

The Accounting Education Change Assessment Process: A Research Report

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Abstract

This paper reports on the assessment of educational outcomes at one of the original twelve schools to receive an Accounting Education Change Commission (AECC) grant. The funded proposal, by the accounting area at the Rutgers Graduate School of Management, called for curriculum and teaching revisions. The changes included modularization of the curriculum, creation of an intensive learning atmosphere to encourage socialization to professional values, and intensive efforts to promote the use of the computer, communication assignments, and research work throughout the curriculum. These were intended to foster higher student technical skills (e.g., computer, research, and writing skills) and values (ethics, commitment to life-long learning, and a positive view of business).

A pre- and post- experimental design was used. Exit data alone were collected from the last, pre-curriculum revision class. Both entry and exit data were collected from the four classes that entered the Rutgers Professional Accounting MBA program (PAMBA) after the curriculum and teaching changes began to be phased in during the Summer of 1992. The survey instrument consisted of some previously published instruments and some created for use in this study. With respect to the four change classes, the results showed that self-reported thinking, financial, communication, and computer skills improved significantly among the classes that benefited from the curriculum and teaching revisions. Scores on the value measures either did not change, or declined. Overall satisfaction with the Rutgers PAMBA program was significantly higher among the classes that benefited from the AECC-funded project than among the students from the last class before the AECC-funded curriculum and teaching changes were implemented. Two of the exit value measures and two of the exit skill measures were also higher for the four change classes collectively than for the last non-change class. On balance, it seems that the Rutgers change effort succeeded. [Key Words: AECC, professional socialization, accounting education, longitudinal research, and educational assessment]

Introduction

This study examines the effectiveness of curriculum changes initiated by a university program to achieve Accounting Education Change Commission (AECC) objectives. The effectiveness of accounting education reform is important to the accounting profession, firms,

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practitioners, and educators. All have continuing concern about the quality of the education that potential new entrants to the accounting profession receive. Such concern is reflected in reports such as the American Accounting Association's (1986) "Future Accounting Education" and Arthur Andersen et al. (1989). These questioned the ability of the accounting education establishment to provide accounting students with proper technical skills and imbue them simultaneously with the ethical values important to the profession and the public at large. Accounting educators are frequently accused of providing rote learning and dry memorization of techniques (e.g., Mayer-Sommer 1990). Further, the accounting education process is often criticized for under-emphasizing communication, computer, and critical thinking skills (e.g., Nikolai 1996).

A major outgrowth of these criticisms, specifically of the 'Perspectives' report, was the establishment of the Accounting Education Change Commission. This commission, funded by grants from the Big 6 auditing firms, provided funds to schools throughout the country willing to re-design their curricula and teaching process to foster the objectives of the AECC (AECC 1990). This paper reports the results of one such experience with the redesign of the curriculum.

Specifically, we report on the achievements of one of the twelve grantee schools, Rutgers University, in its attempts to instill technical skills and values in their graduate accounting students. The creators of the Rutgers accounting education change effort gave that effort the acronym GRAECE, standing for the Graduate Rutgers Accounting Education Change Effort.

The GRAECE Objective

The GRAECE proposal argued that success in producing an accounting professional rested on producing an accounting student with both high ethical and other values, as well as technical skills. A student with high values but low technical skills could be seen as nice but incompetent. A student with high technical skills and low values could be seen as smart but sleazy. The GRAECE effort, therefore, argued that its combination of professional socialization attempts and skill inculcation would result in creating a highly desirable professional. Table 1 lists the attitudes and skills that the GRAECE effort sought to encourage. The rationale for choosing these attitudes and skills is described briefly here. The target attitudes of the GRAECE program are consistent with the recommendations for educational change of the American Accounting Association (1986), Arthur Andersen et al. (1989), and the Accounting Education Change Commission (1990).

Positive view of business

Most PAMBA students were non-business undergraduates. It was felt that they should be socialized to a positive view of business in order to facilitate their entry into the corporate world. Alternate views of business, e.g., a realistic view of business, lack clear definition and are subject to 'in the eye of the beholder' type distortions.

Life-long Learning

An emphasis on developing life-long learning attitudes was considered important because the level of technical challenge that the PAMBA graduates would face would change with (a) changes in the business environment, and (b) the graduates' progress through different career stages. Thus encouraging an attitude favorable to life-long learning would encourage the students to keep developing the required skills that they would need as their careers progressed.

International Skills

The emphasis in the restructured curriculum on international skills stemmed from the growing awareness of the strong connections of the U.S. economy with the rest of the globe. These strong interconnections argued that the accounting professional should be well aware of the importance of becoming aware of the cultural and religious differences that, potentially, separate his/her own understanding of the world from that held by his/her clients.

Service

Service was chosen because the Rutgers PAMBA advisory board had found this quality to be lacking in accounting students. Various sociologists of the professions (e.g., Begun, 1986) have long argued that there is an implicit bargain between society and the professions. In this bargain, the professions discipline their members and socialize them into an attitude of service towards society in exchange for the profession's right to self-regulate themselves.

Quality

The choice of quality as a value target arose from the need to motivate future accounting professionals to meet the needs of their clients by producing a quality product. At the time that the GRAECE proposal was written, there was a great deal of discussion in the popular and business press about the Japanese philosophy of producing quality products.

Ethics

Ethics was chosen as a target of attitude development due to the perceived weaknesses that accounting and business students were felt to have in this area. Various writers (e.g., Loeb, 1988; Bollom, 1988) argued that it was important for accounting education to contain an explicit ethical focus.

The various skills that the GRAECE proposal argued should be developed further by the curriculum changes are discussed next.

Financial Skills

Accounting is a financial discipline. The Rutgers faculty were interested in fostering the further development of financial skills in the students passing through the program.

Communication Skills. Accounting students have long been said to lack competent verbal and written communication skills. Members of the GRAECE advisory board also commented on the inability of accounting students to prepare good oral presentations or written reports. Given the importance of communication in selling ideas and promoting productive discussion, communication was viewed as an important skill to promote.

Computer Skills. Computers have had a pervasive impact on the professional life of accountants. Accordingly, it was felt that the students should be trained to use a variety of computer packages competently.

Research Skills. Being able to perform various kinds of research was considered important. The AAA (1986) also argued for the importance of such skills as performing literature surveys, designing and implementing surveys, and analyzing the results from such surveys.

Group Skills. Various writers (Solomon, 1987) have stated that much audit work is performed in team settings. Given this, the GRAECE proposal deemed it very important to develop the students' ability to work in groups.

Integrative ability. Integrative ability was considered an important skill to develop because the private or public accountant had to have the ability to master issues from a wide variety of fields. Some of these might be fields in which he/she had no initial competence. As a higher order skill, it would provide the new accounting professional with a mental set of skills that would serve him/her well in a variety of professional settings, while dealing with a variety of problems.

Statistical/Mathematical Skills. The GRAECE's emphasis on further developing students' statistical/ mathematical skills stemmed from the authors' perception that the students must have these skills in order to perform audit sampling, regression analysis (e.g., for use in cost estimation), and the like.

GRAECE Curriculum Reforms

The GRAECE's proposed curriculum reforms included modularization of the curriculum, increased reliance on 'classrooms of the future', interdisciplinary teaching, and a comprehensive socialization effort. One example of modularization is as follows. Leasing, as a topic, encompasses various sub-topics, some of which might be taught in a tax course, some parts in an economics course, leasing entries in an accounting course, and other elements in a project management course. The GRAECE proposal stated that the different decision modules would be brought together into one coherent case, taught by one instructor or by a team of instructors who coordinated their coverage. For example, the economic base of leasing might be taught first, followed by lease accounting, tax considerations, and project decisions involving leases.

The 'classroom of the future' part of the GRAECE proposal can be described as follows. Complementary teachers and student computer platforms would be developed. These platforms were to be linked using networking and/or server technologies. The teaching platform would include various databases, educational software tools, test banks, storage of teaching materials, and methods to monitor and test student

performance. The student platform was to be limited to a subset of the software and databases available to the faculty member.

Teaching efforts moved away from the usual lecture format to one involving group work, cases, and presentation skills. Course materials and plans were shared to promote integration of concepts across course offerings. Part of this integration effort rested on maintaining excellent communication with, and obtaining cooperation from, other departments at the Graduate School of Management. Such cooperation was needed in order to help assure that these other departments would make available to the PAMBA, faculty who were experienced with, and interested in, cooperating with the curriculum integration aspects of the GRAECE effort.

Various attempts were made to implement and achieve the program's specific value inculcation and technical skills training objectives. Table 2 presents a description of the efforts that were made throughout the GRAECE implementation effort to achieve the GRAECE proposal's objectives.

How was implementation managed?¹ Many of the curriculum changes were phased in. Co-ordination of the curriculum reform efforts were undertaken through frequent meetings of the faculty that taught in the Professional Accounting MBA program. With respect to values, Schlosser (1997) notes that the Rutgers faculty were encouraged to re-orient their teaching toward a values orientation via a series of weekly meetings. In those meetings, he states, all the attitudes were discussed, with the faculty resolving to structure their course materials and presentations so as to promote each attitude. These meetings also served to aid in monitoring of the program's operations. The program director's conversations with the students about their reactions to the program and implementation efforts provided immediate feedback to the faculty about student perceptions of the change effort.

As would be expected, many of the same individuals who designed the GRAECE effort taught in the program. Faculty who were not involved in the program's development were oriented to its objectives and requirements through the frequent meetings. The sharing of course plans and lecture notes, the frequent meetings, and the obvious excitement and sense of challenge that comes along with the implementation of a major curriculum revision effort also helped promote faculty adherence to the program's goals and enactment of required behaviors.

The GRAECE proposal called for an assessment of the outcomes of the Rutgers change project. This paper reviews the GRAECE assessment efforts from their inception in July of 1992 to their completion in July of 1996. One outcome of this effort, when combined with reviews of outcomes at the other 11 grantee schools, should be a much better understanding of how to revamp the process of imparting accounting knowledge so

¹ These comments are based on the author's interviews with various faculty (retired and still employed at Rutgers) who were involved in either the design or implementation of the GRAECE program, or both design and implementation.

that the desired educational outcomes will be achieved.² (We could not find any other published information on the assessment efforts at the other schools.) Doyle Williams, the former head of the AECC, wrote recently that dissemination of such information is important in that it assists other schools in their own curriculum revision efforts (Williams 1996). The research reported here assists in that important effort.

Next, we review the research design and the rationale for it. Then the data collection effort is described. Subsequently, the study's results are presented. Finally, the conclusions and implications of this effort are given.

Methodology

Research Design

Outcomes were assessed using a longitudinal pre/post study of the progress of the professional accounting students. This design is sensitive to change and can control for personal characteristics that might affect student receptivity to the change curriculum (Kerlinger 1986; Hill, Perry & Stein, 1998). Note that this type of design is used in many types of studies of accounting curriculum effectiveness (e.g., Gordon, 1998). We collected pre- and post- data on several successive classes of students who entered and left the Rutgers Professional Accounting MBA Program (PAMBA). The affected student groups entered in the Summers of 1992, 1993, 1994, and 1995, leaving respectively in the Summers of 1993, 1994, 1995, and 1996. All of these classes were affected directly by the GRAECE effort and are labeled the 'change' classes or groups. Collecting data on successive student groups allows us to examine whether the effects of the phased-in change program strengthen over time. All entry and exit data were collected during class meeting times. While we also collected exit data on the last non-change (non-AECC effort) group, these data were of limited usefulness since we lack comparison entry data. The last non-change class entered in the summer of 1991 and left in the summer of 1992. In order to implement the pre- and post- test design, we had to collect identifying information on the students. All students were told that (a) participation was strictly voluntary and (b) that their responses would be held in strictest confidence.

² Note, however, that this effort does not directly assess the student's acquisition of course content. Testing content acquisition was considered to be the domain of the faculty who taught the content. Content is rarely assessed other than by the teaching faculty because (a) the published content assessment instruments (e.g., the AICPA Core Curriculum Assessment Program) are expensive, and (b) may not reflect the educational emphases actually present in the program to be assessed. Since the teaching faculty are the experts on what was actually taught, it was deemed most appropriate to have them conduct their own assessment of student knowledge acquisition through the grading process. Accordingly, this effort, like many outcomes assessment efforts in academia (see Gainen & Locatelli 1995), is intended to assess student self-ratings of themselves on the relevant skill and value domains. Hill, Perry and Stein (1998) also support the usefulness of outcomes assessment surveys in evaluating student response to accounting curricula. They state (p. 74) that "As accounting education stands on the brink of, perhaps, dramatic change, results of this type of assessment can provide a useful perspective by which academic reform efforts can be assessed. As changes in accounting education curriculum are made, students' perceptions of existing accounting programs can be compared to students' perceptions of reformed programs. In this manner, improvements or fine tuning of educational reform will be better guided."

Given that the purpose of the GRAECE changes was to enhance the students' capabilities *in their professional careers*, we also collected data on the PAMBA students' post-graduation satisfaction with (a) progress in their career, (b) the work, (c) their employer, and (d) their retrospective satisfaction with the Rutgers Professional Accounting program. This information will be reported elsewhere. We also attempted to collect data on students in the general (non-accounting emphasis) MBA program at the Rutgers Graduate School of Management. These students go through the program in a much different manner than do PAMBA students. For example, the PAMBA students are admitted as a group in June of each year and graduate fourteen months later, in August of the succeeding year. Their course work, and the educational experiences that they have, is roughly identical. In contrast, the general MBA students encountered may or may not have started the general MBA program at the same time as others in the group. They typically take a variety of electives, as well as pursue different majors. More critical, however, is that they frequently switch from full-time to part-time matriculation in the general MBA program so that they can take part-time or full-time employment. Many general MBA students also cease matriculation for a semester or two for employment-related reasons. Given the above, it is understandable why the typical general MBA student at Rutgers takes two or more years to complete the MBA program. The difference in patterns of general MBA student progress through the curriculum forced us to rely on mailed questionnaires to collect exit data on these students. We were able to collect pre- and post- data on only 26 General MBA students, giving us a response rate of 36% (26 responses from 72 responses sought). The 72 responses represented all the students in the general MBA classes that answered our initial, in-class survey. This response rate was far below the 80 to 90% response rate that Kerlinger (1986) says the researcher should strive to achieve in mail surveys. It is also much lower than the 50 to 60% response rate that Kerlinger says that the survey researcher must "content himself with" (see p. 380).

Typically, after each questionnaire mailing, only two or three responses would come in. The researchers then called the non-responders repeatedly in order to generate further responses. Letters asking for the students to respond were mailed. Also, new sets of questionnaires were mailed out to the non-respondent group. Thus we have two problems with reporting the general MBA information. The first is that their progress through the general MBA program was significantly different than the progress of the accounting students through the PAMBA program. These differences suggest that any comparison between the general MBA students' initial scores and exit scores would be subject to multiple interpretations. For example, the differences between such pre-and post-test scores may be due to the general MBA students non-academic experiences, maturation, or effects of the general MBA program itself. Second, the extensive efforts that we had to make to generate the limited response achieved may have affected the data in unknown ways. For example, the general MBA students may have responded to the exit questionnaire with positive responses to the general MBA program in order to (a) please the researchers because the students felt guilty for not responding earlier, or (b) displease the researchers by providing false data. Why false data? Out of anger at the researcher for repeatedly seeking a response to the exit questionnaire. The same analysis could be made of any student negative responses. As Parten (cited in Kerlinger, 1986, p. 380)

says, "Most mail questionnaires bring so few returns, and these from such a highly selected population, that the findings of such surveys are almost invariably open to question." Thus we do not trust the data enough to report it here.³

Table 3 provides descriptive information (means, standard deviations) on the sample. This information is broken down by both class and gender. The provided information includes respondent age, Graduate Management Achievement Test (GMAT) score, the number of job interviews attended, and the number of job offers received.

Description of the Key Instrument

A broad array of attitudinal, skill, and capability measures were used in this study. The choice of research targets was governed by the GRAECE proposal. Where possible, preference was given to using standardized instruments with known reliability, validity, and norming groups comparable to our student body. A major source of instruments has been the research literature on accountants and accounting students. When appropriate or acceptable instruments were not found, we constructed our own measures. Doing this was problematic since it meant that we could learn about the measures' characteristics only as they were used. In that respect, the emphasis was on developing items with appropriate content. This problem arose because of the restricted time frame within which this research effort was developed. Thus extensive pre-testing and analysis of the items was impossible.

All questionnaire items were appropriate in that none of them asked the student respondents to assess any element of the educational process or setting that are typically regarded as beyond their sphere of knowledge. Green, Calderon and Reider (1998, pp. 16-17) state, for example, that "There is a broad consensus that students cannot effectively respond to SE (student evaluation-author) items that require them to make judgments, generalizations or inferences that are beyond their knowledge and experience..." Such judgments include sufficiency and currency of course content, the appropriateness of course objectives and the appropriateness of the technology used in the course.

Value and Skill Measures

Several attitude and skill scales were used. Table 4 provides a brief description of each attribute to be measured and the measuring instrument chosen. The items in Table 4 are presented in the same order as the data analyses that follow this section. Following Table 4 is a detailed description of alternate measures that were used to measure critical thinking skills and writing ability.

Integrative Ability

Table 4 refers to the need to develop critical thinking skills amongst PAMBA students. The need to develop critical thinking skills among college students was a very

³ We did calculate the general MBA students' overall satisfaction with their MBA program, however. The average response was 4.97 (standard deviation equaled 1.26), on a 7 point Likert scale. Higher scores imply higher reported satisfaction.

popular topic during the 1980's (e.g., Chamberlain et al. 1991; AAA 1986; Mayer-Sommer 1990). These skills are important as tools of discovery and analysis that enable their possessor to master new problems as they arise. Table 4 describes one of the two ways that we sought to measure the success of the GRAECE program in developing critical thinking skills. For two of the PAMBA classes, we also used an alternate measure. This section describes that alternate instrument and the reason why we used it as a pre- and post- measure in only two of the four PAMBA Change classes.

Selection of instrument

The best way to assess the ability of students to think like accountants is to use a well-validated, accounting-context based, measure of critical thinking skills. This would be a more sensitive measure of student development than the general (i.e., non-specific to the accounting domain) critical thinking tests available (e.g., Baird 1989, Gainen & Locatelli 1995). Unfortunately, no such measure exists within the accounting field (e.g., Rebele et al., 1991; Mayer-Sommer 1990; Herring et al., 1989). Lacking such an instrument, our options were limited to (a) general tools for assessing critical thinking skills, and (b) creating a self-report measure as detailed in Table 4. To choose a general critical thinking skills instrument, we reviewed all articles on critical thinking in the Tenth Mental Measurement Yearbook for 1989. The most highly praised such instrument was the Watson-Glaser Critical Thinking Appraisal Test (see Austin 1989; Berger 1989). It was also the most widely used (Baird 1989). Given these qualities, it was chosen. The Watson-Glaser test sees critical thinking as being composed of five separate abilities. These are the ability to make correct inferences, identify assumptions, correct deductions, correct evaluations, and correct interpretations.

The Watson-Glaser test has certain deficiencies. First, it was developed for high school and college populations. MBA or other graduate students, therefore, might score toward the high end of the eighty point scale, leading to both ceiling effects and, perhaps, a regression to the mean type phenomenon on the post-test. The nature of the test items might lead MBA students to not take the exam seriously. Also, such tests have moderate to strong correlations with intelligence tests, and since adult intelligence tends to be stable, the probability of finding an effect is diminished (Baird 1989). As noted above, as a general test, it lacks content validity with respect to the accounting domain. A final deficiency lay in the time it took to administer the exam. The Watson-Glaser required a maximum of 45 minutes to complete, plus set up time. Therefore it consumed much of the available assessment time. Given the doubts expressed to the GRAECE program management and this author, we ultimately decided to use it as a validity check of sorts on the outcomes of the self-assessment measure. Thus we used it during the second (1993-1994) and third (1994-1995) PAMBA change classes.

Writing Proficiency

Writing proficiency was also to have been assessed in two ways. The first way was through self-assessment items on the questionnaire (see Table 4). The second method was through a gradable writing sample. A section of the NJ Basic Skills test was used for this purpose. Since the attitude questionnaire and the Watson-Glaser test took up to one

and one-half hours to complete, we were forced to ask the students to complete the writing samples off-site and return them to us. This procedure cost us experimental control and led to such a poor response rate that the writing sample was dropped from the assessment plan.

Data Analysis

Overview

The data analysis proceeded in stages. All questions were recoded so that higher scores meant higher possession of each quality/skill/value. Factor analysis was then used to analyze individual scale properties at entrance and exit. This information was used to refine the measures. These data were subjected to analysis of variance (ANOVA) using a repeated measure design. In doing so, we blocked on gender and year of entrance/exit from the program. We first discuss the factor analysis and how it was used to create the entrance and exit measures. Second, we discuss the results of the ANOVAs. *Factor Analysis*

The scale properties of the items were determined by factor analyzing the *prima facie* items used in the questionnaire. Principal components analysis with a varimax rotation was used. After determining which individual items grouped in such a way as to create a meaningful measure, we created a simple average of the items that loaded on each scale. We used a simple average of student responses to each measure (rather than factor scores or scale items weighted by factor loadings) because we believed that score to best capture the items as perceived by the respondents. Moreover, the differences in the factor loadings of the items used were minimal. Thus the results would not have differed much had factor loadings been used as weights.

We separately factor analyzed the items that made up each of the putative measures in order to get a preliminary indication of their scale properties. Separate factor analyses were conducted on each of the entrance and exit sets of items. The factor analysis of each item set is described, as are the resulting decisions that were made about each. Factor analysis was relied on because it provides a clear look at the structure of the data. The method used was principal components analysis followed by a varimax rotation. The factor loadings and other relevant factor analysis information for each of the following final measures are contained in Table 5. Cronbach alpha reliability information is also included for each measure as that measure was used in the tests of the GRAECE program outcomes. Where reliability coefficients were below the minimum customary standard of .6 (Gainen & Locatelli 1995), we conducted paired t-tests of the individual items that made up each suspect scale to verify the direction and significance (or lack) of any relationships found. The details concerning the creation of each measurement scale are shown in Appendix A.

Inferential Statistical Methods

We largely analyzed the data through the use of repeated measures ANOVAs, controlling for group (year of admittance to the program) and respondent gender. We controlled for group membership because we wished to see whether we could identify

any change in the effectiveness of the program over time. For example, did the faculty become more effective at producing the desired positive change in the students as they (the faculty) became more familiar with the new curriculum and became more effective at adapting their teaching techniques and emphases to the goals of the GRAECE proposal? Gender was controlled because prior research has demonstrated that there are systematic differences between male and female accountants and accounting students on value issues (e.g., Kleinman & Farrelly 1995; Nelson & Deines 1995; Mossholder et al. 1985). While the number of males and females included in the sample was roughly equal (54 males and 51 females), the relative proportions differed by PAMBA entering class. Thus we controlled for gender to avoid misinterpreting any finding of group differences. We chose not to control for GMAT score after preliminary analyses showed that the groups (i.e., entering classes) did not differ significantly on this variable. We also found that entering GMAT score as a covariate in the analyses did not change the pattern of results obtained. While males did have significantly higher GMAT scores than females (average change group male GMAT score equalled 581.1, standard deviation of 53.2; average change group female GMAT score equalled 559.8, with a standard deviation of 40.7), given that entering the GMAT score as a covariate did not change the obtained result pattern and that GMAT score was repeatedly not significant, we believe that the results for gender are not confounded by GMAT score differences between the sexes.

For certain analyses, we used only post-test scores. Such a procedure allows very poor inferences as to the success of the GRAECE project since we cannot tell from the posttest results whether the student gained from his educational experience. However, we possess only exit data on the last non-change group. The last set of statistical results reported, therefore, compares the exit scores of the change classes to the exit scores of the last non-change class.

Testing Results

The results of the repeated measure analyses follow. In each case, student growth was measured by including the students' responses to the entry and exit measures. As discussed above, these measures were constructed so as to be consistent. We used the simple average of the students' responses to the items on each measure because we believe that the simple average response is more easily interpretable than responses to factor scores or a factor-loading weighted scale. Repeated measures analysis was used because, unlike the educational assessment field's usual use of difference (end score minus beginning score) scores, repeated measures analyses use more information about the students' responses (see Pike 1992). Stone et al. (1996) also note that computing difference measures increases error variance and thus diminishes the ability of statistical tests to find an effect. Residual scores born of regressing exit scores on entry scores are also widely used as an educational change assessment tool. Unfortunately, such scores are only useful in examining differences between groups. Further, these residuals are not measures of change in itself, but instead are measures of that portion of the dependent variable not accounted for by the independent variable. Thus residual scores measure not only growth but any other variable omitted from the regression equation. While repeated measures analyses, difference scores, and the use of regression residuals are all afflicted by problems of low reliability, it seems that repeated measures analysis is the most

powerful technique available (Pike,1992). In the following repeated measure analysis, only information for the four classes that benefited from the GRAECE efforts is included. We did not include information from the last non-AECC group to graduate Rutgers' PAMBA because we only had exit, not entry, data on that group. At the end of the Results section, we do provide ANOVA analyses that compare the exit scores of the four change groups to the exit scores of the last non-change group.

For each analysis the following information is present: The skill or attitude being studied, whether any significant within subjects effects were found, and whether any significant between subject effects were found. The significance levels reported are two-tailed significance tests. Where any such effects were found, we explore the data further to determine the source of these effects. While such a procedure may seem odd when no significant within subject change effects were found (i.e., the time variable proved insignificant), we believe that such secondary exploration may shed light on the obtained overall results. For example, a finding of no overall within-subject (i.e., Time) effects may be a result of skills improving in the first two years and declining in the second two years. A consistent finding of this sort could be of interest to those evaluating the effectiveness of the Rutgers GRAECE program. We provide the ANOVA tables showing within and between subject effects. Table 6 provides means, standard deviations, and number of case information, broken down by both gender and group. Overall information is also provided by group and, separately, by gender. Table 6A presents this information for the values measures. Table 6B presents this information for the skill measures.

Tests of Value Growth

1. *Positive View of Business: Corporate Role.* We did not find significant differences between entry and exit scores. The within subject interaction terms were not significant, nor were the between subject main effect or interaction variables. These results are summarized in Tables 7A and 7B.

2. *Positive View of Business: Corporate Altruism.* Table 8A, the within-subjects results table, shows that there was no significant change in subject responses to the corporate altruism perception variable. Nor were the time (our designation for the within subject factor) by gender or group interactions significant. Table 8B reports the between subjects results. These show a marginally significant gender by group interaction ($F=2.612, p=.056, n=104$). The main effects for gender and group were not significant however.

3. *Knowledge Acquisition Emphasis (a.k.a., Life-Long Learning).* Table 9A shows that there was no significant time based increase in the level of this variable. Neither were the between subject tests significant (see Table 9B). Table 9A does show, however, a significant time by group interaction ($F=2.516, p=.037, n=103$). An inspection of the entry and exit means over the four years reveals that the average entry level group scores rose over the four years and that the average exit group scores fell over the same period (see Table 6B). Improvements in outcomes occurred in years 1 and 2 (i.e., significant positive changes in exit as compared to entry level skills), while declines occurred in years three and four. A comparison of exit group scores for the first two years with entry

scores for the last two years showed that these scores were almost equal (average exit score for first two years equaled 5.93, average entry score for the last two years equaled 5.97). This suggests that the results may have been affected by a regression to the mean type phenomenon and/or ceiling effects.

To look at this question more closely, we conducted a paired t-test of entry and exit level scores on a year-by-year basis. The results showed that there was a significant positive increase in life-long learning attitudes in year one ($t=2.16$, $p=.020$, $n=32$), and no significant change for year two. Years three and four showed at least a marginally significant decline in the life-long learning variable ($t=1.97$, $p=.031$, $n=23$ for year three, and $t=2.01$, $p=.058$, $n=21$ for year four).

4. *Service/Quality Emphasis.* There was a significant difference between the beginning and ending scores ($F=4.567$, $p=0.035$) on the service/quality value measure. The ending scores were lower than the entry scores (the entry mean, standard deviation, and n were 7.53, 0.93, and 105 respectively; the exit mean, standard deviation, and n were 7.3, 0.99, and 105 respectively). As Table 10A shows, there was also a marginally significant time by group interaction ($F=2.176$, $p=0.09$). The between subjects effects were not significant (see Table 10B).

A post hoc analysis using both Tukey's HSD and Scheffe's test revealed no significant difference between the groups on entry or exit. Per year paired t-tests of differences between pre and post scale values showed significant declines in professed agreement with the service/quality motive in years one and four only ($p=0.045$, $n=33$, for year one, and $p=0.005$, $n=21$, for year four). Even in years two and three, however, values declined. Given that the initial values (7.526 on a nine-point scale) were very high, these results may reflect a regression to the mean phenomenon.

5. *Insider Trading Ethics Case.* Table 11A shows that there were no significant within-subject effects. On average, therefore, student ethical responses did not change over the course of their stay in the professional accounting program. Table 11B, in conjunction with Table 6A, shows, however, that female students were significantly more ethical than males ($F=8.383$, $p=.005$, $n=105$). Average female entry and exit mean scores respectively were 3.675, and 3.8627, $n=51$. Average male entry and exit mean scores respectively were 3.3137 and 3.2593, and $n=54$. The finding of superior female ethical values is consistent with much prior research on accounting and business student ethics (e.g., Kleinman & Farrelly 1995). Higher scores indicate more ethical responses.

Next we report on the success of the GRAECE effort in inducing technical skill changes in the students. Table 6B presents mean and standard deviation information for the entry and exit skills measures. This information is broken down by group (class) and gender.

Tests of Skill Differences

1. *Financial Skills.* Table 12A shows that beginning and exiting self-report scores differed significantly at the $p=.000$, $F=71.5$ level, $n=103$. A significant time by group interaction showed that the changes were not uniform across groups. This interaction

was significant at the $p=.003$, $F=5.003$, level. The tests of the between subject effects, shown in Table 12B, showed marginally significant group effects and a significant gender by group interaction ($p=.056$ and $p=.029$ respectively).⁴

The post-hoc comparisons of exit financial skills, made using Tukey's HSD and confirmed by Scheffe's multiple range test, showed that the exit scores of the four classes did not differ significantly. Thus the exit skills of the groups did not improve as the GRAECE program was phased in. By contrast, the groups did differ significantly on entry skills. All differences were between the first PAMBA group and the other three groups. Using Tukey's HSD, the first PAMBA group's entry skills were significantly higher than groups two and four, but not three. The second, third, and fourth PAMBA groups did not differ significantly amongst themselves.

With respect to gender, gender means across all four groups differed marginally on entry at the $p=.074$ level. There was no significant gender difference on exit skills. Gender differences were narrowest for the first PAMBA entering change class (difference between means equaled .239). For the second change group, the difference in entry means equaled 1.090. For the third change group, the difference in gender means equaled .085. For the fourth change group, the difference in means equaled 1.125. The overall difference on entry means by gender was .072. The overall difference on exit means was .075.

2. *Communication Skills.* Table 13A shows that self-reported communication skills rose significantly over the students time within the PAMBA ($F=57.474$, $p=.000$, $n=102$). On entry, the average student response to the skill equaled 5.04, with a standard deviation of 1.17. On exit, the average student response to the skill equaled 5.84, with a standard deviation of 0.79. There was also a significant time by group interaction. None of the between subject effect tests were significant at conventional probability levels (see Table 13B).

In order to discover the source of the time by group interaction, we used the Tukey HSD and Scheffe tests. Only the second and third entry groups differed significantly from each other ($p=.052$ on Tukey's HSD. Similar results were found using Scheffe's test). The second PAMBA's group average was 4.576 on entry, while the third PAMBA's group average was 5.600. The four PAMBA classes did not differ significantly on the exit measure, forming a homogeneous subset.

3. *Computer/Research Skills 1.* Table 14A shows that self-reported computer skills improved significantly ($F=3.137$, $p=.080$, $n=103$). On entry, the average student response to the measure equaled 2.91, with a standard deviation of 1.54. On exit, the average student response to the measure equaled 3.19, with a standard deviation of 1.36. There

⁴ Given the low reliability of the exit measure (alpha equaled .45), we conducted three separate repeated measures analyses of variance on the items that composed the Finance measure. All three exit scores were significantly higher than their respective entry scores at the $p=.000$ level.

was a marginally significant time by group by gender interaction ($p=.067$, $F=2.459$). Table 14B shows that there were no significant between subject effects.⁵

An examination of both Tukey's HSD and Scheffe's multiple comparison tests revealed no significant differences between the four classes on entry-level or exit-level skills. Table 6B shows entry and exit scores broken down by group and gender.

An inspection of this table shows that in the first and third change classes, female students reported themselves as less skillful on graduation than on entry into the PAMBA program. In the second and fourth classes, they reported themselves as being more skillful at graduation than on entry. Further, the overall average improvement for females was .07 (average exit score of 2.92 less 2.85 average entrance score) on a seven point Likert scale. In contrast, male self-reports of computer skills on exit increased in three of the four classes surveyed. Male self-ratings declined only in the second PAMBA class. Overall, male average self-ratings rose from 2.97 to 3.45, an increase of .48 on a 7 point Likert scale. The pattern of low entry skill level respondents having higher scores on exit, and higher entry skill level respondents reporting lower skill levels on exit suggest that a regression to the mean effect exists, though.

4. *Computer/Research Skills* 2. Table 15A shows that there was no significant increase in skills measured. The main effects on both the with-in subject tests and between subject tests were not significant. Neither were there any significant within subject or between subject interactions. Table 15B shows the between subject tests.

5. *Group Skills*. Table 16A shows that there were no significant within subject effects, whether main effects for time or interaction effects between time, gender, and group membership. There were, however, significant between subject effects on group, gender, and the group-gender interaction. The respective significance levels for these effects were $p=.015$, $p=.011$, and $p=.101$. The respective F-values associated with the aforementioned probabilities are 3.66, 6.81, and 2.133. The sample size for this analysis was 103. This information is displayed in Table 16B. Female responses to the group skills measure were significantly higher than male responses (see Table 6B). The significant group effect can be traced to differences between the first and last PAMBA change group on the exit measure. Using Tukey's HSD, the difference was significant at $p=.063$.

The next set of results differs from the results reported immediately above in two ways. First, some of it does not involve pre and post test data. One set of questions asked for the respondents' self assessment of how their critical thinking skill improved due to their stay in the Rutgers PAMBA. The students were also asked for their rating of

⁵Given the low reliability ($\alpha=.514$) of the exit measure, we conducted three separate repeated measures analyses of variance on the three components that made up the measure. All three ending skills scores were at least marginally significantly higher than the entry scores at the $p=.08$ level or higher. Ending Federal Tax Service Use skills were significantly higher at the $p=.007$, $F=7.576$ level. The ability to use telecommunications packages was marginally significantly higher at the $p=.070$, $F=2.424$ level. Finally, the exiting ability to use data base programs was marginally significantly higher at the $p=.076$, $F=2.365$ level.

their overall satisfaction with the PAMBA. Second, since these questions did not call for comparison of entry with exit data, we structured our analysis so as to compare the last non-AECC Change group with the four AECC Change classes. ANOVA tests were used. To be consistent with our earlier statistical tests, we controlled for gender and group membership. The ANOVA table information is provided only within the text.

6. *Critical Thinking Skills.* The overall model was not significant. The probability level reached was $p=.105$ level ($F=1.67$, $n=133$). The model did show that the main effects for group membership were significant ($F=2.49$, $p=.047$). An inspection of the *group means* shown in Table 5B showed that the last non-AECC change group (class) had lower mean values than did the succeeding AECC Change groups (classes). Accordingly, we grouped the 5 classes by whether they were change classes or not and conducted a t-test of the difference in self-reported critical thinking skill increases between these two groups (change or non-change). The two groups self-reported critical thinking gain scores differed at the $p=.0341$ level ($F=4.591$). There were 20 respondents in the last non-AECC change class, and 105 respondents in the four AECC change classes.

As we noted earlier, we also collected entry and exit data on the students' critical thinking skills in the second and third years of the GRAECE program assessment. The Watson-Glaser Critical Thinking Appraisal test provides scores on five separate components of critical thinking skills. These five components are the ability to deduce information, identify assumptions, make valid inferences, evaluate information, and interpret information. Our repeated measures ANOVAs showed that deduction scores decreased from 12.3 to 11.02, with standard deviations of 2.58 and 2.79 respectively. The minimum and maximum scores on the entry level and exit level deduction WGCTA subtest were, respectively, 6 and 16 on entry, and 5 and 16 on exit. The overall F-test for within subject effects was significant at the $p=.030$, $F=4.99$, level, $n=50$. There was also a significant time by gender interaction ($F=8.903$, $p=.005$, $n=50$). Female scores rose from 11.47, standard deviation equaled 2.72, to 11.76, standard deviation of 11.76, with an n of 17. Male scores declined from 12.3, standard deviation of 2.58, to 11.02, standard deviation of 2.79. The male sample size was 33. There was no significant difference in the students' ability to identify assumptions in the case material presented. The minimum and maximum scores on the entry level and exit level assumption WGCTA subtest were, respectively, 6 and 16 for entry, and 3 and 16 on exit. Inferential ability seemingly declined from an overall average score of 10.2 to 8.2 ($F=11.885$, $p=.001$, $n=50$). There were no significant within subject or between subject interactions, or between group effects. The minimum and maximum scores on the entry level and exit level inference WGCTA subtest were, respectively, 3 and 14 on entry, and 0 and 14 on exit. The ability to evaluate information also declined significantly, from 12.3, standard deviation of 4.36, to 10.98, with a standard deviation of 3.57. The significance level attached to the decline is $p=.073$, $F=3.369$ level. There was no significant within subject interaction, although the between subject gender by group interaction was significant. While male scores declined from pre to post tests in both classes tested, female scores in the first class tested rose from 10.82 (standard deviation of 5.46, $n=11$) to 11.27, standard deviation of 3.17. Female scores in the second class declined from 14.67, standard

deviation of .8165, to 13.17, standard deviation of 2.40, $n=6$. The minimum and maximum scores on the entry level and exit level evaluation WGCTA subtest were, respectively, 0 and 16 on entry, and 0 and 16 on exit.

Finally, interpretive ability scores declined on the Watson-Glaser, from an overall entry average of 12.92, and a standard deviation of 2.3, $n=50$, to an exit average of 11.86, and a standard deviation of 2.86. The decline had a significance level of $p=.071$, $F=3.413$. There was a significant time by group interaction. The second change PAMBA class scores declined from 13.11 (standard deviation equaled 2.42, $n=27$) to 11.19, standard deviation of 3.05. The third PAMBA class's scores increased from 12.70, standard deviation of 2.53, $n=23$, to 12.64, standard deviation of 2.46. The minimum and maximum scores on the entry level and exit level interpretation WGCTA sub-test were, respectively, 5 and 16 on entry, and 5 and 16 on exit.

Suggestive Other Evidence on GRAECE's Effectiveness

As earlier noted, a key difficulty in assessing the effectiveness of the GRAECE program is that we only have exit, not entry, data on the last non-change group that went through the Rutgers PAMBA program. This is so because the key point to be understood is the amount of *learning* and *value acquisition* that took place within that last non-change group compared to the amount of *learning* and *value acquisition* that took place among the change groups. The amount of such learning and value acquisition can not be inferred from the exit values (see Hill et al, 1998). Nevertheless, this section presents comparative information on the last non-change class and on the four change classes. The latter are treated as a group because (a) they collectively belong to the group of classes that went through the Rutgers program after the change program began to be implemented, and (b) the analyses reported above showed that they differed amongst themselves only on one of the measures used.

To explore this issue, we first conducted ANOVA analyses to test for the existence of both group (non-AECC class, or AECC change class) and gender effects. Finding that gender did not affect the results, we conducted a one-way ANOVA analyses of the value and skill acquisition variables described in previous sections. We also included statistical tests of the number of job interviews and offers that the groups received. In this one-way ANOVA, we blocked on group membership only. These results are shown in Table 17. This analysis showed that two of the 5 value items differed significantly between the non-change and the change groups. The change groups (collectively) had significantly more positive views of the corporate role in society ($F=2.83$, $p=.095$, $n=20$ and 104 for the last non-change group and the four change groups combined respectively), and a belief in the importance of knowledge acquisition ($F=7.27$, $p=.008$, $n=20$ and 105 for the last non-change and the four change groups respectively), than did the last non-change group. Among the six skills compared, the change group scored significantly higher on two of these. One of these, thinking skills, was addressed in detail in the Critical Thinking Skills section. The change groups self-reported financial skills were significantly higher than the last non-change group's self-reported financial skills ($F=5.68$, $p=.019$, $n=20$ and 103 for the last non-change and the four change groups respectively). The last non-change group did not score significantly higher than the four change groups on any measure

used. There was also no difference between the change groups and the last non-change group with respect to the number of job interviews that the students were invited to or the number of job offers that they received. This information is reported in Table 17.

Finally, we provide information on how students' overall satisfaction with the PAMBA program changed from one class to the next. As DeMong, Lindgren Jr., and Perry (1994: p.18) stated, "An educational experience should not only meet the educational and academic goals of the system, but it should also meet the expectations of the student. It is important to determine whether the student's educational experience has been satisfying. This includes more general assessment of the whole academic environment."

The ANOVA table information, as well as means and standard deviations for each class, are only provided within the text. A one way ANOVA was used to test for gender and group differences on the students' overall satisfaction with the PAMBA. The overall model was significant at the .001 level ($F=3.53$, $n=123$). Both gender ($F=5.45$, $p=.021$) and group identity ($F=5.11$, $p=.001$) were significant, although the gender by group interaction was not. Student satisfaction with the PAMBA program rose *almost* consistently from the inception of the program. The last non-change group's N, mean, and standard deviation were 19, 3.684, and 1.635 respectively. The first AECC change group had an N, mean, and standard deviation of 33, 4.48, and 1.70 respectively. The second AECC group had an N, mean, and standard deviation of 28, 4.43, and 1.57 respectively. The third AECC group had an N, mean, and standard deviation of 23, 5.13, and 1.06 respectively. The fourth AECC group had an N, mean, and standard deviation of 21, 5.619, and 1.024 respectively. Thus there is an almost consistent pattern of student satisfaction rising as the AECC program was phased in. Overall, males had a satisfaction level of 4.939 ($n=66$, standard deviation equaled 4.66). Females had an overall satisfaction level of 4.345 ($N=58$, standard deviation of 1.60).

Conclusions and Implications

The GRAECE proposal (Rutgers 1990) claimed that its curriculum and teaching method revisions would produce accountants who would be far better equipped to fulfill the professional role of accountant. Born during the legal and social turmoil of the 1980's, the proposal said that there were two key components of the professional role. One was having appropriate values and the other high skills.

Values Results

The results on the value measures tended to be uniformly disappointing. The only value scale that did change, the service/quality variable, changed in a negative direction. In part this failure may be due to the high level of some entry-level values (e.g., the service/quality value and scores on the insider trading case). The results here, therefore, may not be surprising given that ceiling effects on the ethics and values initial measures may have ruled out any further gains due to classroom influences. It may also be true that by the time students enter the PAMBA program, their values are largely fixed.

A variety of studies in the accounting ethics area raise questions about whether ethics education is effective. Results of studies by Jones (1989) and Ponemon (1993)--both

cited in Abdolmohammadi & Rhodes (1996), raise questions about whether ethics can be taught in professional education settings. Later studies, e.g., by McCarthy (1997) find that exposure to ethics education in accounting classrooms does not have an effect. Other recent researchers (e.g., Green and Weber, 1997; Gautschi, 1998; and Abdolmohammadi, Gabhart & Reeves, 1997) did find that different kinds of ethics interventions raised the students' ending levels of ethical reasoning above their pre-intervention ethical reasoning levels. The interventions used by these authors ranged from examining the effect of group decision-making on the students' level of ethical response to examining the effect of a business ethics course to taking the auditing course. McCarthy (1997), however, found that exposure to the AICPA code of ethics was not effective in raising the level of ethical reasoning of the students. Abdolmohammadi and Rhode's (1996) literature review reports that greater success in raising ethics has been had in multi-year educational program settings. Further, La Grone et al. (1996) found that the effects of ethics interventions on accounting students are transitory. Thus the evidence on the effectiveness of ethics-related classroom interventions on the students' post-exposure level of ethics remains somewhat mixed. Thus the effort in the GRAECE program may have been doomed to fail.⁶

There may be various reasons for this. Achieving a higher level of ethical responses by the GRAECE students may have been difficult to achieve anyway because their initial responses on the pre-test were quite high, suggesting that a ceiling effect interfered with the students' scores going higher. Further, it may also be true that the intensity of exposure to all the ethics and values topics, and the length of time that the students were exposed to such messages, may have been too limited. The PAMBA program is a 14 month program. Like any accounting program, it is crowded with highly technical material. Highly technical materials may crowd out or diminish the likelihood of value-laden discussions.

Additional explanations for the ethics and values results exist. As adults, the students' values and attitudes may have been resistant to change. Hurley (1978), for example, notes that as an individual moves through the life cycle, socialization agents and society place much less emphasis on the individual's values than on the individual's behavior. Thus, the students may perceive pressures to conform behaviorally, but not in terms of attitudes. Generally, there are difficulties in getting business faculty to emphasize values to business students. Mayer-Sommer & Loeb (1981) and Loeb (1988), for example, argued that accounting faculty are not effective socialization agents. Covering the accounting curriculum in itself is a challenge. Having faculty cover non-technical topics in addition adds to the challenge that accounting faculty experience.

⁶An additional issue with respect to the Insider Trading Ethics case may have been the lack of anonymity of the student responses to the questionnaire. This may have led the students to choose highly ethical responses, resulting in the ceiling effect. While we cannot prove that the students did not choose the response that they believed to be the most socially desirable, the students were given strong assurances of confidentiality.

With specific respect to the GRAECE effort, learning how to co-ordinate and implement a re-engineered accounting curriculum, achieve the required content coverage, and still act as value-inculcating agents all at the same time, is likely to be extremely difficult to accomplish. Here, however, the Rutgers faculty apparently did emphasize values acquisition throughout the curriculum (see Palmon, Sudit & Vasarhelyi, 1996). The lack of measurable student responsiveness to these efforts, however, argues that prior student attitudes were too engrained, that adult values are difficult to change, or that the faculty's efforts were insufficient to overcome value inertia.

Skills Results

These results are a good, but not perfect, indication that the GRAECE efforts achieved its goal in this arena. Specifically, certain self-reported skills were very positively affected by the revamped curriculum.⁷ That is, the students' levels of self-reported exit level communication, financial, and computer skills were significantly higher than their self-reported entry level skills. Thus key objectives laid out in the Perspectives report were achieved (see also AECC 1990). Unfortunately, not all skills increased. The second set of computer-related skills did not change, nor did group skills. Given that the items used on the group scale also measured interpersonal skills, this finding is further disappointing. Our guess is that the failure to find an effect may be due to these group items being reflective of elements of personal style that might not be amenable to change through experience. Self-reported improvements in critical thinking skills, as measured by the self-report measure, were significantly higher amongst the four change groups than they were in the last non-change group, although the four change groups did not differ amongst themselves. Even though the latter did not differ amongst themselves, however, there was a positive trend as one change class succeeded the other.

However, the results of the Watson-Glaser Critical Thinking test did not support the self-report measure thinking skills finding. Even worse, the average score fell significantly from pre-test to post-test on several of the Watson-Glaser test component skills. It is important to note, however, that the WGCTA is not the most appropriate measure to measure critical thinking skill change in a specific domain, like accounting (Baird 1989). Further, it suffers from all the other problems that were discussed in an earlier section. In addition, the decline in the Watson-Glaser scores probably reflects the fact that the exit test was given within the last week or two of the semester, with final exams and term projects due shortly. This suggests that the students probably suffered from fatigue and role overload, and thus were unable and/or unwilling to concentrate on the test. Finally, Baird (1989) also reports that most studies of critical thinking using the Watson-Glaser show no incremental gain from education. It is also possible that raising the critical thinking skills of MBA students may not be an appropriate goal, given that adult intelligence tends to be stable and critical thinking is known to be highly related to adult intelligence.

⁷ While the use of self-reported gain measures may seem suspect, many institutions use these in program assessment (Gainen & Locatelli 1995). Thus our use is consistent with the mainstream of assessment research and practice.

The positive skill results were attained despite the low reliability of some of the measures used. The reliability of the entrance Financial Skills measure was an acceptable .63. Unfortunately, the reliability of the Exit Financial Skills measure was only .45. Similarly, the reliability of Computer Research Skills 1 entry measure was .63 and the reliability of Computer Research Skills 1 exit measure was .514. Finding significant positive effects is *less likely* with less reliable scales than more reliable ones since the unreliability suggests that there is substantial measurement error in the scale, militating against finding an effect (Kerlinger 1986). Finding a significant effect here, supported by the secondary Analyses of Variance of the individual items, suggests the strength of the effect.

Conclusion and Limitations

Understanding the effectiveness of an academic program is not simple. To *best* understand this, we need a comparison of the change classes to a control group. Ideally, this control group would have been drawn from a second set of PAMBA classes that (a) were not subject to the curriculum changes instituted by the PAMBA, and (b) were running concurrently with the change effort classes. Although originally contemplated in the original Rutgers GRAECE proposal, budgetary problems prevented the use of concurrent non-change and change classes. The next best alternative would have been to have both entry and exit data on the last non-change PAMBA class. We had only exit data on the last non-change (academic year 1991-1992) PAMBA class. As previously noted, our efforts to collect data from a control group of general MBA (non-accounting) students did not succeed.

Accordingly, we used our pre- and post-test data on the four change classes in order to understand the effectiveness of the education received by these groups. The inter-group comparisons showed differences between these groups on entry into the program, but not on exit. Thus the educational environment within the PAMBA program, once the change process had begun, seems to have produced similar outcomes across the academic years studied. One inference is that the academic environment and pressures facing the students were probably the same across the four years beginning in the summer of 1992 and ending in the summer of 1996. Given that Schlosser (1997) reports that the academic changes were largely completed by the end of the 1993 to 1994 academic year, this finding should not be surprising. Apparently the curriculum and other changes were implemented early and, judging by the skills results, effectively.

As noted above, the second best evidence for the effectiveness of the changes would be a comparison of the four change groups' gains with gains by students in the last non-change PAMBA class. We only have exit data on that group. The limited evidence that we do have, however, points to the success of the program--at least with respect to two of the five values measures and two of the six self-reported skills measures used. While there was no significant difference between the last non-change and the change classes with respect to the number of job interviews and job offers that the students received, this probably just reflects the impact of the internships on the students' job opportunities and choices. That is, students are interviewed and usually receive internships at accounting firms during their second semester in the program. Since those who succeed at the

internship usually are offered full time jobs at the employing firm, students who are nearing graduation may not have much interest in exploring alternate career opportunities.

Finally, the students in the four change classes were significantly more satisfied with the PAMBA than were students in the last non-change PAMBA class. The overall student satisfaction measure increased almost steadily over the years of the study. The last non-change group's satisfaction with the program was significantly lower than that of the four change groups. The importance of this finding is that student satisfaction measures are key components of most educational assessment efforts, with the rationale being that the customer of the service is best equipped to evaluate its worth (DeMong et al., 1994; Williams et al. 1988; also Gainen & Locatelli 1988),

On balance, it seems that the GRAECE change effort has been successful.

The aim of this work was to report on the assessment of the GRAECE effort. The reason for reporting these results was to meet Doyle Williams' (1996) call for dissemination of information about successful and unsuccessful programs. More generally this is an important endeavor because of the importance to the accounting profession of promoting effective teaching and increased learning. As Gainen & Locatelli (1995: p. 5) point out, "The value of assessment is not to provide *numerical* indicators of success or failure, nor to design the definitive curricular experiment. Its value is to create a 'culture of evidence' (Wolff 1990)..." They continue (page 6), "In this culture, assessment is a tool that will help accounting educators create educational environments for the 21st century, based on evidence of what works for the students they are responsible to educate". This study is another step toward that important goal.

Bibliography

- Abdolmohammadi, M., D. R. L. Gabhart, and M. F. Reeves. 1997. Ethical Cognition of Business Students Individually and In Groups. *Journal of Business Ethics* 16(16):1717-1725.
- Abdolmohammadi, M. & J. E. Rhodes. 1996. Personal and Professional Attributes of Ethical Auditors: Implications for Ethics Education in Accounting. Presented at the National Meeting of the American Accounting Association, August, 1996.
- Accounting Education Change Commission. 1990. Objectives of Education for Accountants: Position Statement Number One. *Issues in Accounting Education* 5(2):307-312.
- American Accounting Association Committee on the Future Structure, Content, and Scope of Accounting Education. 1986. Future Accounting Education: Preparing for the Expanding Profession. *Issues in Accounting Education* 1(1): 168-195.
- Arthur Andersen & Co, Arthur Young, Coopers & Lybrand, Deloitte Haskins & Sells, Ernst & Whinney, Peat Marwick Main & Co., Price Waterhouse, and Touche Ross. 1989. Perspectives on Education: Capabilities for Success in the Accounting Profession. New York, NY.
- Austin, J. T. 1989. Review of the Management and Graduate Item Bank. In Conely et al. (eds.) Tenth Mental Measurement Yearbook. (Lincoln, NE: Buros Institute of Mental Measurements), 126-127.
- Baird, L. L. 1989. Diverse and Subtle Arts: Assessing the Generic Academic Outcomes of Higher Education. In C. Adelman, M. Appelbaum, L. Baird et al. (1989), Performance and Judgment:

- Essays on Principles and Practice in the Assessment of College Student Learning. (Washington, DC: U.S. Government Printing Office, 1989).
- Begun, J. W. 1986. Economic and Sociological Approaches to Professionalism. *Work and Occupations*, 13(1): 112-129.
- Berger, A. 1989. Review of the Watson-Glaser Critical Thinking Appraisal. In Conely et al. (eds.) Tenth Mental Measurement Yearbook. (Lincoln, NE: Buros Institute of Mental Measurements), 1692-1693.
- Bollom, W. J. 1988. Ethics and Self-Regulation for CPAs in the USA. *Journal of Business Ethics*, 7: 55-61.
- Calderon, T. G., A. L. Gabbin & B. P. Green. 1996. Summary of Promoting and Evaluating Effective Teaching. *Journal of Accounting Education* 14(3): 367-383.
- Chamberlain, D., R. Seay & F. Julian. 1991. Accounting Administrator's Perceptions of the Status and Usefulness of Outcomes Measurement. *Accounting Educator's Journal* 3(2): 18-29.
- DeMong, R. F., J. H. Lindgren Jr., and S. E. Perry. 1994. Designing an Assessment Program in Accounting. *Issues in Accounting Education* 9(1): 11-27.
- Gainen, J. and P. Locatelli. 1995. Assessment for the New Curriculum: A Guide for Professional Accounting Programs. (Sarasota, FL: American Accounting Association).
- Gautschi III, F. H., T. M. Jones. 1998. Enhancing the Ability of Business Students to Recognize Ethical Issues: An Empirical Assessment of the Effectiveness of a Course in Business Ethics. *Journal of Business Ethics* 17(2): 205-216.
- Gordon, I. M. 1998. Enhancing Students' Knowledge of Social Responsibility Accounting. *Issues in Accounting Education* 13(1):31-46.
- Green, B. P., T.G. Calderon and B. P. Reider (1998). A Content Analysis of Teaching Evaluation Instruments Used in Accounting Departments. *Issues in Accounting Education*, 13(1): 16-30.
- Green, S. and J. Weber. 1997. Influencing Ethical Development: Exposing Students to the AICPA Code of Conduct. *Journal of Business Ethics* 16(8): 777-790.
- Herring III, H. C., J. H. Scheiner & J. R. Williams. 1989. The Development of Education Research in Accounting. *Issues in Accounting Education* 4(1): 48-57.
- Hill, N.T., S. E. Perry and D. M. Stein. 1998. Using Accounting Student Surveys in an Outcomes Assessment Program. *Issues in Accounting Education*, 13(1): 65-78.
- Hurley, B.A. 1978. Ch. 3: Socialization for Roles. In M. E. Hardy & M. E. Conway (eds.), Role Theory: Perspectives for Health Professionals. (NY: Appleton-Centur-Crofts, Inc.).
- Jeffrey, C. 1993. Ethical Development of Accounting Students, Non-Accounting Business Students, and Liberal Arts Students. *Issues in Accounting Education* 8(3).
- Kerlinger, F. N. 1986. Foundations of Behavioral Research, Third Edition. (NY: Holt, Rinehart & Winston).
- Kleinman, G. & G. Farrelly. April 1995. Testing Ethics: A Research Report. *The CPA Journal.*
- La Grone, R. M., R. E. Walton & J. R. Davis. 1996. Are the Effects of Accounting Ethics Interventions Transitory or Persistent? *Journal of Accounting Education* 14(3): 259-276.
- Loeb, S. E. 1988. Teaching Students Accounting Ethics: Some Critical Issues. *Issues in Accounting Education*, 10: 77-84.
- Mayer-Sommer, A. P. 1990. Substance and Strategy in the Accounting Curriculum. *Issues in Accounting Education* 5(1): 129-142.

- McCabe, D. L., J. M. Dukerich & J. E. Dutton. 1991. Context, Values and Moral Dilemmas: Comparing the Choices of Business and Law School Students. *Journal of Business Ethics*.
- McCarthy, I. N. 1997. Professional Ethics Code Conflict Situations: Ethical and Value Orientation of Collegiate Accounting Students. *Journal of Business Ethics* 16(12/13): 1467-1473.
- McNair, F. & E. E. Milan. 1993. Ethics in Accounting Education: What is Really Being Done. *Journal of Business Ethics* 12: 797-809.
- Moizer, P. & J. Pratt. 1988. The Evaluation of Performance in Firms of Chartered Accountants. *Accounting and Business Research* 18(7): 227-237.
- Moore, W. E. 1969. Occupational Socialization. In Goslin, D. A. (editor), 1969, Handbook of Socialization Theory and Research. (Chicago, IL: Rand McNally & Co.), 861-883.
- Nelson, A. T. 1996. The Future for Accounting Education: A View from the Rocking Chair. *Journal of Accounting Education* 14(2): 245-254.
- Nikolai, L. E. 1996. Suggestions for Education Research on Improving Thinking and Communication Skills of Accounting Students. *Journal of Accounting Education* 14(2): 193-197.
- Palmon, D., E. Sudit & M. Vasarhelyi. 1996. Accounting as an Information Function: A Project for Change. Prepared in August, 1996, for submission to the Accounting Education and Change Commission of the Professional Accounting Area of the Rutgers Graduate School of Management.
- Pike, G. 1992. Lies, Damn Lies, and Statistics Revisited: A Comparison of Three Methods of Representing Change. *Research in Higher Education* 33(1): 71-84.
- Powers, D. E. & M. K. Enright. 1987. Analytic Reasoning Skills in Graduate Study: Perception of Faculty in Six Fields. *Journal of Higher Education* 58(6): 658-681.
- Rebele, J. E., D. E. Stout & J. M. Hassell. 1991. A Review of Empirical Research in Accounting Education. *Journal of Accounting Education* 9: 167-231.
- Reichers, A. E. 1986. An Interactionist Perspective on Newcomer Socialization Rates. *Academy of Management Review*, 12(2): 278-287.
- Rutgers Graduate School of Management Accounting Area. 1990. Accounting as an Information Function: A Proposal for Change. Submitted to the Accounting Education and Change Commission, February 1, 1990.
- Schein, E. H. 1984. Organizational Socialization and the Profession of Management. In D. A. Kolb, I. M. Rubin & J. M. McIntyre (eds.), Organizational Psychology: Readings on Human Behavior in Organizations, Fourth Edition. (Englewood Cliffs, NJ: Prentice-Hall, Inc.).
- Schein, E. H. 1956. The Chinese Indoctrination Program for Prisoners of War. *Psychiatry*, 19: 149-172.
- Schlosser, R. 1997. *Old Wine in New Bottles: An Analysis of the Curriculum Changes Promoted by the Accounting Education Change Commission*. Working Paper.
- Solomon, I. 1987. Multi-auditor judgment/decision-making research. *Journal of Accounting Literature*, 6:1-25.
- Stone, D. N., V. Arunachalam & J. S. Chandler. 1996. An Empirical Investigation of Knowledge, Skill, Self-Efficacy and Computer Anxiety in Accounting Education. *Issues in Accounting Education* 11(2): 345-376.
- Sundem, G. L. & C. T. Norgaard (eds.). 1991. Models of Accounting Education: Proceedings of a Symposium Sponsored by the Accounting Education Change Commission and the

- Accounting Education Advisory Committee of the American Accounting Association. March 8-9, 1991. (Torrance, TX: Accounting Education Change Commission).
- Watson, G. & E. M. Glaser. 1980. Watson-Glaser Critical Thinking Appraisal. (San Antonio, TX: The Psychological Corporation).
- Williams, D. 1996. Implementing Change in Accounting Education. *Journal of Accounting Education* 14(2): 199-205.
- Williams, J. R., H. Herring, M. Tiller & J. Scheiner. Volume No. 9. A Framework for the Development of Accounting Education Research. (Sarasota, FL: American Accounting Association, 1988).
- Worrell, M. W. 1995. Using a Simulation Game and a Computer Mediated Conference System to Improve Learning in Accounting Information Systems and Auditing: A Field Study. Ph.D. in Management Dissertation, completed at the Rutgers-Graduate School, Newark, NJ.

Table 1: Attitude and Skill Targets of Rutgers GRAECE Effort⁸

Attitude Targets

Positive view of business
Life-long learning (re-labeled as Knowledge Acquisition)
International skills (re-labeled as Knowledge Acquisition)
Service/Quality
Ethics

Technical skill targets

Financial skills
Oral and written communication skills
Computer skills/Research skills
Group & interpersonal skills/Effectiveness
Integrative ability (critical thinking skills)
Statistical & math skills

⁸ Taken from the Rutgers Graduate School of Management's 'Accounting as an Information Function: A Proposal for Change'.

Table 2: Description of Efforts Made During GRAECE Implementation to Achieve GRAECE Proposal Objectives

1. Values: These attitudes were worked on through discussion with the students in a large number of course situations. Also, many of these issues were also introduced during the de-freezing period. This was done to help students question their prior attitudes and beliefs about a variety of subjects, prefatory to later attempts to influence those values and attitudes in the desired direction. The required behavioral science course spent a great deal of time discussing attitudes and supporting positive trends in their development. These approaches are supported extensively in the attitude change (i.e., socialization) literature (e.g., Schein, 1956, 1984; Moore, 1969; Reichers, 1987).
2. Communication Skills: Oral and written presentations were used extensively throughout the program. Students were given training for both internship interviews and later job interviews. Palmon et al. 1996 cite this as a motivational tool of great value.
3. Interpersonal/Group Skills: One behavioral science faculty member worked extensively with the students to help them develop their personal skills. Simulation games and the interdisciplinary capstone course also played a large role in helping the students develop interpersonal skills.
4. Computer Skills: Received a great deal of emphasis. Personal computer packages like word processing, spreadsheets and databases were widely used in order to solve textbook and case problems. Computer-based simulation games were also used extensively. Students were also taught to use the World Wide Web to conduct accounting research.
5. Math and Statistics: The students received a massive infusion of materials during the initial part of their stay at the Professional Accounting Program.
6. Internationalization: The faculty did not use international cases, or focus on transnational issues to the extent that they were expected to do so. The failure of the faculty to adopt a higher degree of international focus suggests that greater efforts should have been made by the GRAECE management in assuring that the faculty were stressing all the attitude and skill components that the GRAECE effort sought to improve. Alternatively, perhaps the GRAECE proposal should have proposed changing fewer attitudes and skills.
7. Integrative Abilities: The capstone course is used to foster an integration of the students' understandings of topics and techniques gained from their coursework for the purpose of dealing with a real business problem.
8. Curriculum Design: The systems audit course was integrated with the auditing course successfully. Other planned sequences of courses (e.g., managerial accounting and economics or finance and financial accounting) did not work as successfully due to personnel turnover and other reasons. This failure suggests that the courses that are most likely to be integrated successfully are those taught by individuals who (a) have a great stake in remaining with the university, and (b) are willing to work hard at integrating the course material that they provide to the students with the materials taught in complementary courses. Nevertheless, very valuable course modules were developed for these courses and were used in teaching.

Note: Much of the information in this table is taken from Palmon, Sudit and Vasarhelyi, 1996.

Table 3: Descriptive Information, by Group and Gender

Age on Exit	N	Male		N	Female		N	Overall	
		Mean	S.D.		Mean	S.D.		Mean	S.D.
Age on Exit									
Last Non-Change									
1991-1992 AY	13	25.5	3.45	7	28.7	5.62	20	26.6	4.48
1992-1993 AY	12	27.2	4.63	21	26.2	4.01	33	26.5	4.20
1993-1994 AY	17	26.6	4.12	11	26.3	3.00	28	26.5	3.67
1994-1995 AY	17	27.6	5.12	6	26.3	1.37	23	27.3	4.45
1995-1996 AY	8	26.5	4.44	13	29.3	6.47	21	28.2	5.83
Across whole sample	67	26.7	4.34	58	27.	4.6	125	27.0	4.47
Graduate Management Achievement Test									
Last non-change									
1991-1992 ay	12	597	56.1	5	576	66.2	17	591	57.9
1992-1993 AY	12	557	55.9	19	557	37	31	557	44.4
1993-1994 AY	17	598	53.8	10	552	43.9	27	581	54.4
1994-1995 AY	17	588	54.4	6	558	31.9	23	580	50.5
1995-1996 AY	7	566	28.2	12	572	49.3	19	570	42
Across whole sample	65	584	53.7	52	561	43.2	117	574	43.2
Job Interviews									
Last Non-Change									
1991-1992 ay	13	5.00	3.06	7	4.14	1.22	20	4.70	2.56
1992-1993 AY	12	4.75	2.86	21	4.76	4.22	33	4.76	3.73
1993-1994 AY	17	5.29	3.51	11	4.09	3.53	28	4.82	3.51
1994-1995 AY	17	4.41	2.60	5	5.00	1.00	22	4.55	2.32
1995-1996 AY	8	5.38	2.39	11	4.55	2.11	19	4.89	2.21
Across whole sample	67	4.93	2.90	55	4.53	3.17	122	4.75	3.07
Job Offers									
Last Non-Change									
1991-1992 AY	13	1.15	.99	7	1.29	0.95	20	1.20	0.95
1992-1993 AY	12	1.25	1.82	21	1.48	1.57	33	1.39	1.64
1993-1994 AY	16	1.50	1.51	11	2.18	2.56	27	1.78	1.99
1994-1995 AY	17	1.65	1.93	5	0.60	.55	22	1.41	1.76
1995-1996 AY	8	1.63	1.19	11	2.00	1.55	19	1.84	1.39
Across whole sample	69	1.46	1.62	59	1.54	1.68	121	1.52	1.61

Table 4: Attributes and their Measures

A. Attitude Measurements

Positive View Of Business: Invented a 4-item scale. These items tapped student perceptions of corporate altruism and the corporate role in society. Seven point Likert scale.

Knowledge Acquisition: Measured by belief in the importance of engaging in specific life-long learning or knowledge acquisition efforts. These knowledge acquisition efforts include attitudes toward learning about foreign cultures, events, learning a foreign language, reading professional journals, taking continuing education credits beyond what the field requires, and attending conferences of professional associations whether or not the person was a member. Seven point Likert scale.

Service/Quality: Behavioral intention scale. Four items from Moizer and Pratt (1988). These items proved to be significant predictors of effort and performance among UK chartered accountants. Seven point Likert scale.

Ethics: Insider trading case used in McCabe et al. (1991). Four alternative actions were listed. These ranged from not using the insider information at all to disseminating it widely amongst friends and relatives. These choices were rank-ordered from least ethical to most ethical, with the criterion for ethicality being how widely the information would be disseminated.

B. Technical Skill Measurements

Financial Skills: Three questions asking students to rate their finance and accounting-related skills. Seven point Likert scale.

Writing and Communication: Three questions on questionnaire asking students to rate their oral and written communication skills. Seven point Likert scale.

Research/Computer Skills: Research skills and computer skills were conflated since it now is impossible to ignore the centrality of the computer in collecting information for business and professional use. Thus the five questions on this measure asked how comfortable respondents felt in using spreadsheets, databases, telecom packages, and CD-Rom resident databases. Seven point Likert scale.

Group Skills/Effectiveness: Measure consisting of 3 items that ask for the individual's self-rating of his effectiveness in work group interactions. Items drawn from Worrell (1995). Seven point Likert scale.

Integrative Ability: Measure consisting of 4 items developed through a review of what the research literature said that critical thinking skills are composed of. The specific items were drawn from a survey of items that graduate faculty in a variety of disciplines thought were at least moderately important. This information was reported in Powers & Enright (1987). Nine point Likert scale.

Table 5: Factor Analyses Results

	<u>Entry factor loadings</u>	<u>Exit factor loadings</u>
Value Measures:		
Positive view of business-corporate role		
Business won't willingly pollute	.725	.761
Corporations play necessary role society	.725	.761
Eigenvalue	1.05	1.160
Percent variance	52.5%	58.0%
Reliability	Not computed	Not computed
N	104	104
Positive view of business-corporate altruism:		
Businesses won't try to take advantage	.824	.791
Corp. Charity is not always self-serving	.824	.791
Eigenvalue	1.36	1.253
Percent variance	67.9%	62.6%
Reliability	Not computed	Not computed
N	104	105
Knowledge acquisition attitude		
Read accounting journals	.726	.746
Be aware major foreign events	.828	.786
Do more continuing education work	.693	.736
Be aware of relevant foreign cultures	.755	.712
Eigenvalue	2.26	2.22
Percent variance	56.5%	55.6%
Reliability	.74	.73
N	103	105
Service & quality attitude		
Want to work for firm producing quality	.663	.641
Have opportunity to help people	.700	.710
Have boss stress skill development	.558	.678
Have supervisor who consults employees	.759	.732
Eigenvalue	1.817	1.91
Percent variance	45.4%	47.7%
Reliability	.59	.63
N	105	105

Table 5 (continued): Technical Skill Measures

	<u>Entry factor loadings</u>	<u>Exit factor loadings</u>
Financial skills measure:		
Able to analyze financial statements	.823	.716
Able to calculate product costs	.809	.828
Able to calculate tax change	.655	.505
Eigenvalue	1.76	1.45
Percent variance	58.7%	48.5%
Reliability	.64	.45
N	105	103
Communication measure:		
Understand business publications	.755	.663
Write clear letters	.838	.848
Explain clearly to subordinate	.817	.772
Eigenvalue	1.94	1.75
Percent variance	64.7%	58.5%
Reliability	.73	.64
N	103	104
Computer skills 1		
Database programs	.790	.819
Federal tax services	.868	.586
Telecom packages	.793	.795
Eigenvalue	2.21	1.78
Percent variance	44.1%	35.6%
Reliability	.64	.5142
N	103	104
Computer skills 2		
Spreadsheet	.778	.790
CD ROM databases	.703	.829
Eigenvalue	1.178	1.31
Percent variance	23.6%	26.3%
Reliability	Not computed	Not computed
N	N=103	N=104
Group skills:		
Comfortable contributing ideas	.769	.822
Compliment others on good ideas	.702	.876
Ask for clarification when unsure	.864	.877
Eigenvalue	1.936	2.213
Percent variance	48.4%	73.8%
Reliability	.68	.82
N	104	104

Note: The method used was principal components analysis followed by a varimax rotation.

Table 6a: Value Measure Results by Group and Gender

<u>Value Measure</u>	<u>Males</u>			<u>Females</u>			<u>Overall</u>		
	<u>Mean</u>	<u>S.D.</u>	<u>N</u>	<u>Mean</u>	<u>S.D.</u>	<u>N</u>	<u>Mean</u>	<u>S.D.</u>	<u>N</u>
Positive View of Business-Corporate Role									
1992-93 Entry	4.7	1.1	12	4.5	1.4	20	3.92	1.33	33
1992-93 Exit	5	1	12	4.4	1.3	20	3.85	1.15	33
1993-94 Entry	4	0.9	16	4	1.4	11	3.98	1.5	27
1993-94 Exit	4.8	1	16	4.6	1.2	11	3.88	1.4	27
1994-95 Entry	4.3	1.5	17	4.4	1.6	6	3.89	1.35	23
1994-95 Exit	4.8	1.1	17	4	1.7	6	3.93	1.5	23
1995-96 Entry	5.1	0.7	8	4.9	1.3	13	3.79	1.14	21
1995-96 Exit	4.8	0.9	8	4.3	1.2	13	3.67	1.48	21
Overall Entry	4.44	1.18	53	4.50	1.41	50	3.9	1.33	104
Overall Exit	4.83	1.01	53	4.40	1.30	50	3.84	1.35	104
Positive View of Business – Corporate Altruism									
1992-93 Entry	3.4	1.4	12	4.2	1.2	21	4.59	1.3	32
1992-93 Exit	3.4	1.3	12	4.1	1	21	4.64	1.23	32
1993-94 Entry	4	1.3	11	4	1.3	11	4.04	1.13	27
1993-94 Exit	4	1.5	11	3.7	1.3	11	4.74	1.09	27
1994-95 Entry	3.8	1.3	17	4.2	1.4	6	4.35	1.48	23
1994-95 Exit	3.9	1.5	17	4	1.5	6	4.57	1.31	23
1995-96 Entry	3.9	1.1	13	3.7	1.2	13	4.98	1.12	21
1995-96 Exit	4.4	1.5	13	3.2	1.3	13	4.5	1.12	21
Overall Entry	3.78	1.42	53	4.03	1.22	51	4.47	1.29	103
Overall Exit	3.91	1.47	53	3.77	1.22	51	4.62	1.18	103
Knowledge Acquisition									
1992-93 Entry	5.5	0.7	11	5.7	1.3	21	5.59	1.11	32
1992-93 Exit	5.8	0.6	11	6.1	0.9	21	6.02	0.81	32
1993-94 Entry	5.3	1.4	16	6	0.6	11	5.6	1.21	27
1993-94 Exit	5.6	1.2	16	6.2	0.7	11	5.83	1.1	27
1994-95 Entry	6	1	17	5.8	0.9	6	5.98	0.93	23
1994-95 Exit	5.2	1.7	17	5.5	0.5	6	5.29	1.46	23
1995-96 Entry	5.8	0.6	8	6.1	0.8	13	5.95	0.74	21
1995-96 Exit	5.6	1.1	8	5.4	1	13	5.5	0.97	21
Overall Entry	5.64	1.07	52	5.87	1.00	51	5.75	1.04	103
Overall Exit	5.51	1.28	52	5.89	.89	51	5.7	1.09	103

Table 6a cont'd: Value Measure Results by Group and Gender

<u>Value Measure</u>	<u>Mean</u>	<u>Males</u>			<u>Females</u>			<u>Overall</u>		
		<u>S.D.</u>	<u>N</u>	<u>Mean</u>	<u>S.D.</u>	<u>N</u>	<u>Mean</u>	<u>S.D.</u>	<u>N</u>	
<u>Service/Quality</u>										
1992-93 Entry	7.6	0.8	12	7.7	0.9	21	7.64	0.82	33	
1992-93 Exit	7.1	0.6	12	7.4	1.2	21	7.30	1.02	33	
1993-94 Entry	7	1.2	17	7.5	1.1	11	7.21	1.18	28	
1993-94 Exit	7.2	1.4	17	7.6	1	11	7.35	1.24	28	
1994-95 Entry	7.7	0.8	17	7.7	0.6	6	7.66	0.72	23	
1994-95 Exit	7.6	0.8	17	7.5	0.8	6	7.58	.78	23	
1995-96 Entry	7.8	0.8	8	7.5	0.7	13	7.61	0.76	21	
1995-96 Exit	7.3	0.6	8	6.8	0.7	13	7.02	.68	21	
Overall Entry	7.46	.98	54	7.60	.83	51	7.53	0.91	105	
Overall Exit	7.31	.97	54	7.32	1.01	51	7.3	0.99	105	
<u>Insider Trading</u>										
1992-93 Entry	3	1	12	3	1	21	3.32	1.04	34	
1992-93 Exit	3.33	1.2	12	3.86	0.65	21	3.68	0.91	34	
1993-94 Entry	3	1	15	4	1	11	3.65	0.69	26	
1993-94 Exit	3.33	1.2	15	4	0	11	3.62	0.94	26	
1994-95 Entry	3	1	16	4	0	6	3.36	1.14	22	
1994-95 Exit	3	1.4	16	4	0	6	3.27	1.24	22	
1995-96 Entry	4	1	8	4	1	13	3.62	0.8	21	
1995-96 Exit	3.63	1.1	8	3.69	0.63	13	3.67	0.8	21	
Overall Entry	3.31	1.11	51	3.63	.71	52	3.48	0.94	103	
Overall Exit	3.27	1.22	51	3.87	.53	52	3.57	0.98	103	

Table 6b: Skill Measure Results by Group and Gender

<u>Skill Measure</u>	<u>Males</u>			<u>Females</u>			<u>Overall</u>		
	<u>Mean</u>	<u>S.D.</u>	<u>N</u>	<u>Mean</u>	<u>S.D.</u>	<u>N</u>	<u>Mean</u>	<u>S.D.</u>	<u>N</u>
<u>Finance Skills</u>									
1992-1993 Entry	5.2	1	12	5	0.7	30	5.07	0.79	32
1992-93 Exit	5.6	0.6	12	5.6	1	20	5.65	0.87	32
1993-94 Entry	4.7	1.4	17	3.6	1.2	11	4.24	1.42	28
1993-94 Exit	5.8	0.6	17	5.5	1	11	5.7	0.8	28
1994-95 Entry	4.8	1.1	17	4.9	1.4	6	4.83	1.18	23
1994-95 Exit	5.8	0.9	17	5.2	1	6	5.67	0.92	23
1995-96 Entry	3.5	1.2	8	4.5	1.4	12	4.12	1.39	20
1995-96 Exit	5.3	0.5	8	5.9	0.8	12	5.65	0.75	20
Overall Entry	4.67	1.30	54	R.54	1.19	49	4.61	1.24	103
Overall Exit	5.70	.70	54	5.63	.96	49	5.67	0.83	103
<u>Communication Skills</u>									
1992-93 Entry	5	1.5	12	5.4	1.1	20	5.21	1.26	32
1992-93 Exit	6	0.5	12	6	0.7	20	5.96	0.64	32
1993-94 Entry	5	1.4	17	4.5	1.3	11	4.6	1.33	28
1993-94 Exit	6	1	17	5.9	0.8	11	5.74	0.92	28
1994-95 Entry	5	0.7	17	5.9	0.6	6	5.43	0.74	23
1994-95 Exit	6	1	17	5.8	0.5	6	5.7	0.86	23
1995-96 Entry	5	0.8	7	5.1	1.2	12	4.95	1.05	19
1995-96 Exit	6	0.4	7	5.9	0.8	12	5.96	0.71	19
Overall Entry	4.9	1.17	53	5.19	1.17	49	5.04	1.17	102
Overall Exit	5.75	.83	53	5.93	.74	49	5.84	0.79	102
<u>Computer/Research Skills 1</u>									
1992-93 Entry	2	0.8	12	3.3	1.8	20	2.88	1.59	32
1992-93 Exit	3.5	1.8	12	3	1.4	20	3.19	1.54	32
1993-94 Entry	3.6	1.4	16	2.1	1	11	3.02	1.47	27
1993-94 Exit	3.1	1.4	16	2.6	0.8	11	2.91	1.23	27
1994-95 Entry	3.1	1.7	17	3.5	2.6	6	3.23	1.87	23
1994-95 Exit	3.5	1.3	17	2.9	0.9	6	3.39	1.25	23
1995-96 Entry	2.4	0.6	9	2.5	1.4	13	2.48	1.12	21
1995-96 Exit	3.8	1.5	9	3.1	1.3	13	3.33	1.37	21
Overall Entry	2.97	1.40	53	2.85	1.70	50	2.91	1.54	103
Overall Exit	3.45	1.47	53	2.92	1.18	50	3.19	1.36	103

Table 6b Cont'd: Skill Measure Results by Group and Gender

<u>Skill Measure</u>	<u>Males</u>			<u>Females</u>			<u>Overall</u>		
	<u>Mean</u>	<u>S.D.</u>	<u>N</u>	<u>Mean</u>	<u>S.D.</u>	<u>N</u>	<u>Mean</u>	<u>S.D.</u>	<u>N</u>
Finance Skills									
Computer/Research Skills 2									
1992-93 Entry	4.5	1.9	11	4.5	1.3	21	4.57	1.31	32
1992-93 Exit	4.7	1.7	11	5.3	1.4	21	5.09	1.53	32
1993-94 Entry	4.5	1.2	16	4.5	1.2	11	4.52	1.17	27
1993-94 Exit	5	1.7	16	4	1.5	11	4.57	1.71	27
1994-95 Entry	4.6	1.3	17	4.1	1.6	6	4.5	1.37	23
1994-95 Exit	5.1	1.5	17	5	1	6	5.04	1.36	23
1995-96 Entry	5.1	1.2	9	4.8	1.1	13	4.9	1.17	21
1995-96 Exit	4.6	2.1	9	4.9	1.4	13	4.76	1.66	21
Overall Entry	4.64	1.36	52	4.50	1.27	51	4.57	1.31	103
Overall Exit	4.89	1.67	52	4.86	1.46	51	4.88	1.56	103
Group Skills									
1992-93 Entry	6	1	12	5.9	1	21	5.92	.98	33
1992-93 Exit	6	0.6	12	6.1	0.8	21	6.17	.70	33
1993-94 Entry	6	1.4	16	6.2	0.7	11	5.83	1.22	27
1993-94 Exit	6	1.8	16	6.4	0.5	11	5.86	1.48	27
1994-95 Entry	6	0.6	16	6.4	0.5	6	6.15	.61	22
1994-95 Exit	6	1.3	16	6.4	0.7	6	6.12	1.17	22
1995-96 Entry	6	0.7	8	5.9	1	13	5.75	.94	21
1995-96 Exit	5	2	8	5.7	1.5	13	5.29	1.77	21
Overall Exit	5.71	1.56	52	6.10	.98	51	5.89	1.31	103
Self Report Thinking Skills On Exit Only									
Last No-Change (1991-92)	6.52	.73	13	6.07	.57	7	6.36	.70	20
1992-93 Exit	6.98	.52	12	6.54	.85	21	6.70	.77	33
1993-94 Exit	6.93	.95	17	6.36	1.16	11	6.71	1.06	28
1994-95 Exit	7.01	1.16	17	7.38	1.22	6	7.11	1.16	23
1995-96 Exit	6.81	.69	8	7.04	.83	13	6.95	.77	21
Overall Exit	6.87	.88	67	6.65	.98	58	6.76	.93	125

Table 7a: Positive View of Business—Corporate Role within Subject Effects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA ²
Time	.32	1	.32	.21	.65	.00
Time*Group*Gender	.74	3	.25	.16	.92	.01
Time*Group	7.58	3	2.53	1.63	.19	.05
Time*Gender	1.80	1	1.80	1.16	.29	.01
Error (Time)	147.59	95	1.55			

Table 7b: Positive View of Business-Corporate Role between Subject Effects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA ²
Intercept	3710.00	1	3710.01	2424.98	.00	.96
Group*Gender	.71	3	.24	.15	.93	.01
Group	5.37	3	1.79	1.17	.33	.04
Gender	3.50	1	3.50	2.29	.13	.02
Error	145.34	95	1.53			

Table 8a: Positive View of Business-Corporate Altruism within Subjects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA ²
Time	.14	1	.14	.08	.78	.00
Time*Group*Gender	1.38	3	.46	.27	.65	.01
Time*Gender	2.08	1	2.08	1.21	.28	.01
Time*Group	.11	3	.04	.02	.99	.00
Error (Time)	165.36	96	1.72			

Table 8b: Positive View of Business-Corporate Altruism between Subjects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA ²
Intercept	2694.98	1	2694.98	1410.50	.00	.94
Group*Gender	14.97	3	4.99	2.61	.06	.08
Group	1.06	3	.36	.17	.91	.01
Gender	.03	1	.03	.01	.91	.00
Error	183.42	96	1.91			

Table 9a: Knowledge Acquisition within Subject Contrasts

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA²
Time	.31	1	.31	.36	.55	.00
Time*Group*Gender	1.15	3	.38	.45	.72	.01
Time*Gender	.00	1	.00	.00	.98	.00
Time*Group	7.55	3	2.52	2.95	.04	.09
Error (Time)	81.10	95	.85			

Table 9b: Knowledge Acquisition between Subject Effects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA²
Intercept	5834.31	1	5834.12	4118.16	.00	.98
Group*Gender	3.03	3	1.01	.71	.55	.02
Group	.45	3	.15	.11	.96	.00
Gender	3.17	1	3.17	2.24	.14	.02
Error	134.59	95	1.42			

Table 10a: Service/Quality Emphasis within Subject Effects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA²
Time	2.28	1	2.28	4.57	.04	.05
Time*Group*Gender	.17	3	.06	.11	.95	.00
Time*Gender	.01	1	.01	.02	.88	.00
Time*Group	3.26	3	1.09	2.17	.10	.06
Error (Time)	48.35	97	.50			

Table 10b: Service/Quality Emphasis between Subject Effects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA²
Intercept	9997.40	1	9997.40	7688.98	.00	.99
Group*Gender	4.17	3	1.39	1.07	.37	.03
Group	1.95	3	.65	.50	.68	.02
Gender	.19	1	.19	.14	.71	.00
Error	126.12	97	1.30			

Table 11a: Insider Trading Ethics Case within Subject Effects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA²
Time	.39	1	.39	.65	.42	.01
Time*Group*Gender	1.15	3	.38	.64	.59	.02
Time*Gender	.39	1	.39	.65	.42	.01
Time*Group	1.32	3	.44	.74	.53	.02
Error (Time)	56.06	94	.60			

Table 11b: Insider Trading Ethics Case between Subject Effects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA²
Intercept	2252.51	1	2252.51	1911.14	.00	.95
Group*Gender	3.35	3	1.12	.95	.42	.03
Group	1.94	3	.65	.55	.65	.02
Gender	9.88	1	9.88	8.38	.01	.08
Error	110.79	94	1.18			

Table 12A: Financial Skills within Subject Effects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA²
Time	52.44	1	52.44	71.50	.00	.43
Time*Group*Gender	3.52	3	1.17	1.60	.19	.05
Time*Gender	.00	1	.00	.00	.99	.14
Time*Group	11.01	3	3.67	5.00	.00	.14
Error (Time)	69.68	95	.73			

Table 12b: Financial Skills between Subject Effects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA²
Intercept	4580.13	1	4580.13	3493.47	.00	.97
Group*Gender	12.39	3	4.13	3.15	.03	.09
Group	10.27	3	3.42	2.61	.06	.08
Gender	.24	1	.24	.18	.67	.00
Error	124.55	95	1.31			

Table 13a: Communication Skills within Subject Effects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA²
Time	28.24	1	28.24	57.47	.00	.38
Time*Group*Gender	1.92	3	.64	1.30	.28	.04
Time*Gender	.77	1	.77	1.57	.21	.02
Time*Group	6.54	3	2.18	4.44	.01	.12
Error (Time)	46.19	94	.49			

Table 13b: Communication Skills between Subject Effects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA²
Intercept	5187.75	1	5187.75	3554.88	.00	.97
Group*Gender	1.82	3	.61	.42	.74	.01
Group	6.32	3	2.11	1.44	.24	.04
Gender	2.06	1	2.06	1.41	.24	.02
Error	137.18	94	1.46			

Table 14A: Computer/Research Skills 1 within Subject Effects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA²
Time	5.32	1	5.32	3.14	.08	.03
Time*Group*Gender	12.51	3	4.17	2.46	.07	.07
Time*Gender	7.38	3	2.46	1.45	.23	.04
Time*Group	3.99	1	3.99	2.35	.13	.02
Error (Time)	161.03	95	1.70			

Table 14b: Computer/Research Skills 1 between Subject Effects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA²
Intercept	1638.00	1	1638.00	683.35	.00	.88
Group*Gender	11.62	3	3.87	1.62	.19	.05
Group	3.82	3	1.27	.53	.66	.02
Gender	3.69	1	3.69	1.54	.22	.02
Error	227.72	95	2.40			

Table 15a: Computer/Research Skills 2 within Subjects Effects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA²
Time	2.54	1	2.54	1.49	.23	.02
Time*Group*Gender	5.99	3	2.00	1.17	.32	.04
Time*Gender	.37	1	.37	.22	.64	.00
Time*Group	6.15	3	2.05	1.20	.31	.04
Error(Time)	161.72	95	1.70			

Table 15b: Computer/Research Skills 2 between Subjects Effects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA²
Intercept	3913.56	1	3913.56	1524.33	.00	.94
Group*Gender	5.00	3	1.67	.65	.59	.02
Group	2.87	3	.96	.37	.77	.01
Gender	.96	1	.96	.38	.54	.00
Error	243.90	95	2.57			

Table 16a: Group Skills within Subject Effects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA²
Time	.17	1	.17	.14	.71	.00
Time*Group*Gender	1.38	3	.46	.37	.77	.01
Time*Gender	.48	1	.48	.39	.54	.00
Time*Group	4.19	3	1.40	1.13	.34	.03
Error (Time)	117.78	95	1.24			

Table 16b: Group Skills between Subject Effects

Source	Type III Sums of squares	DF	Mean Square	F	Sig.	ETA²
Intercept	6247.12	1	6247.12	4802.20	.00	.98
Group*gender	8.33	3	2.78	2.13	.10	.06
Group	8.86	1	8.86	6.81	.01	.07
Gender	14.29	3	4.76	3.66	.02	.10
Error	123.58	95	1.30			

Table 17: Comparison of Change Groups to Last Non-Change Class

	Last Non-Change PAMBA Class			All AECC Change Classes			Differences Between Groups	
	<u>N</u>	<u>Mean</u>	<u>S.D.</u>	<u>N</u>	<u>Mean</u>	<u>S.D.</u>	<u>F-Value</u>	<u>P Value</u>
Values								
Corporate Role	20	4.10	1.25	104	4.60	1.20	2.83	.095
Corporate Altruism	20	4.18	1.35	105	3.85	1.5	.96	NS
Knowledge Acquisition	20	4.98	1.01	105	5.69	1.11	7.27	.008
Service/Quality	22	7.27	1.05	105	7.32	.99	.035	NS
Insider Trading Ethics	19	3.47	1.02	105	3.55	1.00	.099	NS
Technical Skills								
Financial	20	5.15	1.15	103	5.67	.83	5.68	.019
Communication	20	5.88	.93	104	5.81	.81	.129	NS
Computer/Research Skills 1	20	2.88	1.84	104	3.18	1.35	.708	NS
Computer/Research Skills 2	20	4.53	1.67	105	4.91	1.57	.990	NS
Group Skills	20	5.98	.85	104	5.90	1.31	.080	NS
Thinking Skills	20	6.36	.70	105	6.84	.95	4.591	.034
Other Information								
Job Interviews	21	4.48	2.69	102	4.75	3.12	.145	NS

Appendix A: Creation of Scales Used In Statistical Analyses

This appendix describes how the scales used in the statistical analyses were created.

Value Measure Creation

1. *Positive View of Business.*

The preliminary version of this measure consisted of four items. These items said that (a) businesses will not willingly pollute, (b) businesses will not try to take advantage of their customers, (c) corporations play a necessary role in society, and (d) corporate charity is not always self-serving.

i. Entrance. The factor analysis revealed that these four items broke into two factors. The first, comprised of items B and D above, seemed to measure perceptions of corporate altruism. It had an eigenvalue of 1.36043 and accounted for 34% of the variance. The second factor, consisting of items A and C from above, seemed to measure perceptions of the corporation's role in society. It had an eigenvalue of 1.065 and accounted for 26.6% of the variance.

ii. Exit. The factor analysis of the exit items produced the same two factors as did the analysis of the entry data. That is, the same items loaded on each of the two factors as in the entrance factor analysis. The respective eigenvalues and variances accounted for by the two factors are 1.43172 and 35.8% of the variance for factor 1 (corporate altruism) and 1.04211 and 26.1% of the variance for factor 2 (corporate role in society).

iii. Action Taken: Because of the consistent factor break outs across time, we created four separate variables. Two of these reflect the two factors that showed up in the entry data. Two of these reflect the two factors that showed up in the exit data. We dubbed the Business Altruism variables Corpalt1 and Corpalt2 respectively. The Corporate Role variable was also dubbed Corprol1 and Corprol2, to reflect whether it measured perceptions of the corporate role on entry into the PAMBA (given the suffix '1') or on exit from the PAMBA (given the suffix '2'). Given that only two items constituted each measure, the reliability coefficient was not computed. See Table 4 for factor analysis information.

2. *Knowledge Acquisition.*

The GRAECE proposal argues that students should develop positive attitudes towards lifelong learning and toward working in a global business environment. As noted earlier, three items were developed to measure each. Since these six items were included within the same section of the questionnaire, we began our analysis by putting them through a shared factor analysis since their placement may have affected student responses to them. The common denominator in both sets of items is expenditure of effort to remain current with the environment.

The questionnaire asked for the respondents' ratings of how strongly they believed that a good CPA should (a) read accounting journals, (b) be aware of major foreign events, (c) be multilingual, (d) do more continuing education work than required, (e)

attend meetings of professional associations, and (f) be aware of foreign cultures of relevance to clients.

i. Entry. The analysis of the entry level responses to the 6 items produced two factors. The first included items B, F, A, and D from above. It had an eigen value of 2.54536 and accounted for 42.4% of total variance. The items that loaded most highly seemed to concern active environmental scanning. The second factor consisted of items C and E (see above for descriptions). These items are harder to characterize, although they seem related to a communications capability. This factor had an eigenvalue of 1.00574, barely meeting the criterion that a factor must have an eigenvalue of 1.0000 to be retained. It accounted for 16.8% of the variance.

ii. Exit. All 6 items loaded on one factor. That factor had an eigenvalue of 3.02352 and accounted for 50.4% of the variance.

iii. Action Taken. Given (a) that the second factor in the factor analysis of the entry data accounted for just 40% (16.8%/42.4%) of the variance accounted for by the first factor in the entry data, and (b) barely met the criterion for forming a distinct factor (eigenvalue greater than or equal to 1.0), and (c) that only one factor emerged in the analysis of the exit data, we created one entry level scale (dubbed Acompac1) and one exit level measure (dubbed Acompac2). Both measures were constructed using only the four items (B, F, A, and D) that loaded most highly on the entry scale. The other two questionnaire items were dropped from the measure in order to maintain consistency between the entrance and exit measures. The resulting measures seemed to measure the person's belief in the necessity for reaching out and gaining knowledge of both professional and foreign cultures. The Cronbach alphas of Acompac1 and Acompac2 respectively were .74 and .73. See Table 4 for factor analysis information.

3. *Service/Quality Items*

The prima facie items that made up this measure asked the respondents how important it was to them to (a) work for a firm producing a quality product, (b) have a supervisor who consults with employees, (c) have the opportunity to help people, and (d) have a boss who stresses professional development, and (e) provide a product that objectively satisfies the client.

i. Entrance. Factor analysis of these items yielded two factors, one with an eigenvalue of 1.86, accounting for 37.2% of the variance. The second factor had an eigenvalue of 1.079 and accounted for 21.6% of the variance. Items A,B,C, and D loaded on the first factor. Only item E loaded on the second factor.

ii. Exit. Factor analysis of the exit data yielded one factor with an eigenvalue of 1.991, accounting for 39.8% of variance. All five items loaded on that factor.

iii. Action Taken: Given that only one item loaded on the second factor in the analysis of the entry items, and that the second factor analysis consisted solely of one factor, we dropped item E from the analysis. Table 4 shows the factor analyses after we re-ran them without using item E. The subsequent entry and exit measures, then, consisted solely of items A, B, C, and D. We dubbed the entry values measures Values1

and dubbed the exit values measure Values2. The alpha reliability of Values1 equaled .59. The alpha reliability of Values2 equaled .63. See Table 4 for factor analysis information.

Technical Skills Measure Creation

1. Self-Reported Financial and Communication Skills.

Questionnaire items in this group asked the respondents to report their self-assessment of their ability to (a) analyze financial statements, (b) calculate product costs, (c) calculate the change in their personal income tax obligations if their salaries changed, (d) understand stories in business publications, (e) write clear and persuasive business letters, and (f) explain clearly to employees what was expected of them.

i. Entry. Two factors emerged. The first factor had an eigenvalue of 2.6824 and accounted for 44.7% of the variance. The items that loaded most highly on this factor were (letters taken from above list) F, E, C, and D. With the exception of calculating personal taxes (D), these items seem to reflect an underlying communications factor. The second factor, which had an eigenvalue of 1.07843 and accounted for 18% of the variance, consisted of items A and B from above. Thus it seemed to measure financial skills. An alternate explanation of the two factors, of course, is that the first reflects entry skills of the students enrolling in an MBA program. These skills might have been developed during their undergraduate work or, in the case of personal taxes, through preparation of their own tax returns in the years between completion of their undergraduate degree and entry into the MBA program. Since the average age of the PAMBA respondents was 26 years old on entry, the subjects would have had several years of work experience before entering the PAMBA. The second factor, therefore, seems to measure those items that the students are not likely to have had much experience with before entering the program. (Note that the PAMBA does not admit students who have had more than 9 credits of accounting).

ii. Exit. The exit data also yielded two factors. The first factor again reflected communication skills. The three most highly loading items on it were D, E, and F. The first factor had an eigenvalue of 2.06424 and accounted for 34.4% of the variance. The second factor had an eigenvalue of 1.24464 and accounted for 20.7% of the variance. The items that loaded on this second factor were A, B, and C. Thus it seemed to measure financial skills.

iii. Action Taken. To resolve the problem of how to construct entry and exit scales, given that the personal income tax calculation item switched factor membership between the first administration of the questionnaire and the second, we examined the entry factor structure more carefully. On entry, the factor loading on factor 1 for the tax item was .47155. The personal tax calculation variable's loading on factor 2 was .40345. Given the small difference between the loadings, we decided to construct pre and post scales that included only the communication items from the pre and post first factors. These we dubbed Com1 and Com2 respectively. Separately we constructed pre and post scales that included only the financial skill items from the pre and post factors. These we dubbed Fin1 and Fin2. The reliability of the Com1 and Com2 scales respectively were .73 and

.64. The reliability of the Fin1 and Fin2 scales respectively were .64 and .45. See Table 4 for factor analysis information.

2. Computer Skills.

The GRAECE proposal argued that the curriculum and teaching method changes would significantly improve the students' computer and research skills. The five questions in this area sought the students' self-assessment of their skills in using (a) spreadsheets, (b) data base programs, (c) CD Rom databases, such as are found in libraries, (d) federal tax services, and (e) telecommunication packages.

i. Entry. The five items were subjected to a factor analysis. Two factors emerged. The first factor was composed of items B, D, and E. It had an eigenvalue of 2.2061 and accounted for 44.1% of the variance. The second factor was composed of items C and A from the above mentioned list. The second factor had an eigenvalue of 1.17768 and accounted for 23.6% of total variance. It is unclear why these factors broke out as they did.

ii. Exit. Factor analysis of the exit data showed that two factors existed here as well. The first factor again included items D, E, and B. It had an eigenvalue of 1.78007 and accounted for 35.6% of total variance. The second factor, which included items C and A, had an eigenvalue of 1.31476 and accounted for 26.3% of total variance.

iii. Action Taken. Based on these analyses, we created two measures for both the entry and exit data. The first measure at each testing point (pre and post) consisted of the items that loaded most highly on the first factor. The entry level first factor variable was labeled CPU1-1. The exit level first factor variable was labeled CPU2-1. The second measure consisted of the two items that loaded most highly on the second factor. The entry level second factor variable was labeled CPU1-2. The exit level second factor variable was labeled CPU2-2. The respective reliabilities of CPU1-1 and CPU2-1 were .653 and .514. Since only two items loaded on the second entry and exit factors (CPU1-2 and CPU2-2), reliability coefficients were not computed. See Table 4 for factor analysis information.

3. Group Skills

There were six group skill questions. These questions asked whether the respondents (a) felt comfortable when contributing to group discussions, (b) were annoyed when people disagreed with them, (c) compliment others on their contributions to the group, (d) let others deal with disruptive persons, (e) ask for clarification when they are unsure of a point being discussed within the group, and (f) say that fatigue leads them to agree to anything to avoid further group discussions. The latter item was excluded from the analysis because it was not present on the original questionnaire administered to the Summer 1992 entering PAMBA class.

i. Entry. Two factors emerged. Three of the five items (E, A, and C) loaded on the first factor. Its eigenvalue was 2.21991 and accounted for 44.4% of the variance. The second factor had two items (D and B) load on it. Items D and B loaded on the second factor. It had an eigenvalue of 1.12485 and accounted for 22.5% of total variance.

ii. Exit. Only one factor emerged in the factor analysis. It had an eigenvalue of 2.71413 and accounted for 54.3% of variance. All five items loaded on it.

iii. Action Taken. Given the differences in factor structures between the entry and exit data, we decided to use only the three items that loaded on the first factor in the entry factor analysis. The two items on the entry questionnaire (B and D) that loaded on the second factor were omitted from both the entry and exit group skills measures. The group entry variable was labeled Group1 and had a reliability coefficient of .68. The group exit variable was labeled Group2 and had a reliability coefficient of .82. See Table 4 for factor analysis information.

4. *Critical Thinking Skills.*

The exit questionnaires included items asking the respondents to rate themselves on the extent to which their experience in the professional accounting program led to an increase in their ability to do each of the following (a) identify unspoken assumptions in the statements that other people make, (b) solve or think through problems in which all the needed information is not known, (c) deduce new information from a set of relationships, (d) test the validity of an argument by searching for counter-examples, (e) detect logical contradictions in an argument, (f) take well known principles from one area and apply them to a different specialty.

As these were exit questions only, only a post-test measure was created. The items were factor analyzed to determine if there was one underlying factor structure. The one factor that emerged had an eigenvalue of 3.62384 and accounted for 60.4% of total variance. The 6 items that made up the scale had an alpha reliability coefficient of .8673. Since this measure is used on both the 4 PAMBA change classes *and* the last non-AECC class that graduated from Rutgers in the Summer of 1992, we created a measure that consisted only of items B, C, D and F from above. This was done because two questions (A and E) were added to the exit questionnaires after the last non-AECC class graduated. The measure consisting of only these four items had an alpha value of .7434.