Gradings (number of re-submissions of an assignment to meet competency level), Grade Composite, and Overall Attitude.

Listserv Messages

Total Listserv E-mail messages

In general, a linear combination of Type A Personality and Locus of Control predicted 37.4% of the variance in ITMA students' coping skills (see Table 7 and Figure 7). While Locus of Control loaded positively, β= .414, $t(38)$ = 2.964, $p<.05$; Type A Personality loaded negatively β= -.451, $t(38)$ = -3.5, $p<.05$. In turn, Coping Skills determined 18.8 % of the variance in each students' total listserv postings, β= -.433, $t(39)$ = -3.00, $p < .05$.

Neutral Listserv Messages

The most complex model of listserv activity was the one for neutral messages (see Table 8 and Figure 8). Two indicators of Locus of Control were significant exogenous

variables within this model. Students who think their limitations are temporary (Locus of Control: Stable/Nonstable) tended to have Type A traits, $R^2=.132$, $F(2,39)=53947$, $<.05$. This variable combined with external Locus of Control to predict 27.8% of the variance in Coping Skills: Proactive Attitude, $F(2,38)=7.323$, $p<.05$. At this stage, Misunderstandings joined in linear combination with Proactive Coping Skills to explain 34% of the variance in neutral listserv postings $F(2,38)=9.605$, $p<.05$.

Positive Listserv Messages

Once again, Type A personality loaded negatively on the subscale Coping Skills: Proactive Attitude, $\beta = -.366$, $p < .05$ (see Table 9 and Figure 9). Locus of Control: Success Attribution (external vs. internal) loaded positively $\beta = -.384$, $p < .05$. In linear combination, they accounted for 27.8% of the variance in Coping Skills: Proactive Attitude, $F(2,38)=7.323$, $p<.05$. Coping Skills: Proactive Attitude loaded positively on Positive E-mail, determining 11.3 % of the variance.

Negative Listserv Messages

In contrast with the other two listserv models, negative listserv postings were more strongly determined by the coping skill Ability to Assess the Situation than Proactive Attitude (see Table 10 and Figure 10). As mentioned earlier within the review, for these ITMA students, Ability to Assess the Situation was highly, positively correlated with Coping Skills: Proactive Attitude, $r = .892$, $p < .01$. Therefore, within this model,

students who had strong Ability to Assess the Situation probably also had a Proactive

Attitude.

Type A Personality and Locus of Control: Success Attribution (External/Internal)

determined 31.7 % of the variance in Coping Skills: Ability to Assess the Situation. Type

A Personality loaded negatively $\beta = -.307$, $p < .05$ and Locus of Control: Success

Attribution (External/Internal) loaded positively ($\beta = .429$, $p < .01$). Coping Skills:

Ability to Assess the Situation determined 15.9% of the variance in Negative E-mail.

The Achievement Model

The initial Achievement Model (Achievement Model 1, see Figure 11) was

modified because the hypothesized path between Number of Gradings and Overall

Attitude was not significant within Equation 3 (Table 11). This was probably due to the

correlation between Number of Gradings and Grade Composite ($r = .38$, $p < .05$). The

path was removed from the final model (Achievement Model 2, see Figure 12 and Table

12).

Model 2 was composed of 4 equations (see Figure 12). Misunderstandings ($\beta = -$

.337, $p < .05$) explained 11.3% of the variance in Number of Gradings. Number of

Gradings ($\beta = -.449$, $p < .01$) explained 20.1% of the variance in Grade Composite. Grade

Composite ($\beta = -.571$, $p < .01$) explained 32.6% of the variance in Overall Attitude. A

linear combination of Overall Attitude ($\beta = .660$, $p < .01$) and Grade Composite ($\beta = .247$,

$p < .05$) explained 68.3% of the variance in Academic Achievement.

Indirect, Direct, and Total Effects

Across the four models of listserv postings, Locus of Control had a negative total

effect on Number of Postings. Locus of Control (or one of its subscales) contributed

negatively, from 12% to 17% of the variance in listserv postings (see Tables 13 – 16).

Across the four models, Type A Personality contributed positively, between 12% and

21% of the variance in listserv postings. Coping Skills also had a negative influence on

number of postings, contributing 34% to 43% of the variance in listserv postings. The

stronger the Coping Skills, the less frequently an ITMA student posted to the listserv.

Misunderstandings made a greater contribution to the variance of Neutral Listserv

Postings (39%) than to either model of Achievement (see Figures 14, 17, and 18).

Misunderstandings correlated positively with Number of Postings, but negatively within

Achievement Model 1 (5%) and Achievement Model 2 (9%).

Overall Attitude was the largest predictor of student Achievement in both Model

1 and Model 2 ($s^2_{Model\ 1} = .53$; $s^2_{Model\ 2} = .66$). While deletion of the path from Number of

Gradings to Overall Attitude (see Figures 11 and 12) decreased the contribution by

Number of Gradings from 38% to 28%, the revision increased the contribution of

Misunderstandings (from 5% to 9%) and Grade Composite (from 31 to 62%).

Discussion/Conclusion

Over the course of two years, patterns of behavior appeared on the ITMA-I

listserv. At the two extremes, there were the messages that expressed appreciation for the

program and very negative messages. In both cases, a student had initiated a public

demonstration. As evidenced by so clearly in political events, such as the demonstrations

after Bush's 2000 presidential election victory, public demonstration promotes exposure

and affiliation.

According to this analysis of the ITMA-I student data, those individuals who were

easy-going and likeable and who viewed personal success a result of personal effort

possessed strong coping skills. They demonstrated a strong ability to assess situations and

act proactively. And, they posted very little E-mail to the program listserv. On the

opposite end of the spectrum, there were goal-oriented ITMA students who seemed to

required external affirmations. These students also tended to attribute their success to

chance; they perceived their successes and those affirmations as some variable-ratio

reinforcement. These Type A students can be highly motivated and extremely successful.

However, they had poor coping skills; over 30% of the variance in ITMA Coping Skills

was due to the linear combination of Type A and Locus of Control. And 18.8% of the

variance in total listserv E-mail was attributed to Coping Skills. In contrast, the volume of

listserv postings was minimally correlated to individual's academic ability. Even there, it

appeared that Misunderstandings (specifically, difficulty in interpreting narratives) could

contribute a great deal of that correlation.

These models then, suggest that the high-profile communicator seeks affirmation

through public demonstration of ideas and opinions. And this indicates an instructional

prescription, that instructional programs should provide both that individual affirmation

and scaffolding that would allow the individual to retain their drive while also growing

more intrinsically satisfied, more relaxed. It seems that early identification would allow a

program to assign trained mentors to communicate with high-profiler posters to nourish

learner independence through an individual E-mail correspondence relationship. In

support of this prescription, ITMA-I personnel saw a dramatic decline in listserv activity

during the third year of the first cycle as administrators attempted to meet these needs.

Preliminary observation of the final ITMA-I year listserv totals suggested that ITMA-I

high-profile students benefited from the scaffolding they received within the program.

Considering the distributed nature of learning, it is possible that the low-profile posters

could also benefit from some type of intervention; perhaps they could increase the pay-

off they receive from their web-based courses (assimilation and accomodation of

knowledge, skills, and attitudes) if an intervention enabled them to contribute more to the

listserv discussion.

Those students with a lower ability to assess a situation tended to post negative

messages, while those students who lacked a strong ability to act proactively tended to

post positive and neutral listserv messages. Lack of ability to assess a situation indicates

that an individual distrusts his or her own judgement. Lack of Ability to Assess a

Situation is so closely correlated with Proactive Attitude that both cannot remain

statistically significant within the same model; however, realize that this distrust of

personal judgement probably occurs within all of the E-mail models.

A second purpose of this study was to unravel a bit of the tangle that leads

students to misunderstand written instructions. Additionally, observations of student

listserv behavior over two years had suggested that students who misunderstood

directions became frustrated and bitter. It appeared logical to assume that those who

became frustrated would write and post negative E-mail messages. This led to the

hypothesis that those who misunderstood directions would be apt to write negative E-

mail messages. But ITMA-I students' misunderstandings did not correlate with their

negative listserv postings. Neither did misunderstandings correlate with Achievement,

Overall Attitude, or positive listserv messages (see Table 6).

Within scientific investigation, there is no shame in any first steps. As

investigations of the web-based distance learning environment proceed, it is possible that

Locus of Control, Coping Skills and Type A Personality will no longer be specified

within models of student behvior. Rather, they may be subsumed within more significant

variables. With time and study, researchers and developers may harness the powerful

links between learner characteristics and achievement. Pursuit of any goal will draw us

closer to its attainment. This study proceeded toward a goal of building effective, learner-centered distance education programs based upon theory and empirical evidence. We might all accept that individuals are unique; however, when we uncover the patterns that govern individual differences, we can use those patterns to engineer educational environments that promote learning.

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Table 1.

Mean Importance and Presence Rankings of Non-essential Benchmarks As Evaluated by

Institute of Higher Education Policy

Benchmark	Mean Importance[a]	Mean Presence[b]
9. During course development the various learning styles of students are considered.	4.2*	4.6
10. Assessment instruments are used to ascertain the specific learning styles of students, which then determine the type of course delivery.	3.5	2.8
11. Courses are designed with a consistent structure, easily discernable to students of varying learning	4.4*	5.2

syles.

Mean of 45 Benchmarks' means	4.36	5.08

[a]Benchmark scores on importance run from 0 (not important) to 5 (very important).

[b]Benchmark scores on presence at university run from 0 (strongly disagree that this benchmark is present) to 5 (strongly agree that this benchmark is present).

*Scores in the category authors label "very important"

Table 2.

Mean Importance and Presence Rankings of Selected Essential Benchmarks As

Evaluated by Institute of Higher Education Policy

Benchmark	Mean Importance[a]	Mean Presence[b]
3. A documented technology plan is in place to ensure quality standards.	4.3	4.4
37. Faculty members are assisted in the transition from classroom teaching to distance instruction and are assessed in the process.	4.4	4.7
38. There are peer mentoring resources open to faculty members teaching distance courses.	4.3	4.6
39. Distance instructor training continues	4.4	4.7

throughout the progression

of the online class.

40. Faculty members are	4.0	4.1

provided with written

recourses to deal with issues

arising from student use of

electronically-accessed

data.

Mean of all 45	4.36	5.08

Benchmarks' means

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[a]Benchmark scores on importance run from 0 (not important) to 5 (very important).

[b]Benchmark scores on presence at university run from 0 (strongly disagree that this

benchmark is present) to 5 (strongly agree that this benchmark is present).

Table 3.

QueenDom Psychosocial Inventories and their N, Alpha Levels, and Subscales.

Inventory	Subscale	N	Cronbach's Coefficient Alpha
Coping Skills Inventory		811	0.94
	Reactivity to stress		
	Self-reliance		
	Resourcefulness		
	Adaptability		
	Proactive attitude		
	Ability to relax		
Type A Personality Inventory		3383	0.63
Locus of Control and Attributional Style Inventory		9993	0.6914
	Success Attribution (internal versus external)		
	Success Attribution (stable versus unstable)		

Failure Attribution (internal

versus external)

Failure Attribution (stable

versus unstable)

Table 4.

Rating Scale for ITMA Students' Attitude and Achievement Survey Completed by Faculty

and Support Staff.

Variable	Scale Rank	Description
Achievement		
	0	Very poor: This is a very poor student. It is obvious to me that this student is deficient in either (a) the prior knowledge and experience required to be successful in my course, the ITMA program, or as a future IT professional or (b) self-reliant learning and cognitive strategies.
	1	Some difficulty: I recollect that this student had some difficulty in my class(es).
	2	Average, Neutral or Do not recall: This student was average or I cannot say off the top of my head because (a) I have no position, or (b) I do not recall this student. The student must have met the course expectations.
	3	Did well: I recollect that this student did well in my course(s).

4   Outstanding: This is an outstanding student. Assignments and projects matched the caliber of that produced by my best on-campus students.

Attitude

0   Very negative: This student had a very negative attitude. Either the student participated in more than one communication or action that indicated a negative attitude toward the ITMA program and/or staff, the course, the content, or me-as the professor of record; or the student participated in one salient, negative incident.

1   Negative: I recollect some indication of a negative attitude, but nothing specific.

2   Neutral or Do not recall: I cannot say because (a) I have no position or (b) I do not recall this student.

3   Positive: I recollect some indication of a positive attitude, but nothing specific.

4   Very positive: This student had a very positive attitude. Either the student participated in more than one communication or action that indicated a positive attitude

toward the ITMA program and/or staff, the course, the

content, or me-as the professor of record; or the student

participated in one salient, positive incident.

Table 5.

First-Order Correlations Between All ITMA Variables.

NAME	NOGRAD	POS	NEUTRAL	NEGATIVE	MISUNDER	FACATTM	FACACH2
NOGRAD	1.00	-0.24	-0.11	-0.23	0.36*	-0.36*	-0.41**
POS	-0.24	1.00	0.72*	0.53*	0.12	0.22	0.33*
NEUTRAL	-0.11	0.72**	1.00	0.64**	0.45**	0.03	0.20
NEGATIVE	-0.23	0.53**	0.64**	1.00	0.29	-0.14	0.15
MISUNDER	0.36*	0.12	0.45**	0.29	1.00	-0.25	-0.26
FACATTM	-0.36*	0.22	0.03	-0.14	-0.25	1.00	0.79**
FACACH2	-0.41**	0.33*	0.20	0.15	-0.26	0.79**	1.00
TOTEMAIL	-0.16	0.79*	0.98**	0.74**	0.41**	0.03	0.23
ZTYPEA	0.24	0.06	0.26	0.21	0.24	-0.19	-0.14
ZCOPE1	0.06	-0.25	-0.41**	-0.39*	-0.10	0.17	0.15
ZCOPE2	0.11	-0.14	-0.30	-0.29	-0.15	0.24	0.26
ZCOPE3	0.05	-0.16	-0.32*	-0.39*	-0.20	0.16	0.16
ZCOPE4	0.01	-0.23	-0.36*	-0.35*	-0.13	0.15	0.17
ZCOPE5	-0.04	-0.25	-0.37*	-0.33*	-0.03	0.10	0.00
ZCOPE6	0.01	-0.18	-0.35*	-0.35*	-0.16	0.22	0.17
ZCOPE7	0.01	-0.32*	-0.42**	-0.36*	-0.16	0.11	0.11
ZCOPE8	0.29	-0.20	-0.18	-0.11	0.19	0.07	0.09
ZLC1	-0.09	-0.22	-0.24	-0.37*	-0.05	0.10	0.08
ZLC2	-0.03	-0.29	-0.30	-0.43**	-0.09	-0.09	-0.13
ZLC3	-0.29	-0.07	-0.17	-0.12	-0.28	-0.07	-0.15
ZLC4	-0.10	-0.04	-0.15	0.13	-0.23	-0.09	-0.09
ZLC5	-0.09	-0.03	-0.04	-0.04	0.08	0.10	0.17
GRADECOM	-0.38*	0.20	0.00	0.05	-0.35*	0.50**	0.59**
MEAN	2.05	2.15	13.98	2.38	2.78	2.51	2.70
STDDEV	1.11	2.84	13.67	3.00	3.43	0.74	0.66
N	40.00	40.00	40.00	40.00	40.00	40.00	40.00

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Table 5 continued

NAME	TOTEMAIL	ZTYPEA	ZCOPE1	ZCOPE2	ZCOPE3	ZCOPE4	ZCOPE5	ZCOPE6
NOGRAD	-0.16	0.24	0.06	0.11	0.05	0.01	-0.04	0.01
POS	0.79**	0.06	-0.25	-0.14	-0.16	-0.23	-0.25	-0.18
NEUTRAL	0.98**	0.26	-0.41**	-0.30	-0.32*	-0.36*	-0.37*	-0.35*
NEGATIVE	0.74**	0.21	-0.39*	-0.29	-0.39*	-0.35*	-0.33*	-0.35*
MISUNDER	0.41**	0.24	-0.10	-0.15	-0.20	-0.13	-0.03	-0.16
FACATTM	0.03	-0.19	0.17	0.24	0.16	0.15	0.10	0.22
FACACH2	0.23	-0.14	0.15	0.26	0.16	0.17	0.00	0.17
TOTEMAIL	1.00	0.24	-0.42**	-0.30	-0.33*	-0.37*	-0.38*	-0.36*
ZTYPEA	0.24	1.00	-0.47**	-0.37*	-0.35*	-0.39*	-0.59**	-0.42**
ZCOPE1	-0.42**	-0.47**	1.00	0.91**	0.93**	0.93**	0.82**	0.93**
ZCOPE2	-0.30	-0.37*	0.91**	1.00	0.89**	0.87**	0.66**	0.87**
ZCOPE3	-0.33*	-0.35*	0.93**	0.89**	1.00	0.90**	0.71**	0.94**
ZCOPE4	-0.37*	-0.39*	0.93**	0.87**	0.90**	1.00	0.67**	0.89**
ZCOPE5	-0.38*	-0.59**	0.82**	0.66**	0.71**	0.67**	1.00	0.77**
ZCOPE6	-0.36*	-0.42**	0.93**	0.87**	0.94**	0.89**	0.77**	1.00
ZCOPE7	-0.43*	-0.39*	0.94**	0.85**	0.89**	0.88**	0.75**	0.90**
ZCOPE8	-0.19	-0.29	0.67**	0.61**	0.44**	0.51**	0.56**	0.47**
ZLC1	-0.28	-0.10	0.48**	0.40*	0.52**	0.46**	0.26	0.39*
ZLC2	-0.34*	-0.17	0.52**	0.43**	0.52**	0.49**	0.38*	0.40*
ZLC3	-0.16	-0.36*	0.16	0.14	0.20	0.21	0.23	0.20
ZLC4	-0.10	-0.10	-0.07	-0.02	0.00	-0.05	0.01	0.02
ZLC5	-0.04	-0.05	0.19	0.16	0.27	0.23	-0.02	0.16
GRADECOM	0.04	0.17	-0.13	-0.10	-0.05	-0.14	-0.22	-0.04
MEAN	18.50	-0.70	0.32	0.17	0.23	0.39	0.62	0.15
STDDEV	17.93	0.75	0.85	0.91	0.86	0.78	0.95	0.87
N	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00

Table 5 continued

NAME	ZCOPE7	ZCOPE8	ZLC1	ZLC2	ZLC3	ZLC4	ZLC5	GRADECOM
NOGRAD	0.01	0.29	-0.09	-0.03	-0.29	-0.10	-0.09	-0.38*
POS	-0.32*	-0.20	-0.22	-0.29	-0.07	-0.04	-0.03	0.20
NEUTRAL	-0.42**	-0.18	-0.24	-0.30	-0.17	-0.15	-0.04	0.00
NEGATIVE	-0.36*	-0.11	-0.37*	-0.43**	-0.12	0.13	-0.04	0.05
MISUNDER	-0.16	0.19	-0.05	-0.09	-0.28	-0.23	0.08	-0.35
FACATTM	0.11	0.07	0.10	-0.09	-0.07	-0.09	0.10	0.50**
FACACH2	0.11	0.09	0.08	-0.13	-0.15	-0.09	0.17	0.59**
TOTEMAIL	-0.43**	-0.19	-0.28	-0.34*	-0.16	-0.10	-0.04	0.04
ZTYPEA	-0.39*	-0.29	-0.10	-0.17	-0.36*	-0.10	-0.05	0.17
ZCOPE1	0.94**	0.67**	0.48**	0.52**	0.16	-0.07	0.19	-0.13
ZCOPE2	0.85**	0.61**	0.40*	0.43**	0.14	-0.02	0.16	-0.10
ZCOPE3	0.89**	0.44**	0.52**	0.52**	0.20	0.00	0.27	-0.05
ZCOPE4	0.88**	0.51**	0.46**	0.49**	0.21	-0.05	0.23	-0.14
ZCOPE5	0.75**	0.56**	0.26	0.38*	0.23	0.01	-0.02	-0.22
ZCOPE6	0.90**	0.47**	0.39*	0.40*	0.20	0.02	0.16	-0.04
ZCOPE7	1.00	0.57**	0.41**	0.45**	0.18	0.02	0.15	-0.11
ZCOPE8	0.57**	1.00	0.08	0.18	-0.17	-0.21	-0.12	-0.15
ZLC1	0.41**	0.08	1.00	0.84**	-0.02	-0.33*	0.76**	-0.01
ZLC2	0.45**	0.18	0.84**	1.00	0.10	-0.35*	0.40*	-0.20
ZLC3	0.18	-0.17	-0.02	0.10	1.00	0.13	-0.10	-0.25
ZLC4	0.02	-0.21	-0.33*	-0.35*	0.13	1.00	-0.19	-0.13
ZLC5	0.15	-0.12	0.76**	0.40*	-0.10	-0.19	1.00	0.08
GRADECOM	-0.11	-0.15	-0.01	-0.20	-0.25	-0.13	0.08	1.00
MEAN	0.36	0.05	-0.20	-0.23	0.45	0.41	-0.87	9.98
STDDEV	0.86	0.96	0.84	0.96	0.83	0.63	0.75	3.17
N	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00

Note. NOGRAD = number of gradings; POS = number of positive E-mail postings;

NEUTRAL = number of neutral E-mail postings; NEGATIVE = number of negative E-

mail postings; MISUNDER = number of E-mail postings exhibiting misunderstandings;

FACATTM = faculty composite evaluation of student attitude; FACACH2 = faculty

composite evaluation of student achievement; TOTEMAIL = number of total E-mail

messages posted by the student; ZTYPEA = *z*-score of Type A Personality; ZCOPE1 = *z*-

score for General Coping; ; ZCOPE2 = *z*-score for Coping Skills: Reactivity to Stress;

ZCOPE3 = *z*-score for Coping Skills: Ability to Assess the Situation; ZCOPE4 = *z*-score

for Coping Skills: Self Reliance; ZCOPE5 = *z*-score for Coping Skills: Resourcefulness;

ZCOPE6 = *z*-score for Coping Skills: Adaptability and Flexibility; ZCOPE7 = *z*-score for

Coping Skills: Proactive Attitude; ZCOPE8 = *z*-score for Coping Skills: Ability to Relax;

ZLC1 = *z*-score for Locus of Control: General (internal vs. external); ZLC2 = *z*-score for

Locus of Control: Success Attribution (external vs. internal); ZLC3 = *z*-score for Locus

of Control: Success Attribution (stable vs. unstable); ZLC4 = *z*-score for Locus of

Control: Failure Attribution (unstable vs. stable); ZLC5 = *z*-score for Locus of Control:

Failure Attribution (external vs. internal); GRADECOM = Grade Composite.

Table 6.

Model of Total Email and General Traits : Type A, General Locus of Control, and

General Coping Skills.

Equation	Variable	B	$SE\ B$	β	R^2
1					.374
	Type A	-.521**	.149	-.451**	
	Locus of Control	.392**	.133	.379**	
2					.188
	Coping Skills	-8.935**	2.977	-.433**	

** *p* < .01

Table 7.

Model of Neutral Email and Traits with Subscales: Locus of Control (Success Attribution – Stable/Unstable), Type A Personality, Locus of Control (Success Attribution – Internal/External). Coping Skills (Proactive Ability), and Misunderstandings.

Equation	Variable	B	$SE\ B$	β	R^2
1					.132
	Locus – Success (Stable/unstable)	-.331*	.136	-.364*	
2					.278
	Type A	-.432**	.165	-.366*	
	Locus (Success/ Internal/External)	.306*	.129	.331*	
3					.336
	Coping (Proactive)	-5.563*	2.067	-.362*	
	Misunderstanding	1.551**	.537	.389**	

*$p < .05$

**$p < .01$

Table 8.

Model of Positive Email and Traits with Subscales: Locus of Control (Success Attribution

– Stable/Unstable), Type A Personality, Locus of Control (Success Attribution –

Internal/External), Coping Skills (Proactive Ability), and Misunderstandings.

Equation	Variable	B	SE B	β	R^2
1					.278
	Type A	-.432**	.165	-.366*	
	Locus (Success/ Internal/External)	.306*	.129	.331*	
2					.113
	Coping (Proactive)	-1.071*	.481	-.336*	

*p < .05

**p < .01

Table 9.

Model of Negative and Traits with Subscales: Type A, Locus of Control (Success

Attribution, Internal/External), and Coping Skills (Ability to Assess the Situation).

Equation	Variable	B	SE B	β	R²
1					.317
	Type A	-.352*	.155	-.307*	
	Locus (Success Attribution)	.385**	.121	.429**	
2					.159
	Coping (Assess Situation)	-1.388**	.510	-.399**	

*p < .05

**p < .01

Table 10.

Achievement and Its Predictors Model 1: Misunderstandings, Number of Gradings,

Grade Composite, Overall Attitude, and Overall Achievement.

Equation	Variable	B	$SE\ B$	β	R^2
1					.113
	Misunderstandings	.113*	.050	-.337*	
2					.201
	Number of Gradings	-.136**	.431	-.449**	
3					.345
	Number of Gradings	-.140	.096	-.210	
	Grade Composite	.101	.032	.462	
4					.683
	Overall Attitude	.574	.090	.660	
	Grade Composite	.045	.019	.247	

*p < .05

**p < .01

Table 11.

Achievement and Its Predictors Model 2: Misunderstandings, Number of Gradings,

Grade Composite, Overall Attitude, and Overall Achievement.

Equation	Variable	B	$SE\ B$	β	R^2
1					.113
	Misunderstandings	.113*	.050	-.337*	
2					.201
	Number of Gradings	-.136**	.431	-.449**	
3					.326
	Grade Composite	.121**	.026	.571**	
4					.683
	Overall Attitude	.574	.090	.660	
	Grade Composite	.045	.019	.247	

*p < .05

**p < .01

Table 12.

Direct Effects, Indirect Effects, and Total Effects for Model of Total Listserv Postings.

Variable	Direct Effect	Indirect Effect	Total Effect
Type A	0	.208	.208
Locus of Control	0	-.164	-.164
Coping	-.433	0	0

Table 13.

Direct Effects, Indirect Effects, and Total Effects for Model of Neutral Listserv Postings.

Variable	Direct Effect	Indirect Effect	Total Effect
Locus of Control: Success (Unstable/Stable)	0	-.048	-.048
Type A	0	.132	.132
Locus of Control: Success (External vs Internal)	0	-.12	-.12
Coping: Proactive Attitude	-.362	0	-.362
Misunderstandings	.389	0	.389

Table 14.

Direct Effects, Indirect Effects, and Total Effects for Model of Positive Listserv Postings.

Variable	Direct Effect	Indirect Effect	Total Effect
Type A	0	.122	.122
Locus of Control: Success (External vs. Internal)	0	-.171	-.171
Coping: Proactive Attitude	-.336	0	-.336

Table 15.

Direct Effects, Indirect Effects, and Total Effects for Model of Negative Listserv Postings.

Variable	Direct Effect	Indirect Effect	Total Effect
Type A	0	.122	.122
Locus of Control: Success (External vs Internal)	0	-.171	-.171
Coping: Ability to Assess Situation	-.399	0	-.399

Table 16.

Direct Effects, Indirect Effects, and Total Effects for Model 1 of Achievement

Variable	Direct Effect	Indirect Effect	Total Effect
Misunderstandings	0	-.05	-.05
Number of Gradings	0	-.38	-.38
Grade Composite	.225	.305	.530
Overall Attitude	.660	0	.660

Table 17.

Direct Effects, Indirect Effects, and Total Effects for Model 2 of Achievement

Variable	Direct Effect	Indirect Effect	Total Effect
Misunderstandings	0	-.09	-.09
Number of Gradings	0	-.280	-.280
Grade Composite	.247	.377	.624
Overall Attitude	.660	0	.660

Figure Captions

Figure 1. Histogram of scores ITMA Type A construct. Scores were standardized using QueenDom population norms. On the average, the ITMA group exhibited less Type A and more Type B traits than the general population.

Figure 2. ITMA students tended to have external Locus of Control, although a couple of students scored very highly on the instrument, throwing the ITMA mean toward the population mean.

Figure 3. ITMA students had higher scores on Coping Skills than the norming population. Still, one-fourth of the ITMA students scored below the normed mean. Eighteen percent of the variance in number of E-mail messages was due to student's Coping Skills. Analysis of the regression equation for the general coping model indicated that, for every 1 unit increase in these students' Coping Skills (Coping Skills are calculated as a z-score), total E-mail volume would decrease by 8.95 messages.

Figure 4. Ability to Assess the Situation.

Figure 5. Proactive Attitude.

Figure 6. Locus of Control.

Figure 7. Path Model of ITMA Total Listserv E-mail Postings. Equation 1 predictors of General Coping Skills were Type A Personality and Locus of Control. R^2

$_{\text{Equation 1}}=.374$. Equation 2 predictor of Total Listserv E-mail Postings was Coping Skills,

$R^2_{\text{Equation 2}}= .188$.

Figure 8. Path Model of ITMA Neutral Listserv E-mail Postings. Equation 1

predictor of Type A Personality was Locus of Control: Stable/Unstable $R^2_{\text{Equation 1}}=.132$.

Equation 2 predictors of Coping Skills: Proactive Attitude were Type A Personality and

Locus of Control (Success Attribution: External/Internal), $R^2_{\text{Equation 2}}=.278$. Equation 3

predictors of Neutral E-mail were Coping Skills: Proactive Attitude and

Misunderstandings, $R^2_{\text{Equation 3}}= .336$.

Figure 9. Path Model of Positive Listserv E-mail Messages. Equation 1 predictors

of Coping Skills: Proactive Attitude were Type A Personality and Locus of Control

(Success Attribution: External/Internal), $R^2_{\text{Equation 1}}=.278$. Equation 2 predictor of Positive

E-mail was Coping Skills: Proactive Attitude, $R^2_{\text{Equation 2}}= .113$.

Figure 10. Path Model of ITMA Negative Listserv E-mail Postings. Equation 1

predictors of Coping Skills: Ability to Assess the Situation were Type A Personality and

Locus of Control (Success Attribution: External/Internal), $R^2_{\text{Equation 1}}=.317$. Equation 2

predictor of Negative E-mail was Coping Skills: Ability to Assess the Situation, $R^2_{\text{Equation 2}}= .159$.
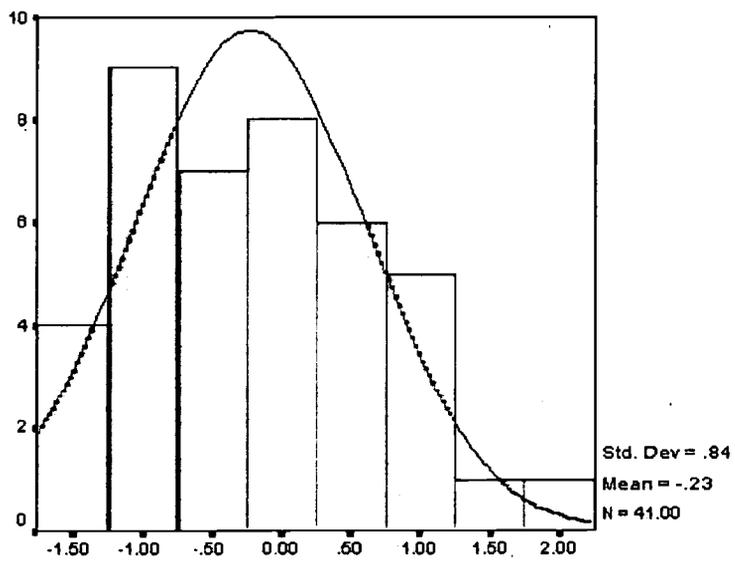
Figure 11. Achievement and Its Predictors: Model 1. Equation 1 predictor of

Number of Gradings was Misunderstandings, $R^2_{\text{Equation 1}}=.113$. Equation 2 predictor of

Grade Composite was Number of Gradings, $R^2_{Equation\ 2}$=.201. Equation 3 predictors of

Overall Attitude were Number of Gradings and Grade Composite, $R^2_{Equation\ 3}$= .345.

Equation 4 predictors of Academic Achievement were Overall Attitude and Grade
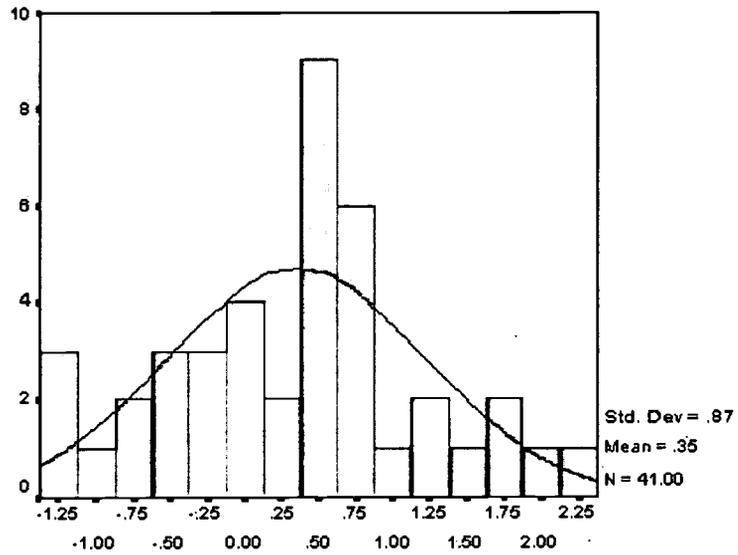
Composite, $R^2_{Equation\ 4}$= .683.

Figure 12. Achievement and Its Predictors: Model 2. Model 2 was a revision of

Model 1, with Number of Gradings removed from equation 3 of Model 2. Equation 1

predictor of Number of Gradings was Misunderstandings , $R^2_{Equation\ 1}$=.113. Equation 2

predictor of Grade Composite was Number of Gradings, $R^2_{Equation\ 2}$=.201. Equation 3

predictor of Overall Attitude was Grade Composite, $R^2_{Equation\ 3}$= .326. Equation 4

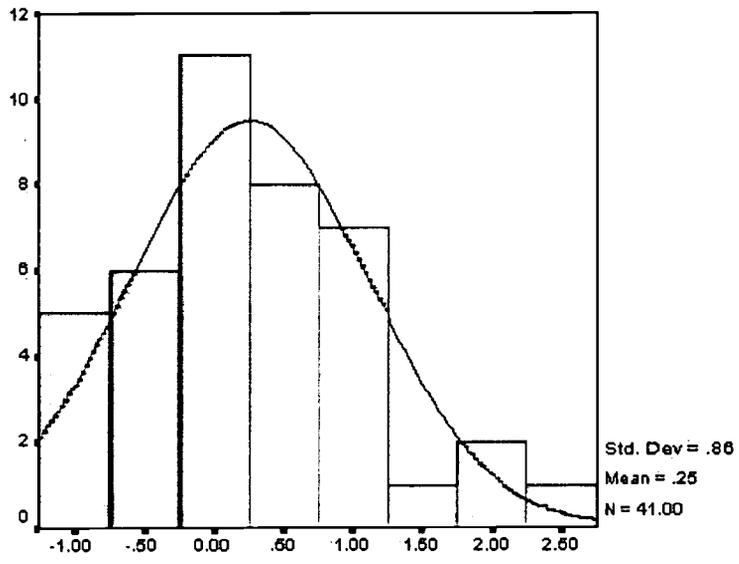predictors of Academic Achievement were Overall Attitude and Grade Composite, R^2

$_{Equation\ 4}$= .683
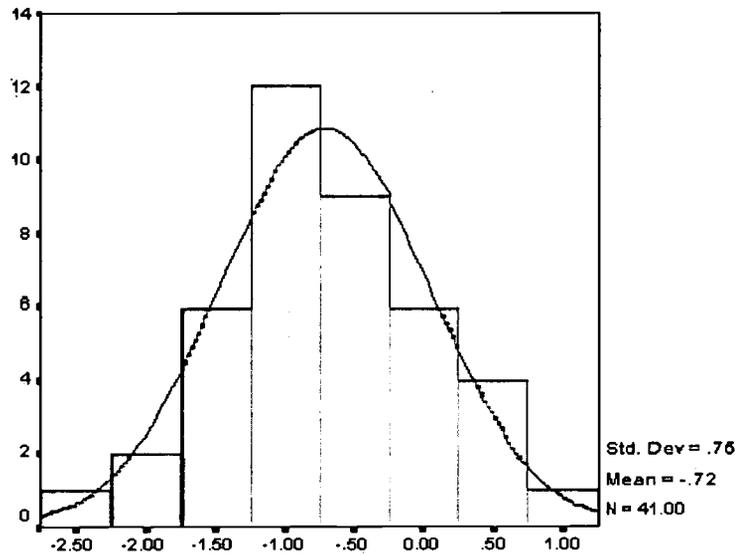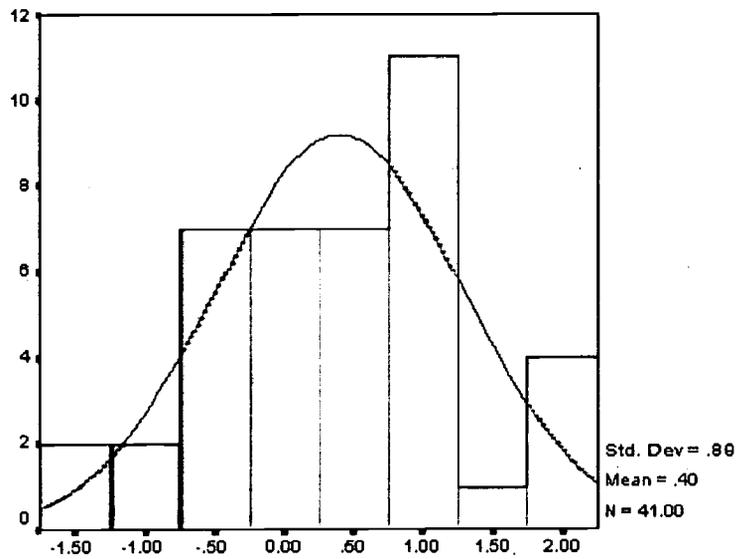
Z score for Type A - according to Queendom Parameters
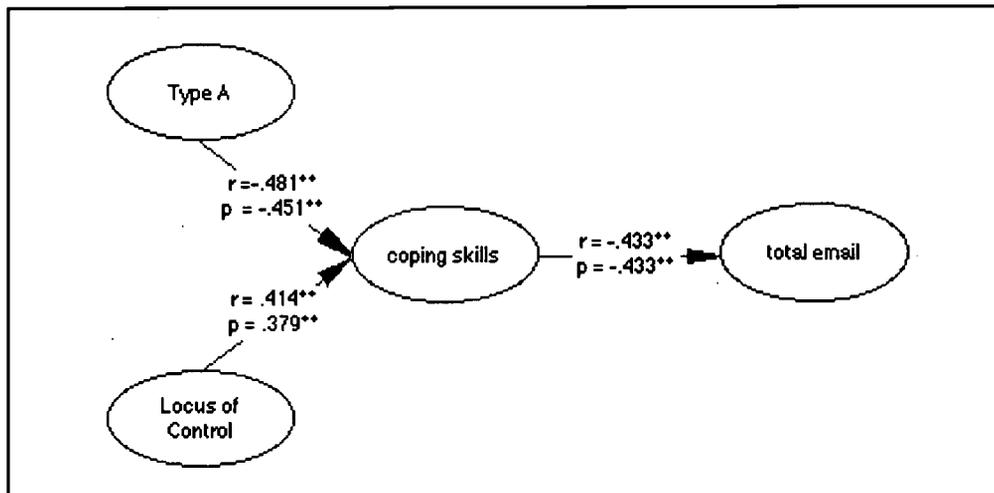
zlc1-locus general: external (-) vs internal (+)

Std. Dev = .84
Mean = -.23
N = 41.00

zc1-general cope

Std. Dev = .87
Mean = .35
N = 41.00

Std. Dev = .86
Mean = .25
N = 41.00

zc3-ability to assess situation

zc7 - proactive attitude

Type A

r = -.481**
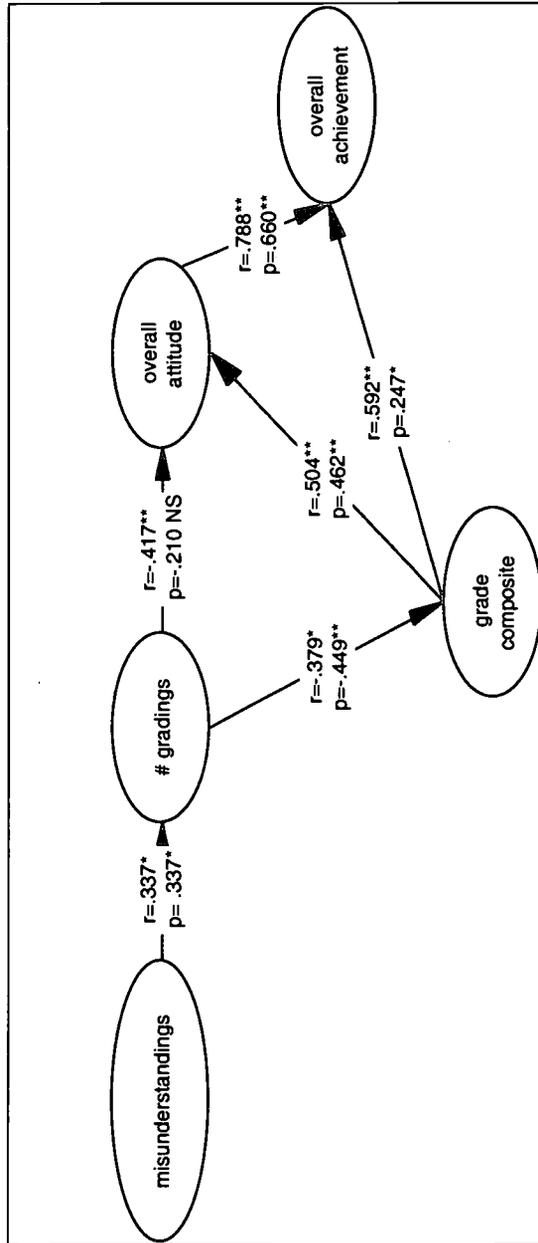p = -.451**

coping skills

r = -.433**
p = -.433**

total email

r = .414**
p = .379**

Locus of
Control

Type A

r = -.413**
p = -.366*

coping skills-
proactive

r = -.336*
p = -.336*

positive email

r = -.384*
p = .331*

L of C-
Success
attrib(ext/int)

Type A

r = -.369*
p = -.307*

coping skills -
assess
situation

r = -.396*
p = -.399*

negative
email

r = .474**
p = .429**

L of C-
Success
attrib(ext/int)

70

misunderstandings

r=.337*
p=.337*

gradings

r=-.417**
p=-.210 NS

overall
attitude

r=.788**
p=.660**

overall
achievement

r=.504**
p=-.462**

r=-.379*
p=-.449**

r=.592**
p=.247*

grade
composite

misunderstandings

r=.337*
p=.337*

gradings

r=-.379*
p=-.449**

grade
composite

r=.504**
p=.571**

overall
attitude

r=.788**
p=.660**

overall
achievement

r=.592**
p=.247*

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