**Volume 9, Number 1** **ISSN 1095-6328**

# ACADEMY OF EDUCATIONAL LEADERSHIP JOURNAL

An official Journal of the

Allied Academies, Inc.

Michael Shurden and Royce Caines
Editors
Lander University

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Whitney Press, Inc.

Printed by Whitney Press, Inc.
PO Box 1064, Cullowhee, NC 28723
www.whitneypress.com

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The *Academy of Educational Leadership Journal* is published by the Allied Academies, Inc., PO Box 2689, 145 Travis Road, Cullowhee, NC 28723, (828) 293-9151, FAX (828) 293-9407. Those interested in subscribing to the *Journal,* advertising in the *Journal,* submitting manuscripts to the *Journal*, or otherwise communicating with the *Journal*, should contact the Executive Director at info@alliedacademies.org.

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Royce Caines and Michael Shurden
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# DISTANCE LEARNING AND THE FACULTY: AN ANALYSIS OF PERCEPTIONS, CONCERNS, AND OPPORTUNITIES

**Nick Gerlich, West Texas A&M University**
**Pamela H. Wilson, West Texas A&M University**

## ABSTRACT

*Higher education is experiencing a major paradigm shift from the traditional lecture/face-to-face learning environment to online/distance learning. Studies showing student, faculty, administrative, and the institution's adjustments, concerns and attitudes are now becoming available. However, this information is changing very rapidly, as the implementation of new distance learning delivery modes and methods become available. This study focuses on the difference in attitudes and concerns of faculty determined by their age, gender, tenure, PC literacy and whether they have taught an online class previously. Results indicated that the greatest disparity in faculty perceptions of online teaching were apparent between those with and without online teaching experience. Other factors, such as age, gender, tenure, and computer literacy, played little or no role in perceptual differences.*

## INTRODUCTION

Online education has grown and prospered in the ten years following the commercial development of the internet. Private and public universities, as well as private firms, have embraced the concept in large numbers, as have students. Still, there are concerns about the new paradigm, often centered on faculty perceptions.

These perceptions often include concerns about the quality of teaching, the amount of preparation, the level of student-faculty interaction, and technical support provided by the university (Schiffer 2002; Meyer 2002; Bower 2001; Crumpacker 2001). These concerns are typical of schools with little or no prior experience in online learning, and thus may not reflect views after experience is gained.

The purpose of this study is to examine full-time faculty views on distance learning at an institution that has been delivering online courses and programs for over five years, and was one of the first movers among public universities in its home state.

## LITERATURE REVIEW

This study focuses on concerns and barriers to effective online/distance learning from the faculty point of view. "Technological change is what many have said is the only constant in our work today" (Kubala, 2000). Development of distance education technologies requires that faculty adjust their teaching styles, course design, evaluation of student work and in essence, the way they think about education and educational tools available to them. Thus, a major a paradigm shift, from lecture/face-to-face classes to technologically advanced online/distance learning. (NEA, 2002; Quinn and Corry, 2002; Oblinger, Barone and Hawkins, 2001; Hassenplug and Harnish, 1998).

Have faculty made this paradigm shift? According to a survey conducted by the NEA, one in 10 higher education NEA members teaches a distance learning course and 90% of these NEA members who teach traditional courses say that distance learning courses are offered or being considered at their institutions. (NEA, 2000). As stated in this survey, "Distance learning NEA members resemble traditional faculty in that they are full time (80%), tenured (73%), split evenly between full professors (35) and lecturers and adjuncts (35%), hold masters' degrees (48%) rather than a Ph.D. (31%)" (NEA, 2000). From the above statistics, we can dispel the notion that traditional faculty are being replaced by part-time distance learning faculty, allowing for the fact that many distance learning faculty, teaching only one or two courses, would probably not be members of the NEA (NEA 2000).

If a large number of full-time and tenured faculty are teaching distance/online learning classes, then what are their attitudes and concerns? Only recently has literature been available to review to give further insight to these issues.

One recurring theme in recent literature is the issue of increased preparation time or workload increase when teaching distance/online classes. Several studies concluded that distance/online learning requires a disproportionate investment of time and effort for preparation than traditional face-to-face classes (Carnevale 2001; Schneider 2000; Carr2000b; National Education Association 2000; American Association of University Professors 1999). Along with workload considerations, distance/online learning faculty are concerned about appropriate compensation for the work (Meyen and Yang 2003; Lynch and Corry 1998). However, regardless of preparation time, workload, or compensation issues the National Center for Education Statistics (2002) found that ". . . despite carrying larger teaching loads, faculty who taught any distance classes were just as likely, and in some cases more likely, to indicate that they were very satisfied with their workload, compared with faculty teaching only traditional classes." This was also found to be the case in a survey by the National Education Association (2000).

Some critics believe that distance/online learning is not a substitute for students interacting spontaneously in a face-to-face environment with other students and professors (Guernsey 1998; Sherron and Boettcher 1997; Black 1992). However, other studies show that there may be benefits

and more options available in distance/online learning than are available in the face-to-face learning environment (Turoff 1999; Sherron and Boettcher 1997).

Another concern is that of tenured versus non-tenured faculty. Are tenured or non-tenured faculty more likely to make the paradigm shift to distance/online learning? The National Center for Education Statistics (2002) states that "the security of tenure might encourage experienced faculty to try more controversial forms of instructional design . . ." This seems to be contrary to the fact that tenured faculty have more years of experience in teaching and might be less likely to want to change their methods of teaching.

Many studies show that distance/online teaching faculty are concerned about the level of student /faculty interaction when using distance technologies. Some disagree that the kind of interaction the distance education student experiences is comparable to the face-to-face teaching/learning environment (Gladieux and Swail 1999; Sherron and Boettcher 1997). However, the National Center for Education Statistics (2002) stated that "faculty who participated in distance education appeared to interact with students, or be available to them, more than their non distance counterparts in fall 1998. Full-time faculty teaching distance classes held slightly more office hours per week than their peers who did not teach distance education classes or non-face-to-face classes." Many distance educators perceive some of the greatest barriers to teaching in a distance environment as technology issues; either not having the needed technology, or not having the technological support to successfully implement distance/online classes. In addition, distance faculty are also concerned with the content and quality of their classes. (Meyen and Yang 2003; Greenagel 2002; Berge 1998). One survey revealed 43% of the respondents had concerns about "content" and 31% expressed concerns about "technical issues", such as not having the necessary equipment (DDI 2002) and another report by Killion (2000) reported faculty concerns about content and learning methods employed.

The initial costs, hidden costs and ongoing costs of distance/online learning environments can also be a detriment when developing distance/online learning environments (National Staff Development Council and National Institute for Community Innovations 2001; Killion 2000; One study identified 22 barriers to online staff development programs that ranged from lack of technology, limited time factors, limited budgets, not having the expertise to develop classes, lack of incentives for instructional faculty to participate and others (Meyen and Yang, 2003).

Although advantages and disadvantages of distance/online learning are still being studied, educators and researchers will have a plethora of research opportunities in the foreseeable future as the educational paradigm continues to shift towards distance/online learning and away from the traditional face-to-face teaching modes and methods.

## METHODOLOGY

Data were collected at a medium-sized Division II public university in the Sun Belt. This university has been delivering online courses since 1997, starting with one course and 25 students, to its current level of over 75 courses and over 4300 course enrollments.

An email announcement was sent to all 226 full-time faculty, with a link to an online survey instrument. Of these, 110 submitted the survey (48.7%). Respondents remained anonymous, and constitute a volunteer sample, since all full-time faculty were invited to participate.

Exploratory research was conducted to determine the key issues surrounding online education deemed important by the faculty. A series of 14 Likert-type statements were developed and included in the survey, along with five faculty demographic variables that would be used for detailed analysis of the data.

The Likert statements included in the instrument are found in Table 1 below. The five demographic variables were (1) whether the faculty member had taught online, (2) gender, (3) PC literacy, (4) age group, and, (5) tenure status. Several open-ended questions were also provided, to which faculty members could elaborate on their primary concerns. Data were analyzed using SPSS-PC software.

The demographic variables were categorized as follows:

| |
|---|
| Online experience: Yes or No |
| Gender: Male or Female |
| PC Literacy: High or Medium vs. Low or None |
| Age: 40 and under vs. over-40 |
| Tenure: Yes or No |

**Table 1: Survey Instrument**

| | |
|---|---|
| Respondents were given 14 Likert-type statements and asked to rate their level of agreement or disagreement with the statement. A score of 1 indicated "strongly agree" while a score of 5 indicated "strongly disagree." A score of 3 indicated neutrality while 2 was "agree" and 4 was "disagree." | |
| Q1: | The university's online program offers too many courses. |
| Q2: | The University provides its online faculty with sufficient computer and staff resources to be able to teach online effectively. |
| Q3: | Online teaching is less effective than teaching using the regular on-campus format. |
| Q4: | Most student comments about courses they have taken through the online program have been favorable. |
| Q5: | Many students believe the Online program offers too few course choices. |
| Q6: | The quality of our online course instruction has improved significantly since the online program began. |

| Table 1: Survey Instrument | |
|---|---|
| Q7: | There is substantial student demand for additional online courses at our university. |
| Q8: | Fewer hours of professor labor are required for an online course than for the same course taught on-campus. |
| Q9: | Instructors should be paid more for teaching online than for teaching on-campus. |
| Q10: | Given the choice I would prefer teaching on-campus to teaching online. |
| Q11: | Students learn as much in an online course as they do in the same course taught on-campus. |
| Q12: | Students get as much value for their money in an online course as they do in an on-campus course. |
| Q13: | It is easy to engage online students in class discussions via the internet. |
| Q14: | It is more difficult to meet the needs of online students than of on-campus students. |

## RESULTS

Mean responses for each of the 14 Likert statements were calculated, and then broken down by each of the five demographic variables (see Tables 2-6 for results). A mean response of 3 indicates overall neutrality to an issue, while an average score greater than 3 indicates an increasing level of disagreement, and an average score less than 3 indicates an increasing level of agreement. T-tests for independent samples were performed for each of these comparisons, and the probability of these differences occurring by chance.

Table 7 summarizes which mean scores were significantly different (at $p<0.05$) for each of the 14 statements and 5 demographic variables. Of the 70 possibilities, 17 analyses resulted in significant differences.

Perhaps the most important result is that, after five years of offering online courses and programs, the one demographic variable producing the most significant differences in responses is whether or not the faculty member had ever taught online. Of the 14 Likert statements, eight produced significantly different mean responses.

Results for the other demographic variables were not as compelling. Gender produced 5 of 14 significant differences, while PC literacy produced 3 and tenure 1. There were no significant differences for the age variable.

Table 3 summarizes the data between online and offline faculty. Specifically, the online faculty disagreed more with the statement that too many courses were offered, suggesting they think that more could be offered (Q#1). Online faculty also demonstrated a sizeable difference in their disagreement with the statement that online teaching is less effective than traditional formats (Q#3). Other responses echoed these findings, revealing that the online faculty contend there is great demand for more online courses (Q#7), that students learn as much in online courses as they do in other courses (Q#11), online students receive value for their money (Q#12), and that faculty with online experience prefer this method (Q#10).

| Table 2: Analysis By Online Experience | | | | | | |
|---|---|---|---|---|---|---|
| | Online Exper. | N | Mean | Std. Deviation | t-statistic | p-value |
| Q #1 | yes | 39 | 4.0769 | .8998 | 2.290 | 0.024 |
| | no | 71 | 3.5493 | 1.2738 | | |
| Q #2 | yes | 39 | 3.1282 | 1.5249 | -0.433 | 0.666 |
| | no | 71 | 3.2394 | 1.1397 | | |
| Q #3 | yes | 39 | 3.8718 | 1.3412 | 4.005 | 0.000 |
| | no | 71 | 2.7606 | 1.4189 | | |
| Q #4 | yes | 39 | 2.4615 | 1.1203 | -3.039 | 0.003 |
| | no | 71 | 3.1127 | 1.0495 | | |
| Q #5 | yes | 39 | 2.6154 | .7475 | -2.172 | 0.032 |
| | no | 71 | 3.0000 | .9562 | | |
| Q #6 | yes | 39 | 2.3846 | 1.1382 | -1.256 | 0.212 |
| | no | 71 | 2.6056 | .7067 | | |
| Q #7 | yes | 39 | 2.3590 | 1.1118 | -2.292 | 0.024 |
| | no | 71 | 2.8451 | 1.0371 | | |
| Q #8 | yes | 39 | 4.1026 | .5024 | 0.336 | 0.737 |
| | no | 71 | 4.0563 | .7725 | | |
| Q #9 | yes | 39 | 3.0000 | 1.6859 | -0.917 | 0.361 |
| | no | 71 | 3.2817 | 1.4559 | | |
| Q #10 | yes | 39 | 3.3077 | 1.7038 | 4.922 | 0.000 |
| | no | 71 | 1.9718 | 1.1335 | | |
| Q #11 | yes | 39 | 2.4615 | 1.3148 | -4.588 | 0.000 |
| | no | 70 | 3.5714 | 1.1493 | | |
| Q #12 | yes | 39 | 2.3590 | 1.4046 | -4.137 | 0.000 |
| | no | 71 | 3.4366 | 1.2505 | | |
| Q #13 | yes | 39 | 3.3846 | 1.5151 | -0.213 | 0.832 |
| | no | 71 | 3.4366 | 1.0383 | | |
| Q #14 | yes | 39 | 2.5897 | 1.4458 | -0.229 | 0.819 |
| | no | 71 | 2.6479 | 1.1723 | | |

| Table 3: Analysis by Gender | | | | | | |
|---|---|---|---|---|---|---|
| | Gender | N | Mean | Std. Deviation | t-statistic | p-value |
| Q #1 | male | 57 | 3.4211 | 1.2385 | -3.200 | 0.002 |
| | female | 51 | 4.1176 | .9929 | | |
| Q #2 | male | 57 | 3.0526 | 1.2736 | -1.221 | 0.225 |
| | female | 51 | 3.3529 | 1.2779 | | |
| Q #3 | male | 57 | 2.7368 | 1.5298 | -3.334 | 0.001 |
| | female | 51 | 3.6471 | 1.2779 | | |
| Q #4 | male | 57 | 3.0877 | 1.2142 | 2.295 | 0.024 |
| | female | 51 | 2.6078 | .9182 | | |
| Q #5 | male | 57 | 2.7193 | .8609 | -1.849 | 0.067 |
| | female | 51 | 3.0392 | .9372 | | |
| Q #6 | male | 57 | 2.6140 | .9591 | 1.180 | 0.241 |
| | female | 51 | 2.4118 | .8044 | | |
| Q #7 | male | 57 | 2.6667 | 1.0911 | -0.093 | 0.926 |
| | female | 51 | 2.6863 | 1.1044 | | |
| Q #8 | male | 57 | 4.1053 | .8169 | 0.645 | 0.520 |
| | female | 51 | 4.0196 | .5095 | | |
| Q #9 | male | 57 | 3.2807 | 1.5440 | 0.878 | 0.382 |
| | female | 51 | 3.0196 | 1.5426 | | |
| Q #10 | male | 57 | 1.9825 | 1.3295 | -3.565 | 0.001 |
| | female | 51 | 2.9608 | 1.5226 | | |
| Q #11 | male | 57 | 3.3684 | 1.2905 | 1.539 | 0.127 |
| | female | 50 | 2.9800 | 1.3169 | | |
| Q #12 | male | 57 | 3.3158 | 1.4535 | 2.003 | 0.048 |
| | female | 51 | 2.7843 | 1.2855 | | |
| Q #13 | male | 57 | 3.5614 | 1.1498 | 1.148 | 0.253 |
| | female | 51 | 3.2941 | 1.2696 | | |
| Q #14 | male | 57 | 2.4737 | 1.2692 | -1.043 | 0.299 |
| | female | 51 | 2.7255 | 1.2342 | | |

| Table 4: Analysis by PC Literacy | | | | | | |
|---|---|---|---|---|---|---|
| | PC Literacy | N | Mean | Std. Deviation | t-statistic | p-value |
| Q #1 | low | 11 | 3.4545 | .9342 | -0.835 | 0.406 |
| | high | 99 | 3.7677 | 1.2023 | | |
| Q #2 | low | 11 | 3.4545 | 1.3685 | 0.692 | 0.491 |
| | high | 99 | 3.1717 | 1.2781 | | |
| Q #3 | low | 11 | 2.9091 | 1.6404 | -0.576 | 0.566 |
| | high | 99 | 3.1818 | 1.4733 | | |
| Q #4 | low | 11 | 2.9091 | .9439 | 0.085 | 0.932 |
| | high | 99 | 2.8788 | 1.1363 | | |
| Q #5 | low | 11 | 3.0909 | 1.0445 | 0.879 | 0.382 |
| | high | 99 | 2.8384 | .8888 | | |
| Q #6 | low | 11 | 2.8182 | .4045 | 1.151 | 0.252 |
| | high | 99 | 2.4949 | .9189 | | |
| Q #7 | low | 11 | 3.2727 | .9045 | 1.959 | 0.053 |
| | high | 99 | 2.6061 | 1.0863 | | |
| Q #8 | low | 11 | 4.4545 | .6876 | 1.969 | 0.052 |
| | high | 99 | 4.0303 | .6769 | | |
| Q #9 | low | 11 | 4.0000 | 1.0000 | 1.879 | 0.063 |
| | high | 99 | 3.0909 | 1.5655 | | |
| Q #10 | low | 11 | 2.5455 | 1.5725 | 0.232 | 0.817 |
| | high | 99 | 2.4343 | 1.4994 | | |
| Q #11 | low | 11 | 2.9091 | 1.2210 | -0.702 | 0.484 |
| | high | 98 | 3.2041 | 1.3313 | | |
| Q #12 | low | 11 | 3.0909 | 1.3751 | 0.090 | 0.928 |
| | high | 99 | 3.0505 | 1.4097 | | |
| Q #13 | low | 11 | 3.0000 | 1.0000 | -1.199 | 0.233 |
| | high | 99 | 3.4646 | 1.2398 | | |
| Q #14 | low | 11 | 3.4545 | 1.1282 | 2.323 | 0.022 |
| | high | 99 | 2.5354 | 1.2561 | | |

| Table 5: Analysis by Age | | | | | | |
|---|---|---|---|---|---|---|
| | Age | N | Mean | Std. Deviation | t-statistic | p-value |
| Q #1 | 41 up | 79 | 3.7468 | 1.1262 | 0.148 | 0.883 |
| | 40 under | 31 | 3.7097 | 1.3215 | | |
| Q #2 | 41 up | 79 | 3.1139 | 1.3106 | -1.124 | 0.263 |
| | 40 under | 31 | 3.4194 | 1.2048 | | |
| Q #3 | 41 up | 79 | 3.2152 | 1.5079 | 0.682 | 0.497 |
| | 40 under | 31 | 3.0000 | 1.4376 | | |
| Q #4 | 41 up | 79 | 2.8608 | 1.1179 | -0.315 | 0.753 |
| | 40 under | 31 | 2.9355 | 1.1236 | | |
| Q #5 | 41 up | 79 | 2.8987 | .9001 | 0.649 | 0.518 |
| | 40 under | 31 | 2.7742 | .9205 | | |
| Q #6 | 41 up | 79 | 2.6203 | .8815 | 1.776 | 0.079 |
| | 40 under | 31 | 2.2903 | .8638 | | |
| Q #7 | 41 up | 79 | 2.7342 | 1.0944 | 0.948 | 0.345 |
| | 40 under | 31 | 2.5161 | 1.0605 | | |
| Q #8 | 41 up | 79 | 4.0886 | .6829 | 0.386 | 0.701 |
| | 40 under | 31 | 4.0323 | .7063 | | |
| Q #9 | 41 up | 79 | 3.2278 | 1.4759 | 0.499 | 0.619 |
| | 40 under | 31 | 3.0645 | 1.7114 | | |
| Q #10 | 41 up | 79 | 2.5570 | 1.5587 | 1.248 | 0.215 |
| | 40 under | 31 | 2.1613 | 1.3190 | | |
| Q #11 | 41 up | 78 | 3.1026 | 1.3444 | -0.901 | 0.370 |
| | 40 under | 31 | 3.3548 | 1.2530 | | |
| Q #12 | 41 up | 79 | 3.0000 | 1.3960 | -0.651 | 0.517 |
| | 40 under | 31 | 3.1935 | 1.4241 | | |
| Q #13 | 41 up | 79 | 3.3165 | 1.2041 | -1.400 | 0.164 |
| | 40 under | 31 | 3.6774 | 1.2487 | | |
| Q #14 | 41 up | 79 | 2.6835 | 1.3062 | 0.740 | 0.461 |
| | 40 under | 31 | 2.4839 | 1.1796 | | |

| Table 6: Analysis by Tenure | | | | | | |
|---|---|---|---|---|---|---|
| | Tenure | N | Mean | Std. Deviation | t-statistic | p-value |
| Q #1 | yes | 63 | 3.5397 | 1.1334 | -2.057 | 0.042 |
| | no | 47 | 4.0000 | 1.1978 | | |
| Q #2 | yes | 63 | 3.2381 | 1.2916 | 0.359 | 0.720 |
| | no | 47 | 3.1489 | 1.2850 | | |
| Q #3 | yes | 63 | 3.0476 | 1.4857 | -0.873 | 0.384 |
| | no | 47 | 3.2979 | 1.4878 | | |
| Q #4 | yes | 63 | 2.9524 | 1.1836 | 0.767 | 0.445 |
| | no | 47 | 2.7872 | 1.0201 | | |
| Q #5 | yes | 63 | 2.8889 | .9352 | 0.338 | 0.736 |
| | no | 47 | 2.8298 | .8678 | | |
| Q #6 | yes | 63 | 2.5556 | .9466 | 0.386 | 0.700 |
| | no | 47 | 2.4894 | .8041 | | |
| Q #7 | yes | 63 | 2.8413 | 1.0657 | 1.910 | 0.059 |
| | no | 47 | 2.4468 | 1.0796 | | |
| Q #8 | yes | 63 | 3.9841 | .7294 | -1.577 | 0.118 |
| | no | 47 | 4.1915 | .6128 | | |
| Q #9 | yes | 63 | 3.3810 | 1.4304 | 1.581 | 0.117 |
| | no | 47 | 2.9149 | 1.6528 | | |
| Q #10 | yes | 63 | 2.3175 | 1.4682 | -1.037 | 0.302 |
| | no | 47 | 2.6170 | 1.5401 | | |
| Q #11 | yes | 63 | 3.1270 | 1.3379 | -0.437 | 0.663 |
| | no | 46 | 3.2391 | 1.3027 | | |
| Q #12 | yes | 63 | 3.0000 | 1.4142 | -0.471 | 0.638 |
| | no | 47 | 3.1277 | 1.3928 | | |
| Q #13 | yes | 63 | 3.2381 | 1.1875 | -1.808 | 0.073 |
| | no | 47 | 3.6596 | 1.2385 | | |
| Q #14 | yes | 63 | 2.6508 | 1.3218 | 0.224 | 0.823 |
| | no | 47 | 2.5957 | 1.2097 | | |

| Table 7: Summary of Significant Differences of Response Means (p<0.05) | | | | | |
|---|---|---|---|---|---|
| | Online Exp. | Gender | PC Literacy | Age | Tenure |
| Q#1 | Yes | Yes | | | Yes |
| Q#2 | | | | | |
| Q#3 | Yes | Yes | | | |
| Q#4 | Yes | Yes | | | |
| Q#5 | Yes | | | | |
| Q#6 | | | | | |
| Q#7 | Yes | | | Yes | |
| Q#8 | | | | Yes | |
| Q#9 | | | | | |
| Q#10 | Yes | Yes | | | |
| Q#11 | Yes | | | | |
| Q#12 | Yes | yes | | | |
| Q#13 | | | | | |
| Q#14 | | | | Yes | |

Table 4 summarizes the data between male and female respondents. Five of the 14 items resulted in significant differences, indicating possibly that women are more inclined to favor online courses because of the clear advantages such courses offer female students (especially those who are married and/or with children).

For example, males were more likely than females to feel that online teaching is less effective than on-campus teaching (Q#3), yet men were also more likely to prefer to teach online than were women (Q#10). Women were more likely to feel that online students get value for their money (Q#12), and that student comments have been favorable (Q#4), while disagreeing strongly that there are too many online courses (Q#1).

The other demographic variables (PC literacy, age, and tenure status) did not produce many significant results, leading us to conclude that these factor were not relevant pivot points for the data. This is somewhat surprising, since online teaching assumes a certain level of PC literacy. Furthermore, age is often assumed to be a factor in PC literacy, since younger faculty have been exposed to computer technologies for a greater percentage of their lives than have their more senior colleagues.

Finally, tenure was not a good source of perceptual differences. Given the pressures of attaining tenure, one might conclude that previously-tenured faculty might be less favorably disposed toward a paradigm that would require them to learn new pedagogy and computing skills, at a point in their career when it might not be critical to do so.

## CONCLUSIONS

The results reported above point to an interesting observation: After five years of delivering courses and programs online, the biggest factor producing differences of opinion is simply whether the faculty member had ever taught online. Generally speaking, experienced online faculty were more favorable in their assessments of this paradigm than were faculty with no online experience. While it is not possible to determine from this study if these online faculty were naturally predisposed to the paradigm (or the opposite for other faculty not teaching online), it may be possible to improve overall perceptions of online teaching by merely getting more offline faculty into the ranks of online faculty.

No attempt was made to analyze for differences among the experienced online faculty. It is possible that their assessments improve as their number of online experiences increases. Still, it is apparent from these results that by increasing from 0 to 1 or more the number of online teaching experiences, a generally more favorable outlook toward online teaching will result.

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# ADDING AN ACCOUNTING COMPONENT TO A COMPUTER-BASED INTERDISCIPLINARY EXERCISE: DESCRIPTIVE RESULTS

**James W. Bovinet, Winona State University**
**Gloria McVay, Winona State University**

## ABSTRACT

*Educators and accreditation organizations have recently been extolling the value of interdisciplinary education in business. Often, students work in a single-major vacuum and do not see the inevitable working relationships that are established within a company. Interdisciplinary experiential exercises are one way to show students what other majors "bring to the table" in terms of skill sets and complementary information.*

*The exercise detailed in this paper began 10 years ago. Marketing, advertising, and public relations classes joined to participate in a computer-based business simulation. In time, it became obvious that the students involved had little understanding of the accounting procedures that form the structure of a business. Building financial statements for a viable business plan was an exercise in futility. The program needed to add an accounting component.*

*The simulation exercise described in this paper incorporates a number of suggested learning strategies. This paper details the experiences gained when an accounting component was added to an interdisciplinary simulation that previously incorporated marketing, public relations, and advertising students. Some of the background material and results of the first ten years are provided (prior to adding the accounting component), but the focus is on the benefits realized when adding the accounting component in the eleventh year. The objective is to provide accounting instructors with a case study of an interdisciplinary teaching experience, to show how simulations and small group work might facilitate this process of integrating accounting into such an experience, and to provide an overview of a working model.*

*This paper also details the pedagogical theories underpinning such an endeavor. The advantages for the accounting majors are detailed. In addition, procedural issues are addressed allowing any accounting educator to devise a similar exercise.*

## INTRODUCTION

Several important themes have converged in recent years to impact the landscape of accounting education: the demand for student core competencies that extend beyond the mechanics

of accounting to include communication skills, problem solving and critical thinking skills, and social interaction skills (www.AICPA.org); the introduction and widespread adoption of instructional technologies (Leidner & Jarvenpaa, 1995; Massy & Zemsky, 1995; Chickering & Ehrmann, 1996; Butler & Mautz, 1996; Hagen et al, 1997; Hein & Stalcup, 2001; Karakaya et al., 2001; Rankin & Hoass, 2001; Basile & D'Aquila 2002; Milliken & Barnes, 2002; Parikh & Verma, 2002); and a focus on what constitutes "good practice" in undergraduate education (Chickering & Gamson, 1987; Newlin & Wang, 2002). This paper presents some ideas on how a computer-based, interdisciplinary exercise can be used to leverage good practices in accounting education and improve core competencies of undergraduate accounting students.

One of the objectives of accounting educators is to supply job-ready accounting graduates who possess a skill set demanded by the profession. This objective is addressed by identifying core skills and by formulating strategies to develop well-equipped students. Subsequent to the 1989 Accounting Education Change Commission (AECC) report, accounting educators have been striving to address these changing needs within the accounting curriculum. At the same time, instructional technology has entered the educational arena, providing opportunities to enhance the undergraduate experience through a wider array of learning media.

In 1916, John Dewey wrote in Democracy and Education that education should be alive and involved. He believed that knowledge is linked to experience but that mere activity does not constitute experience. In other words, learning has both passive (learning the connections) and active (learning the consequences) components. A paradigm shift in higher education is evident. The instruction paradigm views students as passive recipients of knowledge and the learning paradigm views students as active participants in the learning process (Bobbitt et al., 2000). Business students may excel in theoretical courses and then become paralyzed when exposed to the rigors of a chaotic working world. Additionally, students who only sporadically participate in the passive element of learning (lecture, textbook reading, etc.) often rise to the challenge in a "hands-on" setting (experiential exercises) (Bovinet, 2001).

A potential answer to this problem is to lead accounting students toward a dualistic experience that integrates theory and practice. The method to achieve this duality, however, is often the conundrum. The Accounting Education Change Commission suggests active participation, unstructured problems, learning by doing, and working in groups.

> Students must be active participants in the learning process, not passive recipients of information. They should identify and solve unstructured problems that require use of multiple information sources. Learning by doing should be emphasized. Working in groups should be encouraged. (Accounting Education Change Commission 1990, p.309)

First, we discuss opportunities for integrating instructional technology into the learning experience while at the same time addressing the core competencies need for entrance into the

accounting profession. Next, the literature on small group learning is reviewed. Simulations and interdisciplinary teaching are then placed in a historical perspective and the advantages of using these pedagogical tools are developed. A model is described to illustrate the learning theory advanced in this experiment. The actual exercise is then described, along with the results of student surveys and a self-reported assessment of core competencies.

## INSTRUCTIONAL TECHNOLOGY AND ACCOUNTING CORE COMPETENCIES

The AICPA's Accounting Education Executive Committee (AEEC) appointed an Integration of Technology into the Learning Experience Task Force (Task Force) and provided it with the charge of identifying opportunities for the AICPA to provide support to faculty which will facilitate integrating IT into accounting education while at the same time addressing the core competencies needed for entry into the accounting profession. The core competencies cross three broad areas: functional competencies, personal competencies, and broad business perspective competencies. Functional competencies relate to the technical competencies typically associated with the accounting profession. The functional competencies include: decision modeling, risk analysis, measurement, reporting, research, and leveraging technologies to develop and enhance the functional competencies. Personal competencies relate to attitudes and behaviors of accounting professionals and include: professional demeanor, problem solving and decision making, interaction, leadership, communication, project management, and leveraging technologies to develop and enhance the personal competencies. Broad business perspective competencies relate to the context in which accounting professionals perform their work and encompass strategic/critical thinking, industry/sector perspective, international/global perspective, resource management, legal/regulatory perspective, marketing/client focus, and leveraging technology to develop and enhance a broad business perspective. A thorough discussion of these core competencies may be found on the AICPA web site (www.aicpa.org/edu/corecomp.htm).

## SMALL GROUP LEARNING

Meyers (1997) summarizes a multitude of ways in which student participation and productivity is increased in psychology classes by using various forms of small-group activities in the classroom. In a thorough analysis of learning in science, mathematics, engineering, and technology undergraduate classes, small group exercises engendered a positive main effect of learning on achievement, persistence, and attitudes among undergraduate students (Springer et al., 1999). They conclude that, "In general, our data support the inference of robust effects across the disciplines. No significant differences on achievement-related outcomes for students in different fields of study are apparent" (Springer et al.,1997, p.39). Both of these articles suggest enormous benefits from small group learning in the classroom.

Finally, some research addresses both technology use and small group learning. Alavi (1994) studied the use of a group discussion support system (GDSS) on collaborative learning in a management information systems course for MBAs. Students worked in small groups, one class with the GDSS, and one without. In self-reported scores, students using the GDSS reported higher levels of skills learned, higher levels of interest in the subject, and higher course evaluations. Other studies similarly conclude that using a combination of multimedia presentations and small group workshops in a marketing class is quite successful (Milliken & Barnes, 2002).

Overall, the use of technology and small group exercises within the classroom can be quite beneficial to both learning and positive attitudes among students. The simulation exercise detailed here was designed to incorporate a high use of technology and in such a way that small groups were the norm and used by all instructors within this interdisciplinary exercise. The accounting students formed "firms" composed of three students who were hired by the "companies" managed by small-group management teams composed of marketing students.

## SIMULATIONS

The role of any business manager and the effectiveness of the business decisions involved are often dependent on events that are uncontrollable. However, information on certain probabilities of occurrence is frequently available. Basically, a simulation is an attempt to afford participants the opportunity to experience dealing with those probabilities in a no-risk situation (as opposed to experimentation in the marketplace).

> A complementary approach is to construct an artificial but controlled environment which hopefully captures some of the essentials of the real situation and to use this artificial environment for testing various hypotheses... (Green et al., 1967, p.4)

Accounting today places a large emphasis on the speed and quality of decision making. (AICPA, 2001; LaMont, 2001). Simulation exercises provide similar motivating factors of competition and rapid feedback (Larreche, 1987). Early games developed in the 1950s were contributors to investigations in operations research (Cohen & Rhenman, 1961). In 1962, the first survey of marketing games was published in the Journal of Marketing (McRaith & Goeldner, 1962). By 1968, virtually all business schools were using some form of simulation exercises (Graham & Gary, 1969). In 1970 it was estimated that over 200 simulations were in existence and over 100,000 managers had been exposed to their rigors (Shim, 1978).

> Skills obtained from game-based courses appear to have greater validity because the game experience allows numerous iterations of decisions within similar data sets, while providing simultaneous concrete feedback. Both factors - replications of a practice set and concrete feedback - are necessary in skill-building sessions for many areas but absent in lecture and case classes. (Knotts & Keys, 1997, p.378-9)

The speed and availability of microcomputers for both simulation designers and participants has greatly enhanced their development and use. Simulations have become accessible to more and more researchers and practitioners. The potential value of simulations for experiential learning has been identified by a number of authors (Lamont, 2001; Bobrowski & Molinari, 2000; Bovinet, 2000; Knotts & Keys, 1997; Wolfe & Rogé, 1997; Alpert, 1993; Dyer, 1993; Gentry et al., 1993; Burns & Gentry, 1992; Keys & Wolfe, 1990; Gatignon, 1987; Glazer et al., 1987; Kadane & Larkey, 1982; Babb et al., 1966; Tucker, 1964; Pessemier, 1963; Hoggatt, 1959; Purdy, 1959; Alderson & Sessions, 1957; Hermann & Stewart, 1957; von Neumann & Morgenstern, 1944).

A wide range of key characteristics defines what a simulation can add to undergraduate education. Past experiences with the utilization of business/marketing simulations have shown the exercise provides benefits corresponding closely with Chickering and Gamson's "good practices" in undergraduate education outlined in their Seven Principles (Chickering & Gamson, 1987). Briefly, the Seven Principles include student-faculty contact, cooperation among students, active learning, prompt feedback, time on task, high expectations, and diverse talents and ways of learning. (For an excellent typology of motivational principles see Lanto, 1997):

| | |
|---|---|
| 1. | Direct contact between the students and the instructor. Verbal and written interaction is necessitated by students' investigations into what variables can be manipulated. The accounting instructor also provides feedback to assist the accounting "firms" as they provide consulting services to the "companies." |
| 2. | Teamwork among students. Participants realize that to achieve maximum results they must utilize the unique skills or specialty of each member as well as organize schedules for meetings, deal with diverse personalities, and delegate authority for assignments. |
| 3. | An active learning environment. Students analyze the results of their inputs, present live presentations in class, make decisions involving ethical issues, and realize they can be victims of a stochastic environment and must make appropriate contingency plans. |
| 4. | Prompt feedback on decisions. Ideal simulations provide a decision analysis and team ranking within hours of the students' input, maximizing the time allotted for re-analysis and adjustment of variables for the next decision period. |
| 5. | Practical examples of learning. Some students who are not particularly adept at certain aspects of the classroom experience (class discussion, lecture response, multiple choice exams, etc.) often find stimulation in a competitive simulation environment. |
| 6. | Outcome assessments. Students can be required to file yearly reports on their businesses (written communication), give presentations dealing with promotional aspects, marketing plans, or financial results (oral communication), assemble a compendium of their business and marketing plans as well as detailed explanations of competitive actions taken (portfolio construction), provide analysis of financial results (critical thinking), and learn to manage their time in a team situation (human resource management). |

## INTERDISCIPLINARY TEACHING

As stated earlier, there is an increasing demand for students who possess core competencies that extend beyond the mechanics of accounting. Accountants have taken on new roles within organizations, expanding their contribution to the decision-making process. Accountants are no longer confined to "number crunching" and issuing financial reports containing historical data. They are now asked to extract information from the financial data, interpret the data and, in the case of managerial accountants, make recommendations to managers. It becomes apparent why the profession is demanding that accountants possess communication skills, problem-solving and critical thinking skills, and social interaction skills - accountants are becoming an integral part of the decision-making team in many companies.

Accounting departments at universities need to prepare students for business planning, communication, decision making and teamwork. This cannot be accomplished in a vacuum. The goal of interdisciplinary teaching is to provide a more integrative/cross-functional approach and to involve outside, non-business courses in the curriculum (Smart et al., 1999; Bobbitt et al., 2000).

Interdisciplinary teaching has a number of advantages for the individual instructor. When students take a course in conjunction with other courses in which an instructor has a working knowledge, the instructor is able to point out significant relationships and reinforce learning in a more systematic way than if the courses are operated in a vacuum. By working with student teams and instructors from other disciplines, instructors inevitably find that their interest and knowledge in colleagues' fields are increased (LaFauci & Richter, 1970).

Connecting learning to the students' concrete experience is something good teachers seem to do instinctively (Hutchings & Wutzdorff, 1988). It is not enough to assume that the students have the experience necessary to incorporate the knowledge they are presented. It is up to the instructor to make the class the experience.

The idea behind the interdisciplinary project described in this paper was to cross boundaries between several disciplines involved in professional business education and to provide students with a more integrative and experiential learning experience. Hopefully, such exercises will aid students in "seeing" the depth of interrelationships between different courses and different disciplines (majors).

Interdisciplinary studies have radical curriculum and administrative implications for universities. Education at this level has essentially lost its cohesiveness due to a rapid expansion of career-minded professional studies and abandonment of "...one of the principle aims of liberal education...to integrate what one has learned in different disciplines." (National Institute of Education, 1984, p.44)

In one of its latest publication concerning the new standards for business school accreditation, the American Assembly of Collegiate Schools of Business (AACSB, p.23) states in section C.2.2: Monitoring of Programs for Effectiveness that "Each degree program should be

systematically monitored to assess its effectiveness and should be revised to reflect new objectives and to incorporate improvements based on contemporary theory and practice." One of those improvements could be interdisciplinary teaching.

> The philosophy presupposed by and guiding this mode of team operation has strong progressivistic or even anarchistic overtones. It is assumed that students learn by doing; that they must be involved with one another and with their total environment in order to develop and grow intelligently. ...The team becomes a focal point for personal identification; personal relations between teachers and students are encouraged, and spontaneous group activities are prized. (LaFauci & Richter 1970, p.23)

It is not the purpose of this article to give a complete discussion of the field of interdisciplinary teaching. If the reader wishes to pursue the topic, see: Daly, 2001; Bobbitt et al., 2000; Bovinet, 2000; Treise, 1995; Chonko, 1993; Dyer et al., 1993; Kanter, 1993; Ramocki, 1993; Warren, 1992; Alden et al., 1991; Grabelnick et al., 1990; Miller & McCartan, 1990; Fish, 1989; Jacobs, 1989; Marx, 1989; Henke et al., 1988; Porter & McKibbon, 1988; Astin, 1984; and Newell, 1983.

## DESCRIPTIVE STUDY AND RESULTS

This project does not encompass team teaching. Each class involved in the exercise is presented relevant material by their respective instructor or instructors. This interdisciplinary project utilizes skills gleaned from each discipline to achieve a common goal - business success/viability. Proprietary knowledge and skills (accounting, marketing, advertising, public relations, personal selling, etc.) are assumed and the respective students are expected to be able to employ their knowledge and skills for the common good.

This is also not a residential format and students do not enroll in classes together. Specialization of knowledge is assumed and encouraged. The goal is to show students how to integrate that specialized knowledge into a system where cooperation provides management with the requisite information to compete in a business scenario. In addition, it is hoped that this interdisciplinary method will foster a sense of unity between the different majors and allow students to visualize the reciprocal determinism inherent in business strategy. Any reader interested in the sequential development of this course over the first ten years is referred to the original marketing article detailing the evolution of this project (Bovinet, 2000). The following paragraphs present a description of the course prior to adding the accounting component.

Briefly, an advertising/public relations campaign (the advertising and public relations classes were integrated) class was divided into corresponding teams, and each one of the marketing teams "hired" an advertising "agency," composed of the advertising and public relations campaign

students, to help produce promotional materials. The two classes met together for advertising and promotional presentations during three class periods. Each combination took turns presenting their ideas, audio ads, television videos or story boards, flyers, newspaper slicks, etc. and detailing how their budgets were spent.

Throughout the iterations of this interdisciplinary exercise, several solid outcomes were readily apparent. The advertising "agencies" give a "pitch" to the combined classes much as they will have to do in a real agency. Then the marketing majors presenting a business plan to the combined classes. Soon after, the agencies set up a trade show and the teams negotiate contracts that remain in force for the rest of the term (this is quite a lively process and has garnered local press coverage). All the disciplines get to exercise their distinctive capabilities and see what skills and abilities the other majors bring to the table. Both classes also work on oral and written presentations (business and marketing plans, campaign presentations, financial meeting, loan applications, etc.) and the instructors are able to critique these efforts in order to improve student performance.

In addition, it became sorely evident to all instructors that the students had little or no grasp of basic accounting functions. Standard business applications such as income statements, balance sheets, break-even analysis, and cash flow statements were requested as part of the business analysis. The results were abysmal. Students complained that they did not understand the assignments and did not believe these accounting practices would be an aid to their respective businesses. It was obviously time to enroll the accounting department in the exercise.

During years eight and nine a financial accounting class was enlisted to aid in the project. In both years, the instructors told their students that the exercise was not an integral part of the class, and to pay it only cursory attention. The results were totally unsatisfactory. The accounting class was dropped in year ten.

In year eleven, a new accounting instructor suggested enrolling interested accounting majors in an experimental class focused solely on the interdisciplinary simulation. This paper presents the result of that year's cooperation.

## ADDING THE ACCOUNTING COMPONENT

The experimental accounting course attracted nine upper level accounting majors. (Interestingly, in the second year that this course was offered, the demand for the eighteen available seats was very high and resulted in a waiting list.) Individual skill levels were assessed on a "before" and "after" basis (beginning and end of semester) through a self-assessment instrument that was based on the core competencies outlined by the AICPA. Students were asked to read the AICPA document that was posted in the online course documents to make sure that all students had a clear and similar understanding of what each skill entailed.

Students were informed that their primary role would be to provide accounting support to the marketing students as they formed and ran simulated companies. The class assignments were three-fold:

| | |
|---|---|
| 1. | To provide all necessary and helpful services to the companies who hired their firms; |
| 2. | To keep a log of the work done in the class, documenting all the meetings that they attended and who was present, the purpose of the meeting and what was accomplished, billable and non-billable time, and copies of all of the work performed for the firms; |
| 3. | To access their progress in developing core competencies as identified by the AICPA. |

While the grading in this course was somewhat subjective, the most important considerations were the quality and comprehensiveness of the work log kept by each accounting firm and the feedback received from the marketing students who were running the simulated companies - in other words, feedback from the "client."

The first accounting class period was used to orient the class and to view all the material on the marketing course Web site. Students were formed into three teams of three students each, with each team acting as an "accounting firm." The accounting firms were hired by the simulated companies to provide various accounting services. Tasks included financial statement preparation, preparation of the financial section of the business plan, analysis of quarterly financial results, and specialized analysis such as contribution margin by sector and breakeven analysis. The accounting students were asked to have a planning meeting (prior to the second class meeting) with the members of their accounting firm to determine the types of services their firm might be able to provide; they needed to think about the analytical tools that would be helpful in analyzing their clients' financial position and operating results.

As in prior years when this course was offered, the instructors ran the simulation for four quarters and handed identical results to each team. The teams then ran the business as if they were managing someone else's enterprise (again for four quarters). When the time came for them to be owners, they proposed a business plan to buy out the current proprietors. The advantages in this application were that the teams got some experience running the simulation before the actual industry competition and they had tangible financial data on hand to use in their business plan (adding to the realism of that exercise).

Initially, the accounting students worked with the company teams in formulating a business plan based on the results from their four quarters of managing, rather than owning, the businesses. They then worked with the teams on preparing a loan proposal so that each team could "buy" the business and begin to run it for themselves. Each business plan required an income statement, cash flow statement, balance sheet, inventory analysis, and overall loan proposal.

Each accounting team was then required to gather data on their "client's" business operations and advise them concerning the profit picture, inventory analysis, expense breakdown, and general operating data. Consulting meetings between the accounting students and the marketing students took place on a regular basis. Finally, each accounting team was also required to make an oral and written presentation of their "client's" operating results approximately two-thirds of the way through the exercise.

## CROSS-DISCIPLINE SURVEY RESULTS

Each student involved (all classes) was surveyed at the end of every semester that this course was taught (beginning in year one and continuing through the eleventh year) to garner quantitative results of this exercise. The exact same survey was used every year (with the exception of changing the names of the classes participating). The survey was administered on a single sheet of paper handed to the students by classmates (the instructors left the room during the process). The questions and the results are reproduced below. In addition to reporting the actual results, the response of the students to each question was also correlated with their place (ranking) at the finish of the simulation to discern if final placement in the standings had an effect on their opinion of the exercise:

**Table 1: Number of Students Answering Questionnaire**

| YEAR | '93 | '94 | '95 | '96 | '97 | '98 | '99 | '00 | '01 | '02 | '03 | TOT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STUDENTS | 70 | 71 | 77 | 88 | 71 | 56 | 66 | 57 | 72 | 67 | 72 | 767 |

**Table 2: Student Survey Results**

(Score: 1 = POOR 5 = EXCELLENT)

1. How would you rate the cooperation between your team and the teams in the other classes?

| SCORE | 1 | 2 | 3 | 4 | 5 | MISSING |
|---|---|---|---|---|---|---|
| FREQUENCY | 29 | 46 | 123 | 271 | 295 | 3 |
| PERCENT | 3.8 | 6.0 | 16.1 | 35.5 | 38.6 | |
| MEAN | 3.991 | STAN.DEV. | | 1.063 | | |

Ho: Standings did not matter to cooperation: $R^2 = .04847$ Pr>F = .0000

a) 2003 - all students except accounting:

| SCORE | 1 | 2 | 3 | 4 | 5 | MISSING |
|---|---|---|---|---|---|---|
| FREQUENCY | 0 | 5 | 12 | 18 | 28 | 0 |
| PERCENT | 0.0 | 7.9 | 19.0 | 28.6 | 44.4 | |
| MEAN | 4.095 | STAN.DEV. | | .979 | | |

| Table 2: Student Survey Results | | | | | | |
|---|---|---|---|---|---|---|
| b) 2003 - accounting students: | | | | | | |
| SCORE | 1 | 2 | 3 | 4 | 5 | MISSING |
| FREQUENCY | 0 | 1 | 4 | 3 | 1 | 0 |
| PERCENT | 0.0 | 11.1 | 44.4 | 33.3 | 11.1 | |
| MEAN | 3.444 | STAN.DEV. | | .882 | | |
| 2. Overall, how would you rate the experience gained in this exercise? | | | | | | |
| SCORE | 1 | 2 | 3 | 4 | 5 | MISSING |
| FREQUENCY | 6 | 13 | 78 | 248 | 420 | 2 |
| PERCENT | .8 | 1.7 | 10.2 | 32.4 | 54.9 | |
| MEAN | 4.390 | STAN.DEV. | | .799 | | |
| Ho: Standings did not matter to cooperation: $R^2$ = .01693 Pr>F = .0005 | | | | | | |
| a) 2003 - all students except accounting: | | | | | | |
| SCORE | 1 | 2 | 3 | 4 | 5 | MISSING |
| FREQUENCY | 1 | 0 | 3 | 22 | 37 | 0 |
| PERCENT | 1.6 | 0.0 | 4.8 | 34.9 | 58.7 | |
| MEAN | 4.492 | STAN.DEV. | | .738 | | |
| b) 2003 - accounting students: | | | | | | |
| SCORE | 1 | 2 | 3 | 4 | 5 | MISSING |
| FREQUENCY | 0 | 1 | 5 | 2 | 1 | 0 |
| PERCENT | 0.0 | 11.1 | 55.6 | 22.2 | 11.1 | |
| MEAN | 3.333 | STAN.DEV. | | .866 | | |
| 3. Overall, how would you rate the knowledge gained in this exercise? | | | | | | |
| SCORE | 1 | 2 | 3 | 4 | 5 | MISSING |
| FREQUENCY | 5 | 31 | 90 | 272 | 367 | 2 |
| PERCENT | .7 | 4.1 | 11.8 | 35.6 | 48.0 | |
| MEAN | 4.261 | STAN.DEV. | | .867 | | |
| Ho: Standings did not matter to cooperation: $R^2$ = .01494 Pr>F = .0010 | | | | | | |
| a) 2003 - all students except accounting: | | | | | | |
| SCORE | 1 | 2 | 3 | 4 | 5 | MISSING |
| FREQUENCY | 0 | 0 | 7 | 20 | 36 | 0 |
| PERCENT | 0.0 | 0.0 | 11.1 | 31.7 | 27.1 | |
| MEAN | 4.460 | STAN.DEV. | | .692 | | |

| Table 2: Student Survey Results | | | | | | |
|---|---|---|---|---|---|---|
| b) 2003 - accounting students: | | | | | | |
| SCORE | 1 | 2 | 3 | 4 | 5 | MISSING |
| FREQUENCY | 0 | 3 | 3 | 3 | 0 | 0 |
| PERCENT | 0.0 | 33.3 | 33.3 | 33.3 | 0.0 | |
| MEAN | 3.000 | STAN.DEV. | | .866 | | |
| 4. To what extent do you think this exercise "mirrored" or was similar to a real-life situation? | | | | | | |
| SCORE | 1 | 2 | 3 | 4 | 5 | MISSING |
| FREQUENCY | 20 | 66 | 191 | 316 | 170 | 4 |
| PERCENT | 2.6 | 8.7 | 25.0 | 41.4 | 22.3 | |
| MEAN | 3.721 | STAN.DEV. | | .989 | | |
| Ho: Standings did not matter to cooperation: $R^2$ = .00393 Pr>F = .0939 | | | | | | |
| a) 2003 - all students except accounting: | | | | | | |
| SCORE | 1 | 2 | 3 | 4 | 5 | MISSING |
| FREQUENCY | 1 | 7 | 22 | 18 | 15 | 0 |
| PERCENT | 1.6 | 11.1 | 34.9 | 28.6 | 23.8 | |
| MEAN | 3.619 | STAN.DEV. | | 1.023 | | |
| b) 2003 - accounting students: | | | | | | |
| SCORE | 1 | 2 | 3 | 4 | 5 | MISSING |
| FREQUENCY | 1 | 4 | 3 | 1 | 0 | 0 |
| PERCENT | 11.1 | 44.4 | 33.3 | 11.1 | 0.0 | |
| MEAN | 2.444 | STAN.DEV. | | .882 | | |
| 5. If you were teaching this class next year, would you repeat this exercise? | | | | | | |
| | YES | NO | MISSING | | | |
| SCORE | 734 | 30 | 3 | | | |
| PERCENT | 96.1 | 3.9 | | | | |
| a) All students except accounting: | | | | | | |
| | YES | NO | MISSING | | | |
| SCORE | 92.1 | 7.9 | 0 | | | |
| PERCENT | 92.1 | 7.9 | | | | |
| b) Accounting students: | | | | | | |
| | YES | NO | MISSING | | | |
| SCORE | 6 | 3 | 0 | | | |
| PERCENT | 66.7 | 33.3 | | | | |

Since the inception of this class, each year the instructors analyzed the subjective comments of the students and attempted to alleviate their most common complaints. The results have been generally gratifying. Any time almost 95% of a diverse group of college students agree on ANYTHING is a noteworthy moment. Also, the results indicate that the final standings of the teams do not significantly impact the opinions expressed about the project.

## ACCOUNTING CLASS RESULTS

Table 2 shows the results of the student survey broken out in three sections: the total students involved in all 11 years, the 2003 students without the accounting people, and the 2003 accounting students. It is obvious that the results of this exercise were perceived as less successful by the accounting majors in comparison to the other participants.

To help determine the effectiveness of this course, an additional survey was conducted within the accounting course component of the class: a self-assessment of the accounting students' core competencies at the beginning and end of the semester. The first class period, the instructor asked the students to grade themselves on a scale of one to five (with five being the high end of the scale) as to their perception of their competency in the core skills needed for entry into the accounting profession, as outlined by the AICPA (www.aicpa.org). The core competencies cross three broad areas: functional competencies, personal competencies, and broad business perspective competencies. To assist students in this assessment, information from the AICPA Web site was downloaded by the instructor and distributed on the first day of class. This information included descriptions of the specific meaning of the core competencies being assessed, along with some examples of proficiency. This self-assessment was conducted again at the end of the semester to determine whether students believed their skill levels increased through participation in this class. The results of this self-assessment are reported in Table 3.

The results in Table 3 suggest that the students experienced improvement in core competencies and that these improvements were broadly distributed among the different skills. The largest improvements, with mean increases in scores between the first and self-assessment greater than .75, were found in the areas of decision modeling, risk analysis, research, critical/strategic thinking, and industry/sector perspective. Gains that were approximately two-thirds of an increment (.66 and .67) were found in the areas of measurement, reporting, problem solving and decision making, project management, international/global perspective, resource management, legal/regulatory environment, and the ability to leverage technology to develop and enhance a broad business perspective. All other areas showed at least modest improvements. While the reported improvements in core competencies may not be exclusively attributable to participation in this class, it seems apparent that the students believed they had made some gains over the semester. As with any self-reported assessment, these results are subject to the biases implicit in self-reporting and

should thus be interpreted with caution. A key concern with student-reported surveys is the potential "demand effect." Students may answer in a way they think would please the instructor.

**Table 3**

| | MEAN 1ST GRADE | MEAN 2ND GRADE | DIF. |
|---|---|---|---|
| Category 1: Functional Competencies | | | |
| Decision Modeling | 3.33 | 4.11 | .78 |
| Risk Analysis | 3.22 | 4.00 | .78 |
| Measurement | 3.11 | 3.78 | .67 |
| Reporting | 3.78 | 4.44 | .66 |
| Research | 3.00 | 4.00 | 1.00 |
| Leverage technology | 3.67 | 4.22 | .55 |
| Category 2: Personal Competencies | | | |
| Professional Demeanor | 4.00 | 4.33 | .33 |
| Prob. Solving and Decision Making | 3.67 | 4.33 | .66 |
| Interaction | 4.00 | 4.56 | .56 |
| Leadership | 3.78 | 4.33 | .57 |
| Communications | 3.67 | 4.11 | .44 |
| Project Management | 3.67 | 4.33 | .66 |
| Leverage technology | 3.67 | 4.22 | .55 |
| Category 3: Broad Bus. Perspective | | | |
| Critical/Strategic Thinking | 3.33 | 4.33 | 1.00 |
| Industry/Sector Perspective | 2.44 | 3.67 | 1.23 |
| International/Global Perspective | 2.56 | 3.22 | .66 |
| Resource Management | 3.11 | 3.78 | .67 |
| Legal/Regulatory Environment | 2.67 | 3.33 | .66 |
| Marketing/Client Focus | 3.56 | 3.89 | .33 |
| Leverage Technology | 3.44 | 4.11 | .67 |

## CONCLUSION

Interdisciplinary work is important. Accounting students often move into management positions that demand leadership in dealing with finance, marketing, management, and other areas. Thus, the gap between education and career is often quite evident (Grogan et al., 1988):

| | |
|---|---|
| 1. | Rigid academic programs offer few opportunities for students to assume responsibility or define their personal objectives. And yet, success after graduation depends on this skill. |
| 2. | Accounting curricula often present knowledge in a linear, lock-step form. Professional success depends on the integration and application of knowledge. |
| 3. | Classroom experience is basically passive, but successful careers demand self-activation. |
| 4. | Formal classes treat students as isolated learners, but practice involves personal interactions and effective communication. |

How we teach and how students learn is often a dichotomy. Accounting educators need to focus on integrating knowledge and experience. No single model for accomplishing this task has emerged, and none probably should. Each approach should be geared to a specific outcome and the image of how the student will be different for the effort.

The evaluation of student learning is a constant concern for educators. Old-line standardized tests are simply not doing the job. A better answer is to refine the process by developing new criteria - portfolios of student work, writing assignments, oral presentations, and team interaction dynamics.

Also, people do not learn in a closed model of education. Social interaction and environmental variables inevitably alter that process. Academic performance is highly correlated with the level of engagement in academic work. Student involvement, defined as expenditure of energy or time, relates directly to student academic success (Christopoulus and Rohwer, 1987).

Thus, the objective of any new teaching tool should be to increase involvement of the student in the project as well as offering an alternative to standard forms of evaluation. This is the idea behind combining a simulation exercise with interdisciplinary teaching.

## OPERATING SUGGESTIONS

1. It is vital that all participating instructors be committed to this type of exercise. A casual approach sends a message to the students that the simulation is not to be taken seriously and concomitant performance suffers.

2. Similarly, the students must perceive that the stimulation and attendant interaction between the classes is the primary substance of this course (grade determinant) and it is their responsibility to utilize the respective expertise of each team for the common good.
3. If at all possible, any classes involved in a project like this should be scheduled during the same period. This facilitates meeting times for both instructors and students (and it is difficult for students to say they are unable to make team meetings). Additionally, a longer class period is important to the presentation of campaign materials (usually a Tuesday/Thursday schedule at most schools).
4. Early in the semester or quarter, have an exchange class where the instructors switch classes and explain to the other class their expectations and ground rules.
5. For best results, the accounting teams should contain 2-3 students and be paired one-to-one with the business entities. This allows the accounting majors to focus on their job and produce more information and analysis for their clients. It also cuts down on problems with scheduling meetings between the two teams.
6. Accounting students tend to want as much information as possible - often just short of a "perfect world." Try to avoid listening to their complaints. A vital part of this exercise is to create a level of ambiguity that often occurs in a real business setting. Accounting majors need to learn to deal with this form of chaos. Let them figure things out for themselves.
7. Make it clear to the accounting students that they are "hired" in a consulting mode. They are there to provide their expertise, but also to listen to their customers and give them the information and analysis they require and desire.
8. Differentiate between written and oral presentations. When presenting their results to their clients, the accounting teams often went into excruciating detail about how they formulated the various reports. These details should be included in the written reports handed to the client. The oral presentation should be reserved for critical variables that are affecting the business in a positive or negative fashion. Tell your client what the numbers mean. Get to the point. Additionally, class time should be devoted to practicing the oral presentations. Accounting students are often inexperienced at this business function and they need the practice. It should be added that very few of the accounting firms used any form of graphics in their oral presentations - this can be very effective.
9. Schedule at least two oral and written presentations for the accounting firms. It is educational for the students to be able to hear a critique of their first effort and then attempt to correct the mistakes in another.
10. Schedule deadlines (loan application, oral and written presentations, etc.) far enough in advance that preparation is not rushed. Then make these deadlines absolute so that each team learns to work under a definitive time frame.
11. The simulation chosen should allow a wide range of potential variables for student manipulation (price levels, wages, loans, advertising/promotion expenditures, distribution

intensity, etc.). This forces the business owners to seek help in developing a financial plan, loan presentation, and other vital accounting information. Often, business students study in a vacuum and are not constricted by limited time for analysis. This is not realistic.

12. The accountants need to know the criteria for successful decision making at the beginning of the session.
13. Students and instructors are both tired of people who do little work and "ride" a team's effort without contributing. Make it known to participants that an early team evaluation will be made and that recalcitrant team members will be removed and assigned other duties. It works. Also have a team evaluation at the end of the session and advise the students that part of their grade will be dependent on this result.
14. Use some classes as workshop days. The instructor can be available as a consultant (paid, of course! - in simulated money). Instructors should, however, be careful not to discuss variables that would not normally be available to the accountants of a business (future price fluctuations, intimate details of a competitor's business, etc.). A workshop class also alleviates problems some teams have getting all members to meet at once (again the advantage of having meetings during class time).
15. Lectures and informational classes can be geared around problems that have arisen during the simulation exercise. This helps accounting majors see the relevance of what they are doing as well as providing solutions to inherent problems during the competition.
16. Encourage students to seek outside counseling (legal, management negotiation, team dynamics, etc.). This also adds a realistic element to the proceedings.
17. A number of specific areas seemed to be weak in the accountants' reports:
    a. Loan interest (often not included in the expense report).
    b. Labor costs (not viewed as a double-dip expense - wages and benefits).
    c. Shrinkage - how to expense and how to control.
    d. Returns and allowances - how cost of goods sold is affected.
    e. Comparison of different types of stores (mall, strip center, etc.) - leading into ROA.
    f. Difference in valuation between a standard "bricks and mortar" vs. an e-business.
    g. Little understanding of a proper billing procedure (time frame, payment method, etc.).
    h. Individual product sales - needed some mention of contribution margin.
    i. Comparison of ratios with industry standards (e.g. Robert Morris Studies).

## ENDNOTES

1. The various classes (Accounting, Marketing Management, Advertising Campaigns, and Public Relations) contain only junior and senior students. Tests are foregone in favor of experience discussion, written business and marketing plans, and the oral presentation of ideas and promotions.

2. Cooperation between instructors is crucial. Without teamwork, this journey quickly descends into oblivion. In numerous discussions, the instructors participating in this exercise all believed the project had enhanced their teaching styles and abilities in a positive manner. Students actually begin talking about their plans for this class a year or more in advance - this kind of enthusiasm is a reward in itself.

3. The role of simulations and interdisciplinary teaching in a marketing curriculum is effectively placed in perspective in: Hair, J.F. Jr., (1995), "Marketing Education in the 1990's: A Chairperson's Retrospective Assessment and Perspective," Marketing Education Review, 2 (Summer), 1-6.

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# GROUP VERSUS INDIVIDUAL LEARNING OF QUANTITATIVE ACCOUNTING TOPICS: EFFECTS ON TEST PERFORMANCE IN THE FIRST-YEAR ACCOUNTING COURSE

**Douglass Cagwin, Lander University**
**Katherine J. Barker, Lander University**

## ABSTRACT

*Educators continue to search for ways to improve both accounting and methods of teaching. Increased use of cooperative learning is often a feature of curriculum revision. Although previous research has shown that cooperative learning techniques can sometimes lead to improved student learning, there has been no research that has examined the effects of specific cooperative techniques (e.g., group homework assignments) on learning specific quantitative business topics.*

*This is a field study of first-year accounting students at a large Southeastern university. Multiple regression analysis is used to determine whether there is a difference in test performance on quantitative accounting topics between students completing graded homework in groups versus students completing the same assignments individually.*

*The results of this field experiment indicate that test performance of two specifically targeted quantitative topics was not influenced by using the cooperative learning technique of graded group assignments. Therefore business instructors may feel free to use this cooperative learning technique without fear that it may jeopardize learning quantitative topics. This research did find a positive relationship between quantitative test performance and a higher number of university credit hours completed prior to exposure of the tested quantitative topics. This finding may help to guide those charged with revising business curriculum to introduce quantitative accounting topics later rather than earlier in the sequencing of required business courses.*

## INTRODUCTION

For nearly two decades there have been many appeals from both accounting professionals (e.g., American Accounting Association [AAA], 1986); Arthur Andersen et al., 1989; and Accounting Education Change Commission [AECC], 1990, 1992) and academics to improve undergraduate accounting education; yet the debate continues as to how the accounting curriculum or methods of teaching should be revised. Efforts by business schools and individual business

disciplines to improve the manner in which courses are delivered have included an assortment of educational methods (e.g., case studies, group projects, in-class projects, cooperative learning assignments, and community service learning projects). The use of cooperative learning techniques has often been a feature of curriculum revision, particularly since many employers have embraced a more cooperative focus in the workplace.

Cooperative learning has been defined by Cooper, et al. (1990) as: "An instructional technique which requires students to work together in small fixed groups on a structured learning task." Previous research has shown that the use of cooperative learning techniques generally, but not always, leads to increased learning by students. An underlying assumption is that by working together, students will help teach each other (Gilbert-MacMillan, 1983; Parker, 1984). However, little is known about the effects of cooperative techniques in specific learning situations (e.g., group vs. individual homework assignments) or with regard to learning specific quantitative accounting material. Such research is important to all educators who teach subjects that are quantitative. If experiments involving cooperative techniques show promise, then further research may prove fruitful.

This paper presents the results of test performances of two groups of first-year accounting students at a major Southeastern state university. All students received the same in-class lecture on two quantitative accounting topics by the same instructor. Approximately half the students were given a graded homework assignment to be completed by their group, while the second half had identical graded homework to be completed individually. Five to seven students were in each group, and all members of the group received identical grades. Later in the semester, the same students switched places. Those that had been given a group assignment received an individual homework assignment, and vice versa.

## PRIOR STUDIES

A cooperative learning strategy allows students to work together on a graded assignment with the hope that group members will share knowledge within their group, thereby accomplishing a shared goal and increasing overall individual performance. An individual learning strategy requires students to work by themselves to accomplish their own goals (Johnson & Johnson, 1989). Encouraging students to work together has evolved from a grassroots effort by a few professors to an established method of education and learning. The goals of cooperative learning are diverse and include enhanced academic achievement and cognitive growth, increased student motivation, improved attitudes toward learning, social development and interpersonal relations (Natasi & Clements, 1991). Although all of these goals are important, the focus of this paper is restricted to the effect of cooperative learning techniques on individual academic achievement as measured by a common exam.

Some researchers have commented that merely placing students into groups and asking them to cooperate on a project will not be successful (Johnson & Johnson, 1990). These efforts often fail because student groups are afflicted with problems descriptively labeled as "free rider," "hitchhiker," "sucker," and "rich-get-richer" effects (Johnson & Johnson, 1990). Johnson & Johnson (1990) make the comment that "…groups can also flounder through self-induced helplessness, diffusion of responsibility, social loafing, dysfunctional labor divisions, and destructive conflict."

While cooperative learning has positively influenced student performance and attitude in classroom settings (Sharon, 1980; Johnson & Johnson, 1989; Slavin, 1990), it has not always influenced performance when used with strategies originally designed for individual learning (e.g., graded homework assignments) (Carrier & Sales, 1987; Klein & Pridemore, 1992; Klein, et al., 1994). The above research suggests that a cooperative strategy may not affect educational outcomes in all settings. Therefore, the success of cooperative learning strategies is not assured, and its use may be more appropriate in some settings than others.

Related research suggests that an advantage of cooperative learning groups is that they give students an opportunity to talk aloud, challenge and defend a point of view, and focus on the problem-solving process rather than the answer (Gilbert-MacMillan, 1983). Parker (1984) found that small-group cooperative learning aids in developing thinking and problem-solving skills, and that this approach reduces student anxiety and competition by creating a friendly atmosphere, which allows students the freedom to learn from their mistakes. Another study of eighth-grade pre-algebra students found that students who worked cooperatively were better able to remember and apply problem-solving strategies than those students from independent practice classes (Duren & Cherrington, 1992).

The above findings lend credibility to the belief that cooperative learning techniques may increase individual learning when applied to quantitative accounting topics. In addition, this prior research suggests that cooperative learning can improve student attitudes toward the field of accounting.

## HYPOTHESIS DEVELOPMENT

As described above, previous research has shown that cooperative learning can be effective in facilitating learning, particularly when dealing with quantitative topics in the field of mathematics. Therefore, it is reasonable to expect that cooperative learning techniques could enhance learning quantitative accounting topics as compared to using only the traditional lecture-recitation model and other methods that rely solely on individual efforts. However, it has not been established that cooperative learning techniques, specifically group work on graded homework assignments, are more effective than lecture-recitation and individually graded homework assignments in assisting students to learn quantitative rule-based accounting topics, such as inventory valuation and cost allocations. Effects previously identified (e.g., "free rider," "sucker,"

and "rich-get richer") may mitigate any gains from collaboration in a specific setting. In addition, although previous research has shown that cooperative learning does have positive recall and transfer effect, cooperative learning when applied to specific quantitative concepts may not transfer well to individual performance, which leads to the following hypothesis:

H1: There is a difference in individual test performance on quantitative questions between students completing graded homework assignments in cooperative groups, and students completing graded homework assignments individually.

Two specific quantitative accounting topics are investigated: cost allocations and inventory valuation. The hypothesis is non-directional since it has not been established whether the positive effects of cooperative learning are offset by negative effects in a specific accounting setting.

## EXPERIMENT AND RESEARCH DESIGN

The subjects in this field experiment were sixty-nine students in two sections of an accounting principles course at a major Southeastern university. The format of the two sections was as similar as possible. Each section of approximately 35 students met with the same instructor each Tuesday and Thursday for 80 minutes throughout the semester. Section 1 met from 9:30 - 10:50 a.m., and Section 2 met from 11:00 a.m. - 12:20 p.m. Students self-selected into groups of from five to seven students during the first week of the semester. The groups remained intact during the entire semester.

Switching the groups on the two graded assignments limited potential problems related to equivalency of subjects. Although the research design minimized the risk of problems, equivalency of the subjects was assessed because of its possible impact on interpretation of results. Data was collected on eight demographic variables: SEX, AGE, GPA, RACE, JOBHOURS per week, SEMHOURS (credit hours) enrolled during the current semester, declared MAJOR, and CREDITS (semester credit hours) earned prior to enrolling in the course. In addition, information was gathered regarding prior accounting coursework (COURSE), and any prior bookkeeping experience (EXP) of each student. Descriptive statistics and univariate tests for differences between the sections are shown in Tables 1 and 2, respectively. No significant differences between the groups were found (p-value = .05), although RACE was weakly significant (p-value < .10).

Of the overall sample of 69 students, 44 were male, 12 were planning to major in accounting, 11 were non-white, six had previous bookkeeping work experience, and 19 had previously taken accounting or bookkeeping coursework (generally in high school). The mean student was 21.7 years

of age, had accumulated 57.7 previous credit hours, was currently enrolled in 14.9 credit hours, had a cumulative GPA of 2.97, and was working 11.2 hours per week.

Both sections were taught by one of the authors using a common syllabus. Class discussion and in-class exercises were the same for both sections. However the assignment of graded group versus graded individual homework assignments was reversed between the sections for two topics: cost allocations and inventory valuation. Each graded homework assignment was worth 5% of the total grade, and each member of a group received a common grade for the group assignment. The subjects then took a common multiple-choice examination, administered at a common time and place. The examination consisted of 50 multiple-choice questions, 13 of which were quantitative in nature. Of the 13 quantitative questions, three related to cost allocations, and three to inventory valuations. The remaining seven were general quantitative questions.

**Table 1: Descriptive Statistics**

| Panel A - Dichotomous Variables | | | | | |
|---|---|---|---|---|---|
| Demographic Statistic | N | # = 1 | # = 0 | % = 1 | % = 0 |
| MAJOR (1 = Accounting) | 69 | 12 | 57 | 17.4% | 82.6% |
| EXPerience (1 = Past Experience) | 69 | 6 | 63 | 8.7% | 91.3% |
| SEX ( 1 = Male) | 69 | 44 | 25 | 63.8% | 36.2% |
| RACE (1 = Non-white) | 69 | 11 | 58 | 15.9% | 84.1% |
| COURSE (1 = Previous Coursework) | 69 | 19 | 50 | 27.5% | 72.5% |
| Panel B - Continuous and Discrete Variables | | | | | |
| Demographic Statistic | N | Mean | Maximum | Minimum | |
| CREDITS | 69 | 57.7 | 164 | 33 | |
| GPA | 67* | 2.97 | 4.0 | 1.9 | |
| SEMHRS | 69 | 14.9 | 18 | 3 | |
| AGE | 69 | 21.7 | 43 | 19 | |
| JOBHR (per week) | 69 | 11.2 | 45 | 0 | |

* Two subjects transferred from another institution at the beginning of the semester and had no accumulated GPA.

Univariate tests were used to assess the relative performance of the two subject sections on the test questions against the seven non-experimental sections relating to the specific quantitative topics and to assess the equivalency of the two subject sections. Data from all nine sections showed that students correctly completed 39.5%, 57.7% and 65.7% of the allocation, inventory valuation, and remaining questions, respectively.

Test performance of the two subject sections was not substantially different on the questions of interest from the other seven accounting sections not included in the experiment (allocations was .1% lower than the composite total, inventory valuation was 2.9% higher). There was no statistically significant difference in raw score test performance for the questions of interest between the two sections; however, section 2 marginally outperformed section 1 on the remaining test questions (p-value = 0.0757), and the test as a whole (p-value = 0.0995). Test performance was then regressed against the homework method used, test scores on other questions, and control variables to determine the significance and direction of the homework-method variable.

**Table 2: Univariate Tests of Group Equivalency[a]**

| Demographic Statistic | Mean | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sec 1 Sec 2 | Std Dev | | | | | | | |
| Sec 1 Sec 2 | Parametricb | | | | | | | |
| Statistic P-value | Non-parametric | | | | | | | |
| Statistic P-value | | | | | | | | |
| MAJOR (1=Accounting) | 0.18 | 0.17 | 0.39 | 0.38 | 0.05 | 0.96 | 0.003 | >0.25 |
| EXPerience (1=Past Exp) | 0.12 | 0.06 | 0.33 | 0.24 | 0.88[c] | 0.39 | 0.79[d] | >0.25 |
| SEX (1=Male) | 0.71 | 0.57 | 0.46 | 0.50 | 1.16 | 0.25 | 1.35[d] | >0.25 |
| RACE (1=Non-white) | 0.24 | 0.09 | 0.43 | 0.28 | 1.70c | 0.01 | 2.88[d] | 10>p>.05 |
| COURSE (1=Previous coursework) | 0.32 | 0.23 | 0.47 | 0.43 | 0.88[c] | 0.39 | 0.95[d] | >.25 |
| CREDITS | 58.0 | 57.5 | 25.0 | 15.2 | 0.10 | 0.92 | 0.81[e] | 0.42 |
| GPA | 3.0 | 3.00 | 0.60 | 0.60 | -0.25 | 0.80 | -0.09[e] | 0.93 |
| SEMHRS | 15.4 | 14.5 | 1.78 | 3.20 | 1.49[c] | 0.15 | 1.34[e] | 0.18 |
| AGE | 20.9 | 21.6 | 2.34 | 5.20 | -0.74[c] | 0.46 | 0.08[e] | 0.93 |
| JOBHR (per week) | 9.9 | 12.4 | 12.4 | 14.3 | -0.76 | 0.45 | -0.49[e] | 0.63 |

[a] N = 34 for Section 1 and N = 35 for Section 2; except for GPA, which has N = 33 and N = 34, respectively.
[b] T-tests of differences between means.
[c] Failed F-test that variances are equal; results computed with Cochran Procedure.
[d] Test of equal proportions Chi-Square statistic.
[e] Wilcoxon Rank Sum Test Z-statistic.

## REGRESSION MODEL

The model as initially tested is as follows:

$$SCORE = + \beta_1 METHOD + \beta_2 MAJOR + \beta_3 EXP + \beta_4 SEX + \beta_5 RACE + \beta_6 COURSE + \beta_7 CREDITS + \beta_8 GPA + \beta_9 SEMHRS + \beta_{10} AGE + \beta_{11} JOBHR + \beta_{12} QUEST$$

The variable of interest, METHOD, is a dichotomous indicator variable coded "0" for a group homework assignment, and "1" for an individual assignment. An additional variable, QUEST, is included and represents the non-quantitative test questions. It is included to allow modeling of the comparability of performance on the questions of interest and the remainder of the test. A description of all independent variables is included below as Table 3.

**Table 3: Independent Variable Descriptions**

| Variable Name | Variable Description |
|---|---|
| METHOD | Indicator variable where 1 = group homework assignment, and 0 = individual homework assignment. |
| MAJOR | Anticipated major field of study, indicator variable where 1 = Accounting; 0 = Not Accounting (other business major). |
| EXP | Indicator variable where 1 = previous accounting or bookkeeping work experience, 0 = no previous experience. |
| SEX | Indicator variable where 1 = Male, 0 = Female. |
| RACE | Indicator variable where 1 = Non-white, 0 = White. |
| COURSE | Indicator variable where 1 = previous accounting or bookkeeping coursework, 0 = no previous coursework. |
| CREDITS | Number of college credit hours completed prior to current semester. |
| GPA | Current grade-point average on a four-point scale. |
| SEMHRS | Number of credit hours enrolled in for current semester. |
| AGE | Student age in years at time of examination. |
| JOBHR | Number of hours per week of employment. |
| QUEST | Percentage of correct questions on the examination that were on topics other than the quantitative questions of interest: cost allocations or inventory valuation. |

Correlation of the independent variables was examined. Most were not significantly correlated at the alpha = 0.05 level. Exceptions included the expected positive correlation of AGE with accumulated CREDITS, and negative correlation of JOBHRS with SEMHRS. In addition, MAJOR was significantly correlated with SEX (accounting majors tended to be female); CREDITS was significantly correlated with SEX (males tended to have accumulated more university credits by the time they took this course, possibly because as non-accounting majors they avoided accounting courses as long as possible); and AGE negatively correlated with SEMHRS (the few part-time students were older.) The highest correlation was 0.51 (SEMHRS with JOBHRS). Tests for multicollinearity for all regressions were performed. All variance inflation factors and condition numbers were well below the suggested values of 10 and 100, respectively, indicating that multicollinearity among these variables is not a problem. In addition, tests for heteroscedasticity, and analysis of residuals and autocorrelation, the Durbin-Watson D statistic revealed no violations of these assumptions. Analysis of the studentized residuals revealed no outliers that needed attention.

**Table 4: Correlation Matrix of the Independent Variables**

| Variable | MAJOR | EXP | SEX | CREDITS | GPA | SEMHRS | AGE | RACE | COURSE | JOBHR |
|---|---|---|---|---|---|---|---|---|---|---|
| MAJOR | 1.00 | | | | | | | | | |
| EXP | .13 | 1.00 | | | | | | | | |
| SEX | -.37 | -.20 | 1.00 | | | | | | | |
| CREDITS | -.22 | .16 | .27 | 1.00 | | | | | | |
| GPA | .16 | .03 | -.17 | -.12 | 1.00 | | | | | |
| SEMHRS | -.01 | -.06 | -.18 | -.23 | .22 | 1.00 | | | | |
| AGE | .05 | .03 | .08 | .41 | .07 | -.33 | 1.00 | | | |
| RACE | .22 | .01 | -.17 | -.13 | -.11 | .19 | -.12 | 1.00 | | |
| COURSE | .23 | .16 | -.21 | -.11 | .03 | -.02 | .08 | .00 | 1.00 | |
| JOBHR | -.16 | .08 | .16 | .25 | -.23 | -.51 | .18 | -.20 | .17 | 1.00 |

Note: Bold type = significant at alpha = 0.05 level.

## REGRESSION RESULTS

Test performance of the two subject sections was not substantially different on the questions of interest from the other seven accounting sections not included in the experiment (allocations was .1% lower than the composite total, inventory valuation was 2.9% higher). Data from all nine

sections showed that students correctly completed 39.5%, 57.7% and 65.7% of the allocation, inventory valuation, and remaining questions, respectively. There was no statistically significant difference in raw score test performance for the questions of interest between the two subject sections; however, section 2 marginally outperformed section 1 on the remaining test questions (p-value = 0.0757) and the test as a whole (p-value = 0.0995).

Table 5 sets forth the coefficients, t-statistics and p-values of the ordinary least squares regressions on the full set of independent variables. The model is significant (F = 4.067, p-value = 0.001), and adjusted $R^2$ is 0.2220. The only significant independent variables are CREDITS and QUES, indicating that the number of semester credit hours accumulated prior to this course are positively associated with total test score, and that the non-quantitative questions on the test do have some correlation with the questions of interest. (Since the QUEST variable could be disguising common variance with other variables, a regression was run without QUEST. The variable GPA is then the only significant variable.) The variable of interest, METHOD, shows no indication of statistical significance (p-value = 0.92).

**Table 5: Results from OLS Regressions of SCORE and TOTAL on Independent Variables**

| SCORE[a] | | | | TOTAL[b] | | |
|---|---|---|---|---|---|---|
| F-statistic = 4.067 | | $R^2$ 0.2943 | | F-statistic = 4.547 | $R^2$ 0.4855 | |
| p-value = 0.0001 | | Adj $R^2$ 0.2220 | | p-value = 0.0001 | Adj $R^2$ 0.3787 | |
| Independent Variable | Coefficient | t-statistic | p-value | Coefficient | t-statistic | p-value |
| Intercept | -55.76 | -1.58 | 0.11 | 22.16 | 1.28 | 0.21 |
| MET HOD | -0.51 | -0.10 | 0.92 | N/A | N/A | N/A |
| MA JOR | 4.01 | 0.51 | 0.61 | 2.74 | 0.72 | 0.47 |
| EXP | 1.09 | 0.11 | 0.91 | -0.82 | -0.17 | 0.86 |
| SEX | -6.01 | -0.97 | 0.33 | -2.30 | -0.77 | 0.44 |
| RACE | -12.92 | -1.70 | 0.09 | -5.58 | -1.52 | 0.13 |
| COU RSE | -2.18 | -0.34 | 0.73 | -4.16 | -1.37 | 0.18 |
| CRE DITS | 0.33 | 2.12 | **0.04** | 0.11 | 1.39 | 0.17 |
| GPA | 4.67 | 0.78 | 0.44 | 12.98 | 4.64 | **0.00** |
| SEM HRS | -0.09 | -0.06 | 0.95 | -0.41 | -0.58 | 0.56 |
| AGE | 0.86 | 1.11 | 0.27 | 0.61 | 1.51 | 0.14 |
| JOB HR | 0.02 | 0.07 | 0.10 | -0.08 | -0.66 | 0.51 |
| QUEST | 1.84 | 3.02 | **0.00** | N/A | N/A | N/A |

[a] where SCORE is the prediction of the quantitative questions.
[b] where TOTAL is the prediction of the total test scores.

To derive a more parsimonious model, stepwise regression was performed with selection of the "best" model based on Mallows C(p) to minimize bias, and adjusted $R^2$ to maximize explanatory power. The model developed after reduction by stepwise procedures is included as Table 6. The most appropriate parsimonious model for the dependent variable SCORE included SEX, CREDITS, AGE, RACE, and QUEST in the variable set, with only CREDITS and QUEST significant at the alpha = 0.05 level. The addition of METHOD provides virtually no change in the coefficients other than a 1% change in the value of the intercept. All the tests show clearly that METHOD has no statistically significant effect. Therefore the hypothesis is rejected.

**Table 6: Results for OLS Regressions of SCORE on Reduced Set of Independent Variables**

| Without METHOD | | | | With METHOD | | |
|---|---|---|---|---|---|---|
| F-statistic =10.203 | | $R^2$ 0.2850 | | F-statistic = 8.438 | $R^2$ 0.2850 | |
| p-value =0.0001 | | Adj $R^2$ 0.2570 | | p-value = 0.0001 | Adj $R^2$ 0.2513 | |
| Independent Variable | Coefficient | t-statistic | p-value | Coefficient | t-statistic | p-value |
| Intercept | -52.05 | -2.78 | 0.01 | -51.81 | -2.73 | 0.01 |
| SEX | -7.05 | -1.29 | 0.20 | -7.05 | -1.28 | 0.20 |
| CREDITS | 0.32 | 2.25 | 0.03 | 0.32 | 2.24 | 0.03 |
| AGE | 0.89 | 1.27 | 0.21 | 0.88 | 1.26 | 0.21 |
| RACE | -12.53 | -1.77 | 0.08 | -12.53 | -1.76 | 0.08 |
| QUEST | 2.15 | 4.70 | 0.00 | 2.15 | 4.68 | 0.00 |
| METHOD | | | | -0.50 | -0.10 | 0.92 |

To further understand the factors influencing test performance, a further regression was run to determine whether test scores as a whole were predictable. This regression of total SCORE on the full set of independent variables, excluding the METHOD variable, is also reported on Table 5. The model is significant (F = 4.547, p-value = 0.0001), and adjusted $R^2$ is 0.3787. Although the predictive value has increased substantially for the test as a whole, only the GPA variable is significant.

## CONCLUSIONS

The results of this field experiment indicate that test performance is not positively or negatively influenced by using the cooperative learning technique of graded group homework

assignments versus graded individual homework assignments. This result is similar to previous mathematics studies where mathematics students exposed to cooperative learning situations learned as well as students in more traditional and individual-dependent learning strategies.

The most important finding of this study is that using the cooperative learning technique of graded group homework assignments versus graded individual assignments made no difference in individual test performance. Therefore accounting instructors may feel free to use this cooperative learning technique without fear that it may jeopardize learning quantitative accounting topics.

It is possible in the present study that there are positive effects of group learning but that they were mitigated by previously described negative effects (e.g., "free rider," "sucker," and "rich-get-richer"). If these effects could be controlled in a real-world setting, group assignments could lead to improved performance.

Performance on the quantitative questions of interest was not highly correlated with the non-quantitative questions. This lack of correlation may have been caused by a particular study strategy of the students, where students tend to study those topics that are easier to learn rather than the more difficult topics, such as cost allocations and inventory valuation. (Anecdotal evidence confirming this strategy was gathered during class discussions following the test.) It is not surprising that students found quantitative questions to be the most difficult to answer correctly.

The significance of the CREDITS variable in predicting quantitative test scores is somewhat unclear. However, it is very possible that students with more accumulated university credits have had more exposure to various quantitative topics. Therefore these students can more easily assimilate quantitative accounting topics than older students or those students with higher GPAs. Because of the significance of the CREDITS variable in predicting quantitative test scores, those who are involved in revising accounting and business curriculum may want to rethink where accounting principles courses are introduced to students. Students may benefit from being exposed to other quantitative courses before they are required to take accounting principles courses.

Although it was not tested here, the cooperative learning strategy employed by this study may have improved the overall attitudes of students towards fellow students, accounting, and business in general, as was found in several mathematics studies (Davidson, 1971; Olsen, 1973; Brechting & Hirsch, 1977; Chang, 1977; Shaughnessy, 1977; Treadway, 1983). Any positive change in students' attitude towards the field of accounting would be most welcomed by most business instructors, and is worthy of future study.

As with all research studies, there are many limitations. Care should be exercised in generalizing the results to other environments. The test subjects were all enrolled in a required introductory accounting course. While the sample represented a representative cross-section of predominately sophomore and junior business students at a large Southeastern university, they may not be representative of non-business students or students at other universities. Secondly, only those subjects enrolled in two sections instructed by one of the authors were included in the study. While all sections used a common textbook and methodology, and overall test scores appeared to be

comparable between all other accounting sections, it is possible that results are not generalizable to other instructors. Thirdly, the specialized topics of cost allocations and inventory valuation were the topics of study. The effects of group versus individual study may vary for other topics. It is also possible that the cooperative learning technique chosen for this study did not have sufficient strength on its own to obtain either positive or negative results as measured by test performance.

There are ample opportunities to expand upon this research. Suggestions for future research include the following:

(1) Testing whether a student's opinion of the relative amount of learning group and individual assignments is positively correlated with actual performance.
(2) Testing whether a student's relative enjoyment of group versus individual assignments is correlated with relative learning.
(3) Testing whether a student's preference for the type of homework assignment is affected by either or both the student's belief regarding the relative amount of learning and the relative enjoyment.
(4) Testing whether a student's attitude toward the field of accounting is improved by the cooperative learning technique employed.

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# MERIT PAY, COLAS, AND THE RETURN TO FACULTY SENIORITY

**Kevin C. Duncan, Colorado State University-Pueblo**
**Mark J. Prus, State University of New York**

## ABSTRACT

*The distinction between annual COLA and merit increases at a unionized, public, liberal arts college allows us to estimate the return to faculty seniority with respect to total salary and its components, cost-of-living and promotion-adjusted starting salary and accumulated merit pay. We find that merit pay, which is awarded on the basis of faculty productivity, rises with seniority over a lengthy period. Due to chronically low budgets at this institution, cost-of-living adjustments have failed to keep pace with market trends for new Ph.D.s. Consequently, a seniority penalty with respect to cost-of-living and promotion-adjusted starting salary exists. Since the negative return associated with this salary component is greater than the positive return for merit pay, the net effect is a seniority penalty with respect to total salary. These results present the seeming contradiction of a seniority penalty for productive senior staff. The perpetuation of this circumstance can best be explained by high faculty mobility costs or by limited alternative employment opportunities for senior faculty.*

## INTRODUCTION

Do faculty salaries rise or fall with seniority? Recent empirical studies based on national and institutional-level faculty salary data fail to provide a definitive answer. For example, Ransom (1993) utilizes three national surveys of teaching faculty. Results from one of the surveys indicate a negative marginal effect of seniority whereas results from the other two surveys show no correlation between seniority and salary. On the other hand, Barbezat and Donihue (1998) and Monks and Robinson (2001) suggest that salaries rise with seniority over a relatively lengthy period. Results from studies based on institutional-level data are also mixed. For example, Ransom also reports a strong negative correlation between salaries and seniority among University of Arizona faculty, even after controlling for publication performance. Brown and Woodbury (1998) find similar results for faculty at Michigan State University. These authors also find that the link between internal and external (market) salaries diminishes with seniority. However, Hallock (1995) reports positive returns to seniority among the unionized faculty at the University of Massachusetts, Amherst. Finally, Moore, Newman and Turnbull (1998) examine data gathered from economics

departments at nine state universities and report a negative seniority effect that disappears when detailed measures of publishing performance are included in salary estimates.

Many of these studies are motivated by a desire to reconcile faculty salary patterns with general theories and evidence regarding the relation between seniority and pay. Most studies of non academic labor markets reveal a positive relation between pay and job tenure.[1] Theoretical explanations attribute this positive relation to such factors as the higher productivity of senior workers (Oi, 1962; Mincer, 1974), or to incentive mechanisms that discourage shirking (Lazear, 1981). However, interest in this topic is more than academic as the interpretation of results provides an answer to the policy-oriented question of whether the seniority penalty is deserved. For example, Moore et al. attribute the lower pay of senior staff to their lower productivity, implying that the seniority penalty is deserved. On the other hand, Bok (1993) and Ransom (1993) imply that the penalty is not deserved. Ransom argues that lower pay for senior staff stems from the monopsony power of universities. Bok suggests that university budget constraints result in high, market-level, salaries for new faculty, but insufficient funds to reward the job tenure of more senior staff. If the seniority penalty is undeserved, corrective policies at the university level can be justified. The more practical applications of this literature are evidenced by the studies on methods of correcting inequities due to salary compression (Lamb & Moates, 1999; Moore,1992; Suskie & Shearer, 1983; Wall, 1976).

We contribute to the literature by taking advantage of an administrative practice at a unionized, public, liberal arts college (hereinafter, U-PLAC) of separating annual merit awards from cost-of-living adjustments. This distinction allows us to examine the return to seniority with respect to total salary, cost-of-living and promotion-adjusted starting salary, and accumulated merit pay.[2] We find that accumulated merit pay rises with seniority over a lengthy career period. Since merit pay is distributed according to faculty performance, this finding is consistent with the prediction of human capital theory that pay rises with job tenure because of the higher productivity of senior employees. However, we also find a seniority penalty with respect to cost-of-living and promotion-adjusted starting salaries. This finding illustrates how a seniority penalty can stem from cost-of-living adjustments that fail to keep pace with market trends for new faculty. Since the seniority penalty associated with cost-of-living and promotion-adjusted starting salaries offsets increases associated with merit pay, total salaries decrease with seniority over the initial nine years of service at this institution. Our results illustrate how the seniority penalty can be attributed to budget constraints, even on a campus where performance pay and productivity rise with seniority.

In Section II, the data and models used to estimate the earnings-seniority profiles for total salary, accumulated merit pay and cost-of-living and promotion-adjusted starting salary (hereinafter, *COLA* salary) are described. The empirical results, along with a discussion of implications for the literature on pay and seniority, are discussed in subsequent sections. We conclude with implications for future research.

## DATA AND MODELS

The U-PLAC data contain information on faculty salaries, merit increases, performance, years of service at the present institution, and years of prior experience. We use faculty data from the 1998-1999 academic year and include tenured and tenure-track faculty in our sample. Administrators above the level of department chair are excluded. Similar to other universities in the U.S., U-PLAC has an administrative practice of distinguishing between annual cost-of-living and merit adjustments to base salaries. This distinction provides a unique opportunity to examine the relation between seniority and the components of faculty earnings.

We collected the record of merit pay for each faculty member from individual departments. Merit pay at U-PLAC is awarded in accordance with the published faculty evaluation guidelines issued by the Office of the President. Faculty productivity at U-PLAC is based on the weighted performance in teaching, research, and service. Exemplary teaching and service are recognized. However, research, in terms of the number of publications, carries a higher weight in performance decisions. Data on the level of annual merit awards and on accumulated merit are discussed below.

To obtain *COLA* salary, we subtract a faculty member's record of accumulated merit pay from his or her total salary.[3] This difference is a faculty member's starting salary that has been adjusted for cost-of-living and promotion increases during his or her career at U-PLAC. Since we include measures of rank in our salary estimates, we further control *COLA* salary for the increases in base salary associated with promotion.

U-PLAC has experienced chronically low *COLA*s that have barely kept pace with inflation and have lagged behind overall market trends. For example, the average union-negotiated *COLA* at U-PLAC, in the ten years prior to the study period, was 3.1 percent (with a high of 5.5 percent and a low of 0 percent). This average does not include the fixed-dollar *COLA* of $500 for all faculty in 1991. Inflation over this period averaged 3.1 percent (with a high of 6.1 and a low of 1.6 percent). On the other hand, data from the American Association of University Professors (see AAUP) indicate that over this same period, average faculty salaries, for all ranks, increased by 3.7 percent (with a high of 6.1 and a low of 2.5).

Union-negotiated *COLA*s at U-PLAC are across-the-board. In addition to these adjustments, about 33 percent of U-PLAC faculty also receive merit pay for exceptional performance. However, budget restrictions at U-PLAC have limited the amount of these awards as well. For example, the average merit award for top-performing faculty in our sample is $676. Consequently, even top-performing faculty would be challenged to maintain parity with market trends, given the low *COLA*s at U-PLAC.

The fiscal situation at U-PLAC mirrors that at many public institutions. Zoghi (2003) notes that the tapering off of enrollment demand in the 1980s reduced support for public institutions nationally. This has contributed to the twenty-five-year decline in faculty salaries at public schools

relative to private universities. Alexander (2001) also notes that this fiscal trend has limited the ability of public schools to compete for faculty.

Because of the distinction between merit and cost-of-living increases at U-PLAC, we are able to examine the relationship between seniority and total salary, *COLA* salary, and accumulated merit pay. To illustrate the advantages of these data, we estimate the following faculty earnings equations:

| **Model 1** |
|---|
| $TOTAL\ SALARY = b_0 + b_1\ SENIORITY + b_2\ SENIORITY^2 + b_3\ EXPERIENCE +$ |
| $b_4\ EXPERIENCE^2 + b_5\ X + b_6\ CUPA\ SAL + b_7\ HIGH\ PERFORM + e$ |
| **Model 2** |
| $COLA\ SALARY = b_0 + b_1\ SENIORITY + b_2\ SENIORITY^2 + b_3\ EXPERIENCE +$ |
| $b_4\ EXPERIENCE^2 + b_5\ X + b_6\ CUPA\ SAL + b_7\ HIGH\ PERFORM + e$ |
| **Model 3** |
| $TOTAL\ MERIT = b_0 + b_1\ SENIORITY + b_2\ SENIORITY^2 + b_3\ X + b_4\ CUPA\ SAL + b_5\ HIGH\ PERFORM + e$ |

where the dependent variable for Model 1, TOTAL SALARY, is the faculty member's contractual salary including accumulated merit, but minus stipends for department chairs. For Model 2, the dependent variable, *COLA SALARY*, is the faculty member's contractual salary minus stipends, minus accumulated merit. This variable measures the faculty member's promotion and inflation-adjusted starting salary. The dependent variable for Model 3 is the record of accumulated merit pay since the inception of the faculty member's career at U-PLAC.

It is the convention in the literature to estimate the natural log of faculty salaries. However, since accumulated merit pay for the faculty in our sample ranges from $0 to $14,720, the semi-log approach is not suitable for Model 3. To facilitate the comparison of coefficients across equations, we also estimate total and *COLA* salaries without the log transformation. However, we also estimated the results of Models 1 and 2 with the log transformation of the dependent variable. These empirical results are discussed below. Since new faculty have not been involved in the merit evaluation process at U-PLAC, the estimate of *TOTAL MERIT* is based on a sample of faculty with one or more years of seniority. The sample size for Models 1 and 2 is 225, whereas the number of observations used in the estimate of Model 3 is 207.

The specification of the right-hand side of the equation for Models 1 and 2 is typical of other studies that have examined faculty salaries. For example, Ransom and Brown and Woodbury use the quadratic form of the years of service at an institution. *SENIORITY* is the number of years served at U-PLAC and $SENIORITY^2$ is its square. Faculty salaries that rise, or fall, with additional years of service are indicated by the coefficient signs for the seniority variables. For example, a negative sign for the linear term and a positive coefficient for the quadratic term indicate a U-shaped

earnings-seniority profile with inverted and compressed salaries at this campus. The negatively sloped portion of such a profile reveals the seniority penalty, or relatively lower pay for more senior staff.

*EXPERIENCE* is the number of years of work experience a faculty member has accumulated since completing their degree. This is the measure of experience used by other researchers (e.g., Ransom,1993 and Moore et al., 1998). We include $EXPERIENCE^2$ to determine if the relation between faculty pay and experience is nonlinear. Ransom has reported a U-shaped earnings-seniority profile and an inverted U-shaped earnings-experience profile. Our specification of the seniority and experience variables allows us to determine if there are similar patterns at U-PLAC.

The vector *X* includes faculty characteristics such as rank, gender, race, and degree status. We follow Barbezat (1989) and Hallock (1995) by including measures of faculty rank which allows us to further control our estimate of *COLA SALARY* for promotion pay steps. Brown andWoodbury argue that since rank and salary are jointly determined, least squares estimates will be biased and inconsistent if rank is included as an independent variable. Hallock reports that including measures of rank results in a flatter earnings-seniority profile.

*CUPA SAL* is the 1998 College and University Personnel Administration (*CUPA*) market salary for new assistant professors for each faculty discipline at U-PLAC. To illustrate how this variable is created consider the following examples. For faculty assigned to the Art Department at U-PLAC, *CUPA SAL* has a value of $35,833. This is the starting salary reported by the College and University Personnel Administration for that discipline in 1998. Correspondingly, *CUPA SAL* has a value of $45,401 for the U-PLAC faculty assigned to the Economics Departments. Hence, *CUPA SAL* has a unique value for each of the 23 departments at U-PLAC. Consequently, additional controls for the department assignment (such as dummy department variables) would be redundant and collinear with *CUPA SAL*. The results reported below are based on estimates that include *CUPA SAL* as the control for faculty department. However, we also discuss the results of estimates with department dummy variables as controls.

The advantage of using *CUPA SAL* as a control is that this variable provides additional information concerning the source of faculty salary compression. As an independent variable in the estimated equation, *CUPA SAL* measures the relation between U-PLAC faculty salaries and external (market), entry-level salaries. Brown and Woodbury use entry-level, field-specific market salaries (similar to *CUPA SAL*) to determine if changes in external salaries are transmitted to faculty at their institution. They report that if the market salaries for new economists increase by 1 percent, the salaries for male economics professors at their institution increase by .65 percent. Similarly, a coefficient for *CUPA SAL* with a value less than one indicates that internal salaries at U-PLAC are not keeping pace with entry level, external salaries. The relation between *CUPA SAL* and *COLA* salary is of particular interest since this salary component is most sensitive to market trends.

We include two measures of faculty performance in an attempt to control for productivity differences among faculty. Most studies that include measures of faculty productivity rely on publication records. However, we are unable to collect these detailed data and must rely on other performance measures. *HIGH PERFORM* equals one if the faculty member is among the top performers at this institution (based on the previous year's faculty evaluation). *HIGH PERFORM* is zero for those not in this group. As mentioned above, the evaluation guidelines at U-PLAC are based on the weighted performance in teaching, research, and service, with more weight given to research. Thus, *HIGH PERFORM* is a broad measure of faculty performance. *HIGH PERFORM* not only captures an individual's productivity in terms of his or her performance at U-PLAC (through teaching and service evaluation), but this variable also indicates marketability and mobility (indicated by publication performance). The limitation of this performance measure is that we use data for only one year to designate *HIGH PERFORM*. However, faculty recognized as top producers likely have a history of sustained high performance. For example, top-performing faculty may have more accumulated merit pay or may have received higher starting salaries because of sustained records of high productivity. This example would be supported by a coefficient for *HIGH PERFORM*, from any model, that exceeds the average annual increase in merit pay. Such a result suggests that high performers have an earnings (and productivity) record extending beyond a specific annual merit award.[4]

We also include *CHAIR* for those who are department chairs (equals one if a chair, else 0). If more productive faculty move into these positions, this variable will also measure performance. Results of previous research concerning the earnings effect of a chair position are mixed. For example, Katz (1973) does not find a significant chair effect; however, Moore et al. (1998) and Siegfried and White (1973) report a positive impact on salary. The error term in all models is *e*.

## RESULTS

Summary statistics are presented in Table 1. In 1998, average total faculty salaries (minus chair stipends) were $47,392 at U-PLAC. Average accumulated merit pay was $4,167. *COLA SALARY* is the difference between these two, and the average value for this salary component was $43,225. The data for years of seniority and years of experience indicate that most faculty began their careers at U-PLAC. There was a total of 466 full and part-time teaching staff at U-PLAC in 1998; however, our sample of 225 includes only tenure-track assistants, associates, full, and distinguished professors. Five percent of this sample are distinguished professors. Full and associate professors each constitute thirty-five percent whereas assistant professors, the reference category, comprise the remaining 25 percent of the sample. Ninety-one percent of the faculty have Ph.D.s; the remainder have masters degrees. Thirty-five percent of the sample is female, 11 percent is nonwhite, and 10 percent are department chairs. We are unable to determine racial categories beyond the white-nonwhite classification. This information is not public. Given the distribution of

positions at U-PLAC, the average starting salary, according to the *CUPA* data (*CUPA SALARY*), is $37,625 for new assistant professors in the U.S. in 1998. Based on the previous year's performance evaluation, 33 percent of the faculty are high performers.

**Table 1: Brief Variable Descriptions and Summary Statistics**

| Variable | Brief Description | Sample Mean (Stand. Dev.) |
|---|---|---|
| *TOTAL SAL.* | 1998-1999 salary for full-time faculty minus stipends. | $47,391.92 (10,884.47) |
| *COLA SAL.* | 1998-1999 full-time Salary minus past merit increases and stipends. | $43,225.03 (8,569.34) |
| *TOTAL MERIT* | Accumulated merit increases from the inception of the career at U-PLAC. | $4,166.89 (3,742.11) |
| *SENIORITY* | Years of full-time service at U-PLAC. | 15.69 (11.52) |
| *EXPERIENCE* | Years of full-time service at U-PLAC and at other institutions. | 15.89 (11.37) |
| *RANK* | Dummy variables for distinguished, full and associate professors with assistants as the reference category. | 0.05(0.22), 0.35(0.48), 0.35(0.48) |
| *PHD* | Equal to one for Ph.D.s and zero for MA. | 0.91 (.29) |
| *SEX* | One if female, zero if male. | 0.35 (.48) |
| *RACE* | One if non-white, zero if white. | 0.11 (.31) |
| *CUPA SAL* | *CUPA* salary data for new assistants by discipline. | $37,625.26 (2,431.39) |
| *CHAIR* | Equal to one for department chairs, 0 otherwise. | 0.10 (.30) |
| *TOP PERFORMERS* | Equal to one for top performers based 1997-1998 evaluation, 0 otherwise. | 0.33 (.47) |
| *N* = | | 225 |
| Source: U-PLAC 1998-1999 faculty salary data. | | |

Empirical results for Models 1, 2 and 3 are reported in Table 2. The seniority coefficients from Model 1 (with total salary as the dependent variable) indicate that the earnings-seniority profile at this institution is U-shaped. The negatively sloped portion of the U-shaped profile indicates a seniority penalty: More recently hired faculty earn more than faculty with higher levels of service, other factors held constant. The "U" shape also suggests salary compression between faculty with very high and very low levels of seniority. These linear and quadratic seniority coefficients are statistically significant at the .05 level. The first and second derivatives of the total salary estimate, with respect to years of seniority, indicate that salaries of senior faculty fall, relative to more junior faculty, until 9.1 years of service.

**Table 2: Faculty Earnings Estimates by Salary Component**
Model 1: Dependent Variable = Total Salary – Stipends
Model 2: Dependent Variable = Total Salary – Stipends – Total Merit
Model 3: Dependent Variable = Total Merit

| Variable | Model 1 Coefficient | Model 2 Coefficient | Model 3 Coefficient |
|---|---|---|---|
| Constant | 23890.22 | 26949.86 | -2855.79 |
| | (4.48) | (5.01) | (-1.39) |
| *SENIORITY* | -1719.82 | -1779.81 | 499.30 |
| | (-2.23) | (-2.29) | (7.66) |
| *SENIORITY*$^2$ | 94.85 | 60.77 | -10.18 |
| | (2.19) | (1.39) | (-6.52) |
| *EXPERIENCE* | 1594.16 | 1206.79 | --- |
| | (1.98) | (1.49) | |
| *EXPERIENCE*$^2$ | -79.03 | -35.77 | --- |
| | (-1.80) | (-0.81) | |
| *ASCT. PROF* | 4081.75 | 4681.38 | -744.10 |
| | (3.19) | (3.63) | (-1.50) |
| *FULL PROF.* | 11677.58 | 9427.06 | 2009.04 |
| | (7.49) | (6.00) | (3.37) |
| *DIST. PROF.* | 20573.53 | 15893.93 | 4425.51 |
| | (9.64) | (7.39) | (5.47) |
| *PHD* | 2077.35 | 1144.85 | 950.65 |
| | (1.69) | (0.96) | (2.02) |
| *SEX* | -712.24 | -514.51 | -155.80 |
| | (-0.89) | (-0.64) | (-0.49) |
| *RACE* | -520.88 | -24.36 | -404.90 |
| | (-0.46) | (-0.02) | (-0.95) |
| *CUPA SAL* | 0.28 | 0.24 | 0.02 |
| | (1.95) | (1.66) | (0.06) |
| *CHAIR* | 635.00 | -583.18 | 857.58 |
| | (0.53) | (-0.48) | (1.92) |
| *HIGH PERFORM* | 2043.36 | 362.28 | 1764.67 |
| | (2.69) | (0.47) | (6.19) |
| *N* = | 225 | 225 | 207 |
| $R^2$ (adj) = | .79 | .66 | .75 |
| F = | 66.97 | 34.55 | 56.0 |

Source: U-PLAC 1998-1999 faculty salary data;
t-values in parentheses.

For example, a faculty member with five years of seniority can expect her/his salary to fall (relatively) $771.32 with another year of service. This finding is based on the partial derivative of total salary with respect to years of seniority, evaluated at 5 years of seniority.

Decreasing relative earnings for faculty in the early stages of their careers is consistent with other studies that indicate a seniority penalty (Brown & Woodbury; Ransom). However, the results of all of these studies are inconsistent with those that track career trends in faculty productivity. For example, Oster and Hamermesh (1998) find that productivity, measured by research output, reaches a peak at nine or ten years of experience, before dropping off sharply. They attribute the trend in productivity to the incentive offered by tenure. After tenure is achieved, output for most professors decreases sharply.[5] Although this finding is based on the experience of economists at research institutions, the incentive associated with tenure applies to faculty at all institutions. For example, the possibility of tenure should prompt young U-PLAC faculty to produce, particularly during the probationary period. However, the period with the greatest incentive to produce is also associated with a penalty for seniority. This contradiction suggests that the seniority penalty is not related to faculty productivity.

Our estimate of total salary includes controls for faculty productivity. Hence, our results indicate the persistence of a seniority penalty for faculty in the early stages of their careers, holding productivity constant. However, these controls may not be complete. Consequently, we cannot determine with a high level of certainty if the seniority penalty, with respect to total salary, is due to the lower productivity of faculty or if it is rooted in other factors such as annual salary increases at U-PLAC that have failed to keep pace with market trends. The results from Models 2 and 3 shed more light on this issue.

The seniority coefficients from Model 2 (with *COLA* salary as the dependent variable) suggest another U-shaped earnings-seniority profile. The linear coefficient is significant at the .05 level. While the coefficient sign for the quadratic term suggests a "U" shape, the t-value is below conventional levels of statistical significance. Regardless, the negatively sloped portion of this profile is consistent with the view that budget limitations on this campus have prevented *COLA* adjustments of more senior staff from keeping pace with entry-level salaries. Results from estimates of Models 1 and 2 with the natural log of total and *COLA* salaries as the dependent variables are consistent with those reported in Table 2.[6]

Moore et al. demonstrate that the seniority penalty diminishes and loses statistical significance when more complete controls of faculty productivity are included on the right-hand side of the equation. In our estimate of *COLA SALARY*, we control for differences in faculty productivity by removing accumulated merit pay from the dependent variable, or from the left-hand side of the equation. In this way, we have removed from total salary the earnings component most closely linked to faculty performance. The remaining salary component (*COLA SALARY*) measures a faculty member's starting salary that has increased with annual cost-of-living adjustments and with promotion pay steps. We control for the impact of promotion on base salaries by including rank.

As a consequence, the U-shaped *COLA* salary-seniority profile can be attributed to differences between cost-of-living adjustments at U-PLAC and market salaries for new faculty. This approach illustrates how a seniority penalty may be attributed to limited budgets rather than the lower productivity of senior staff.

The seniority profile for *COLA* salary is steeper and deeper than the corresponding profile from the total salary estimate. This indicates the strength of the penalty with regard to *COLA* salary. The first and second derivatives of the *COLA* salary estimate, with respect to years of seniority, indicate that earnings fall until 14.6 years of service. Furthermore, the partial derivative of *COLA* salary, with respect to years of seniority, indicates a relative decrease in earnings of $1,172.11 for a representative faculty member with 5 years of service.

Results from Model 3 indicate that merit pay rises with seniority at a diminishing rate.[7] The linear and squared seniority coefficients are statistically significant at the .01 level. The first and second derivatives of merit pay, with respect to seniority, indicate that merit pay rises until reaching a maximum at 24.5 years of service at U-PLAC.

These results, based on the pay most closely related to faculty performance, suggest that U-PLAC faculty remain productive for a period much longer than predicted by Oster and Hamermesh. These authors measure productivity via publication in leading journals and note that after the peak period many professors continue to publish, but in lower quality outlets. U-PLAC faculty are not expected to publish in leading journals, but are rewarded for ongoing research activity. The merit-seniority profile indicates that these faculty are active for a lengthy career period.

The empirical results obtained from Models 2 and 3 indicate that the years of rising merit pay overlap with the years in which *COLA* salary decreases with additional seniority. However, since the coefficients for the *COLA* profile are greater, in absolute value, than the corresponding coefficients for merit pay, the net effect of another year of seniority is negative for faculty early in their careers. For example, our representative faculty member with 5 years of seniority will receive $397.50 more merit pay for another year of service (based on the partial derivative of the Total Merit estimate, evaluated at 5 years of seniority). However, this increase is more than offset by the decrease associated with *COLA* salary ($1,172.11, as reported above). The net of these two seniority effects is -$774.61 (-$1,172.11 + $397.50). The net return to seniority calculated in this manner is approximately equal to the seniority penalty obtained from the partial derivative of total salary, evaluated at 5 years of service (or, -$771.32, as reported above).

This example illustrates how senior faculty can experience relatively lower total earnings, even after rewards for ongoing productivity. Ultimately, the overall return to seniority at U-PLAC depends on the financial ability to reward performance and years of service. If the U-PLAC budget provided higher merit awards, or for *COLA* increases that matched market trends, the overall return to seniority would likely be positive. However, our results suggest the contrary. The budget at

U-PLAC simply has not been sufficient to reward the productivity of senior staff with an overall positive return to seniority.

Results from Model 3 are consistent with several human capital predictions concerning the relation between wages and seniority. For example, the diminishing slope of the merit-seniority profile is consistent with the human capital prediction that workers make most productivity enhancing investments early in their careers. Additionally, when we estimate Total Merit without measures of productivity, the slope of the seniority profile is steeper. For example, the linear slope term is 564.55 (t-value = 7.95) and the coefficient for the quadratic form of seniority is -12.11 (t-value = -7.16) without the measures of performance. With our measures of productivity included in the estimate, the seniority profile is not as steep. Such a finding is consistent with the view that years of seniority are a proxy for the skills and productivity acquired on-the-job (Oi, 1962; Mincer, 1974). Finally, when we interact *HIGH PERFORM* with the seniority variables, we find that the slope of the merit-seniority profile is an increasing function of performance, so if our representative faculty member with five years seniority is a high performer, the slope of the merit-seniority profile increases by an additional $310.12.[8] This relationship is consistent with the human capital prediction that earnings rise more quickly for more productive employees.[9]

If our focus is limited to the relation between total salary and years of seniority, the U-shaped total salary-seniority profile (from Model 1) is consistent with the view that the best senior professors have found more rewarding employment elsewhere. Hence, the senior faculty remaining at U-PLAC receive relatively lower pay because of their lower productivity. This explanation is consistent with the "raiding" theories developed by Lazear (1986) and Harris and Holmstrom (1982). However, the positively sloped merit-seniority profile (from Model 3) suggests that productive senior faculty remain at this institution.

Why do productive senior faculty remain at U-PLAC despite the seniority penalty? High mobility costs, the monopsony power of the university, or external openings restricted to the assistant level may explain this phenomenon.[10] Additionally, U-PLAC has an administrative policy of annually adjusting salaries for internal inequities associated with salary compression, budget permitting. The promise of future adjustments may provide an incentive for productive senior faculty to remain at U-PLAC. Some studies have examined the relation between faculty unionization and the return to seniority. For example, Hallock suggests that since the collective bargaining agreement at University of Massachusetts, Amherst grants cost-of-living increases to all faculty, the wage-tenure profile for faculty at that campus has an inverted "U" shape. Barbezat (1989) also finds that faculty unionization at a campus offsets an otherwise negative return to seniority. Our results are based on a campus with union-negotiated, across the board cost-of-living increases, yet the total salary-seniority profile is U-shaped. This finding suggests that faculty unions are not always successful in providing positive returns to seniority.

Other results reported in Table 2 indicate that total salaries rise, at a diminishing rate, with additional years of experience. The linear and quadratic experience coefficients are significant at

the .05 and .10 levels, respectively (two-tailed test). This result is consistent with Ransom who also finds a seniority penalty in the presence of positive returns to overall experience. A positive return to experience, coupled with a penalty for seniority is a strong incentive for senior faculty to seek employment elsewhere. This incentive may be offset by the factors mentioned above (mobility costs, university monopsony power, etc.). The experience coefficients from Model 2 also suggest a *COLA* salary-experience profile that rises at a diminishing rate, yet the t-values for these coefficients fail to achieve conventional level of statistical significance. We omit years of experience from the estimate of total merit pay because the accumulation of this salary component depends on the faculty member's performance at U-PLAC.

Results for the rank variables from Models 1 and 2 indicate that associate, full, and distinguished professors all earn significantly higher total and *COLA* salaries than assistants. Results from Model 3 indicate similar results for full and distinguished professors; however, associates do not have significantly different merit accumulations than assistant professors. These dummy variables capture, in part, the pay steps associated with promotion at this institution ($1,500 for promotion to associate and $2,000 for promotion to full). However, the estimated impact of rank, from Models 1 and 2, exceeds the University's promotion pay increases. In their examination of the wage policy of a firm, Baker, Gibbs and Holmstrom (1994) also find a similar pattern of estimated values associated with a promotion exceeding the pay steps of the promotion. They attribute this finding to the higher productivity of those promoted. Our results are consistent with this explanation and suggest that the rank variables not only capture the pay steps associated with promotion, but also capture productivity differences. Ph.D.s earn significantly more total salary (at the .10 level) and more merit pay (at the .05 level, two-tailed tests). The low t-values for the *RACE* and *SEX* coefficients from any specification suggest the absence of racial and gender earnings differences at U-PLAC.

Results reported in Table 2 also indicate that total salary is significantly related (at the .06 level) to external, entry-level, field-specific salaries. However, the coefficient for *CUPA SAL* suggests that a one dollar increase in entry-level, field-specific salary is associated with an increase of U-PLAC salaries of only $.28. This coefficient's low value suggests that internal salaries at U-PLAC are shielded from external, market salaries which compounds the salary compression problem. The coefficient and t-value for *CUPA SAL* are lower in the estimate of *COLA SALARY* suggesting a weaker relation between this salary component and external salaries. This provides further evidence of the disparity between cost-of-living adjustments at U-PLAC and market trends. The level of merit pay, which depends on established increments, is not statistically related to external salaries.

We also estimated the models by replacing *CUPA SAL* with department dummy variables. Results for total and *COLA* salaries indicate that while faculty in some departments earn more (or less), relative to the reference department (economics), none of these differences are statistically different at the .05 level. With respect to merit pay, faculty in some departments earn more than

faculty in the reference category. For example, faculty in the geography and geology departments have more accumulated merit pay than economists, holding all else constant. These statistically significant differences in merit pay by department are likely due to concentrations of more productive faculty in select areas.

The coefficient for *CHAIR* is only statistically significant (.06 level) in the estimate of accumulated merit. This suggests higher performance for faculty holding this position. Finally, high-performing faculty have significantly higher total salaries and merit pay (.01 level). The values of the coefficients from either model are larger than the average merit increase awarded to these faculty. The average merit increase for top performers was $676 (with a standard deviation of $362) based on the previous year's faculty evaluation, so HIGH PERFORM captures some of the history of past faculty performance.

## CONCLUSION

The determinants of the return to faculty seniority are many and varied. Others have examined the effects of faculty mobility, productivity, tenure, and unionization. Our data allow us to examine the consequences of chronically low university budgets. For the institution we examine, this fiscal setting has resulted in annual *COLA* adjustments that have failed to keep pace with market rates for new Ph.D.s. The consequence has been a seniority penalty even among faculty for whom performance pay rises with years of service. Given the recent reductions in state budgets, the level of funding for state universities may play a larger role in determining the return to faculty seniority in the future.

Our findings imply that future research should address the fiscal condition of an institution when estimating the return to faculty seniority. This could involve collecting longitudinal data for an individual institution and its faculty. Or, national data sets can be expanded to include measures of the fiscal status of the institutions included in the cross section. Either of these approaches would allow for a direct test of the impact of university budget conditions on the return to faculty seniority.

## ENDNOTES

[1] See Brown (1989) and Toppel (1991) for examples. An exception to these empirical findings is Baker, Gibbs and Holmstrom (1994) who find that for the firm they examine, earnings are partially shielded from the external market and real wages often fall with seniority. This effect increases with the time to promotion.

[2] In our empirical results we employ controls for rank to further adjust cost-of-living starting salaries for promotion pay steps. This issue is described in further detail below.

[3] Our data do not allow us to completely remove the effect of performance from *COLA* salary because one year's merit is included in the next year's base salary which will be adjusted by future cost-of-living increases. The

following example illustrates the extent to which we are able to remove the earnings effect of productivity from faculty salary. Consider a faculty member who has completed two years of service. At the end of each year this faculty member received a 3 percent cost-of-living adjustment plus $500 in merit pay. Because the first years' merit ($500) becomes part of the base salary which is adjusted for the cost-of-living in the second year (3 percent times $500 = $15), the accumulated earnings effect of this faculty member's merit is $1,015. Because of how merit increases are recorded at U-PLAC, we are unable to remove that amount of the merit increase that is affected by the cost-of-living adjustment. Consequently, recorded merit for this faculty member is $1,000, or $15 less than the accumulated effect of merit. Since cost-of-living adjustments at U-PLAC have historically been quite low, averaging 3.1 percent annually for the previous 10 years, errors originating from this source should also be low.

[4] This is precisely the effect that is measured by *HIGH PERFORM*. For example, the coefficient for *HIGH PERFORM* from Model 1, from Table 2 indicates that those who received merit pay in the previous year had total salaries that were $2,043.36 higher than other faculty (see the coefficient for *HIGH PERFORM*). On the other hand, the average merit award received in 1998 was $676 (standard deviation of $362).

[5] Oster and Hamermesh track faculty performance based on the citation index of the *Journal of Economic Literature* and assume a 2-year lag between the submission of a paper and its publication date. Consequently, peak performance, occurring at 9 to 10 years, corresponds to activity peaking at 7 to 8 years of experience. These dates overlap with tenure decisions at most universities.

[6] Both of these semi-log estimates suggest U-shaped seniority profiles with respect to total and *COLA* salaries. For example, the coefficients and t-values for the seniority variables for total salary are -0.038 (t-value = -2.66) for the linear term and 0.002 (t-value = 2.49) for the square of seniority. The coefficients and t-values for the seniority variables for *COLA* salary are -0.040 (t-value = -2.50) for the linear term and 0.001 (t-value = 1.49) for the square of seniority.

[7] These results are based on a sample of faculty who have at least one or more years of service at U-PLAC. These 207 faculty have all experienced at least one year of performance review. We also estimated total merit with the complete sample of 225 faculty. Results from this sample are consistent with those reported in Table 2. For example the linear and quadratic seniority coefficients are 441.34 (t-value = 7.79) and -8.91 (t-value = -6.42), respectively.

[8] The partial derivative of the estimate with the interaction of the seniority variables and *HIGH PERFORM* is (t-values for the corresponding regression coefficients in parentheses):

*d TOTAL MERIT / d SENIORITY = 400.75 - 16.24 SENIORITY +*
*(5.83) (-4.87)*
*393.62 HIGH PREFORM - 16.70 HIGH PERFORM*SENIORITY.*
*(3.22) (-2.60)*

Evaluating the partial derivative at 5 years of seniority and for *HIGH PERFORM* = 0, indicates that the merit slope of the profile is $319.55. When this partial derivative is evaluated at 5 years of seniority and *HIGH PERFORM* = 1, the slope increases to $629.67, an increase in the slope of $310.12.

[9] We also interacted our other measure of performance, *CHAIR*, with the seniority coefficients. None of the coefficients from the interaction of *CHAIR* with *SENIORITY* and $SENIORITY^2$ achieved conventional levels of statistical significance.

[10] Ransom argues that high mobility costs and the geographic isolation of campuses are the source of a university's monopsony power. U-PLAC may have considerable monopsony power since the nearest institution is over 50 miles away.

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# ACADEMIC MODEL OR CORPORATE MODEL: IS TENURE STILL VIABLE?

**Sarah T. Pitts, Christian Brothers University**
**Rob H. Kamery, Christian Brothers University**

## ABSTRACT

*Tenure has come under attack because in the age of corporate downsizing, corporate leaders, legislatures, and some board of trustee members have questioned why colleges and universities should not also be made "leaner and meaner" (DeGeorge, 1997). In order to address the issue of whether an institution of higher learning should operate as corporations do, we investigate the role academia takes is compared to the role a corporation takes in society. Tenure and its purposes must also be defined, including arguments for and against this long-standing tradition, and, weighing both sides equally, finally conclude what course of action should be taken to remedy the problems facing tenure.*

## INTRODUCTION

Comparing the corporate and academic cultures is like comparing apples and oranges. Their motives are strikingly different, as are their organizational structures, specializations, decision making processes, and hierarchies of power. Each could learn valuable lessons from the other, such as the presence of shared governance in higher education as a decision-making tool. Corporations would benefit greatly in the area of labor relations if similar policies were adopted. Colleges and universities could provide a great service to their consumers, that is students, if, like corporations, they would place greater value on the student's needs and not their own sense of what is necessary for a proper education.

Tenure is defined many ways, but for the purposes of this research, it will be defined as relating to faculty at colleges and universities, and as the American Association of University Professors (AAUP) defines it: "After the expiration of a probationary period, teachers or investigators should have permanent or continuous employment, and their service should be terminated only for adequate cause, except in case of retirement for age, or under extraordinary circumstances, such as financial exigencies" (DeGeorge, 1997).

According to Richardson (1999), tenured and tenure track faculty constitute only 35 percent of all of those who teach at institutions of higher learning. Marcus (2000) reports on the continuing

decline of academic tenure in the U.S. This is good news for critics of tenure, because not too many decades ago, almost all faculty were tenured or on the tenure track (Richardson, 1999). There are many critics of tenure, but few distinct criticisms. Most fall under the economic umbrella, citing decreases in productivity and motivational problems with post tenure professors.

This research attempts to strike a balance between opposing sides of the tenure debate. In a free market economy, such as exists in the U.S., the organizational model of the academic institution can thrive and continue to grow. It is necessary for attitudes to change; for example, the acceptance of the institution that chooses not to offer tenure, or combine it with part time faculty and/or multi-year contracts. Institutions of higher learning should be able to adjust to the changing economic environment effectively, without dismantling the long standing traditions put in place decades and centuries ago. Tenure is an economically sound policy for colleges and universities, but should not be so sacred that it cannot be reformed. Sowell (2003) notes in a recent article that the time has come to rethink academic tenure.

## COMPARING THE ACADEMY AND THE CORPORATION

Colleges and universities should not be compared to businesses, and the education of students should not be compared to products produced by factories. Businesses usually benefit from downsizing, whereas a college or university may not become more efficiently valuable. In fact, the opposite is more likely to occur. Also, collegiality is highly valued in the academy (Cawyer, Sanders & Schrodt, 2003). Corporations are managed hierarchically, whereas colleges or universities are not. CEOs may make decisions with or without board approval, but administrators share decisions with faculty members. Finally, business is subject to changing trends, whereas most colleges and universities will not find themselves with faculty expertise that is outdated (DeGeorge, 1997). Morrell (1994) states that the private sector employee can expect five to six promotions and the possibility of profit sharing. Faculty members can expect no more than three promotions, with no possibility of profit sharing. Because many members of the board of trustees are from the business world, faculty members may be seen not as partners in the academic enterprise, but as mere employees (Perley, 1998).

## MODELS

DeGeorge (1997) sets up five models of a university. The traditional model goes back to the 13th century and the University of Paris. This university operated autonomously and was faculty-run. Students would learn from the master, and the university was not subject to local authorities. The second model is student run. The main purpose of the university was to prepare students for jobs. Students hired faculty specializing in law or medicine, for example, to teach them what they needed to know in order to thrive in that profession. The third model is similar to what

existed in the former Soviet Union. Faculty could only teach the state's ideology, and students were prepared for specific jobs. The fourth model is an entrepreneurial one. Its goal is to make a profit. Someone starts a college or university, hires faculty and staff, and pays them to teach the students. Courses are determined by the greatest demand. The fifth and final model is the state college or university, and is a mixture of the previous models. It has some autonomy, even though it is supported by tax dollars (the state) and students, by way of tuition. The faculty decide what should be taught and how it should be presented (DeGeorge, 1997).

McPherson (1983) contrasts academic institutions and corporations using tenure, structural aspects, knowledge capital, training patterns, job security, and motivation. Academic tenure differs from the job protection seniority provides to production workers. A striking contrast between academic institutions and corporations is the nature of the job guarantee. In a college or university, there are a number of high-level employees who do not expect to stay. Tenured faculty are not only assured continuous employment, but continuous employment in a highly specific and well-defined area, such as 18th century French literature (McPherson, 1983). Even tenure for college presidents is being discussed (Martin, 2002). McPherson (1983) contends that tenure has some desirable efficiency properties that are often overlooked.

Barring malfeasance or economic hardship, corporate employees, following a brief probationary period, usually will retain continuous employment. They are not, however, guaranteed a specific assignment; instead they face a variety of career paths. University employees do not receive an immediate employment guarantee, but face an extended probationary period. When they are guaranteed employment, it is for a specific set of tasks with well-defined prerequisites.

## ACADEMIC EMPLOYMENT

In academic employment there is very little internal job mobility. It is well understood that people who are hired as faculty either stay on as faculty or are dismissed. Very few former faculty members move on to administration, and non faculty members are rarely promoted to faculty. When a worker is inflexibly attached to a particular job, McPherson (1983) states that mismatches between wage and productivity can only be avoided by (a) adjusting wages to match individual productivity, (b) accepting the costs of higher turnover by dismissing low productivity employees, or (c) introducing more intensive and costly initial screening. Alternative (c) has been the chosen method for academic employers. It is more intense than the process corporations undertake (McPherson, 1983). Corporate employers have the ability to make marginal adjustments in job assignments, which increases productivity in the labor force. In the university, monitoring performance is of little value. One way to increase productivity is to use information about tenured faculty to increase or decrease wage rates and serve as moral suasion (McPherson, 1983).

The major structural contrast between academic institutions and corporations is the fact that professors are hired to do narrowly defined and rigidly specified jobs in the college or university.

Another important difference is between the knowledge capital that workers require to do their jobs. In a university, the knowledge is specific to the occupation and not to the university. In the corporation, firm-specific knowledge, such as codes, practices, and procedures is the norm (McPherson, 1983).

Training patterns differ between university and corporate work. According to McPherson (1983), academic employment is for a specific academic discipline, and is an example of an extreme case of "non appropriation" of worker training. The university hires its faculty already trained, at someone else's expense. A faculty member's duties remain constant, and hopefully improve with time. The corporation hires generalists, who are put through initial firm specific training and future periodic training in firm-related skills.

The form of agreement of job security differs in academic institutions and corporations. The university has little authority to reassign faculty to different work. The faculty member has the authority to determine his/her job description. This is what attracts many people to academic employment: the freedom to read, think, talk, and write about things that they find interesting and rewarding. In the corporation, the firm maintains authority to determine the career path of the employee, not only at the beginning, but also throughout his/her employment. The benefit to the employee is job security.

The tenure decision from the university comes from specific individuals within the institution (Cawyer, Sanders & Schrodt, 2003). In the corporation, decisions are made in a hierarchical manner, with high level decision makers determining the course of those lower. Deans and presidents have input in the tenure decision, but most of the decision-making is left up to those in the same discipline as the candidate, who already has tenure. This is peer review. This process is closely linked to the high level of specialization in academic employment. Peer review is also cost effective, because peers can be familiar with more than just a colleague's published work (McPherson, 1983).

One similarity corporations and universities possess is the avoidance of instituting wide merit-based pay differentials for different workers doing similar jobs. Corporations do use promotions and job reassignments as tools of motivation. Monitoring senior faculty members' performance levels is difficult, expensive, and may have a negative effect on morale.

Trust is an important issue when dealing with post tenure monitoring. Ensuring continued performance in faculty is challenging. One crucial point is to select beforehand faculty who possess internal motivation, or are influenced by moral suasion or peer pressure to perform. Another important motivation is the tendency for tenured faculty to desire a higher position at another university (McPherson, 1983). All of these techniques or a combination of a few are effective methods of maintaining a high quality faculty. There are many differences in how corporations and universities operate. This is just one aspect of the tenure debate.

## THE BENEFITS OF TENURE

Varma (2001) states that the merits of the tenure system have an influence on academic freedom. The majority of tenure's proponents argue that tenure is necessary to protect academic freedom. DeGeorge (1997; 2001) takes this idea one step further by stating that in order to maintain impartiality, objectivity, and lack of pressure, faculty must be able to maintain academic freedom. Tenure protects the faculty from the repercussions of criticisms of policies and administrative decisions (Perley, 1998). Critics claim that academic freedom can be protected separate from tenure by the First Amendment. Perley (1998) argues that professors may not have the resources or the support from their board of trustees to pursue questions about the limits of their speech. The First Amendment does not protect free speech at private universities, and is limited to matters of "public concern" at state institutions (DeGeorge, 1997). "Academic freedom involves the freedom to pursue one's research independent of outside political powers and pressure. Academic freedom loses its central meaning in a society in which the external powers that control the university decide what is true and what is not, and so what may be taught or published, and what may not be" (DeGeorge, 1997).

Another argument used to support tenure is the idea that given the time and study necessary for professors to attain their position, they trade job security for low salaries (Formby & Hoover, 2002). DeGeorge (1997) argues that faculty salaries were low before academic tenure came on the scene, and if faculty salaries were commensurate with the amount of study required to hold such a position, tenure would not be justified.

Tenure is beneficial to academic institutions because it keeps faculty salaries down (DeGeorge, 1997; Morrell, 1994). According to Morrell (1994), colleges and universities monitor their expenditure levels through the Higher Education Price Index (HEPI), which measures the average relative level in the prices of goods and services purchased at academic institutions. Faculty salaries constitute less than one third of the total operating expenditures (excluding financial aid). To reflect the permanent nature of the positions, the laws of economics dictate that salary levels for long term, continuing faculty members continue to be relatively low (Morrell, 1994).

Tenure gives a college or university the competitive edge necessary to obtain the best and brightest graduate students. Elimination of tenure might make the teaching profession less attractive to new graduates, and could cause institutional instability because of increased mobility (Cotter, 1996; Morrell, 1994). Tenure cuts costs to an institution by eliminating high rates of turnover and costs of recruiting (DeGeorge, 1997). Cotter (1996) states that tenure actually allows the faculty member to become more productive and contribute more to the academic quality of the institution. McPherson (1983) states that studies show a mutual benefit between workers and firms when long term, stable employment relations are sustained. Tenure protects against special problems that arise with highly specialized employees. Tenure has efficiency properties as well. The productivity of an organization depends on the character of the work environment. Dnes and Seaton (2001) tested

the hypothesis that reforming tenure may reduce the performance of faculties in universities. Turnover is costly because of training costs and accumulation of information. Mobility is expensive for faculty due to the search and relocation costs. McPherson (1983) also investigates wage and promotion structure and how it helps to secure the relationship between the worker and the firm. The firm invests in the worker, both by training and by accumulation of information about his/her strengths and weaknesses. The worker accepts a low initial wage, which only makes sense if he/she is willing to stay long term. This type of arrangement will be self enforcing because the worker and firm have a mutual interest in placing the worker where he/she will be most productive, and at a wage that the employer will be willing to maintain (McPherson, 1983).

Cotter (1996) states that faculty are the continuing heart of a college or university. Regular turnover occurs with students, trustees, presidents, and staff, but tenured faculties make a lifetime commitment. It is beneficial to academic institutions to provide a stable environment in which creativity can be liberated and faculty will sustain their dedication to their life's work. Faculty has a vested interest in an institution's values and quality. Cotter (1996) continues to make the point that faculty members are depended on to volunteer for advising, mentoring, and committee service, and most of that work is done by tenured faculty.

The academic institution must ensure that it tenures quality faculty. This is a problem unique to the academic marketplace. The probationary period is a viable solution to this problem. There are four distinct ways to express the value of the probationary period:

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|---|---|
| 1. | Performance monitoring--teaching and scholarship are hard to measure, and quite costly. It is possible to adequately monitor these activities over a long period of time at a lower resource cost. |
| 2. | Self selection--the danger in this is the vulnerability of the employer to believe misrepresentations of the candidate. This is remedied by the probationary period and the reasonably likely chance of dismissal. The longer the probation period, the better chance of screening out any unsatisfactory candidates. |
| 3. | Time to tenure as an economic variable. The university can use variations in the length of the probation period to vary the value of its employment as market conditions change. |
| 4. | The focusing of monitoring resources--limiting the probationary period to a reasonable amount of time ensures that the candidate is evaluated carefully, and it cuts back on the tendency to postpone firing anyone, which is an inefficient use of time and resources (McPherson, 1983). |

## CRITICISMS OF TENURE

Conflict surrounding tenure is both theoretically and practically important (Anderson & Hearn, 2002). After the probationary period and tenure appointment, post tenure review becomes an issue (Plater, 2001). Critics of tenure claim that faculty members may reduce their efforts once they obtain the lifetime security of tenure. In response to these critics, Cotter (1996) states that evaluations do not end with tenure. Student evaluations rate faculty's effectiveness at the end of

every course. Some institutions maintain a merit salary system, in which a faculty member's work is reviewed periodically. Its incentive is monetary and can add thousands of dollars to lifetime earnings. Additionally, faculty can be dismissed with adequate cause. This system, properly in place, will motivate tenured professors to remain productive (Cotter, 1996). DeGeorge (1997) states that as faculty members age, they usually grow in wisdom and experience, which is invaluable to the students and the institution.

Other criticisms include the possibility that junior faculty are facing less opportunity for full-time employment when tenure is in place. This is true, but tenure is not the cause; instead it is because retired tenured faculty are being replaced by part time and adjunct faculty (Perley, 1998). Critics of tenure also claim that it hinders an institution from making curricular changes that are responsive to student demands and changes in society. In fact, most faculty members regularly update their own material and may even introduce new courses. There is significant turnover, resulting from retirements, resignations, denials of tenure, and denied contract renewal for colleges and universities to make new appointments (Cotter, 1996).

There are many non economic criticisms of tenure including the deadwood argument, the six year conformity argument, the post modernist argument, and the politicization attack argument (DeGeorge, 1997). DeGeorge answers these critics by explaining that if a faculty member fails to perform his/her duties, he/she can be dismissed. Poor performance does not necessarily reflect on tenure itself, but on the individual. The six year conformity argument states that the candidate will conform for a short period of time in order to achieve tenure and then change. This is an abuse of the tenure system, not a result of the tenure system.

As far as there being no absolutes, this is a matter of opinion. DeGeorge (1997) believes that there are still absolute truths and knowledge to be pursued. The post modernist argument does nothing but damage the discipline involved in this belief. Politicization is a problem, and if it does exist, it should be remedied, but again this does not reflect on tenure, but on the institution (DeGeorge, 1997).

If the tenure system were abolished, unions and collective bargaining would replace tenure (Mortimer, Bagshaw & Masland, 1985). The collective bargaining process cannot protect society's interests or academic freedom. It could also polarize viewpoints, rigidify tactical positions, delay resolutions of dispute, politicize faculty and students, and induce resentment, slowdowns, and boycotts in an effort to influence negotiations (Mortimer, Bagshaw & Masland, 1985). There are many critics who would like to see tenure abolished. The effects of this action are unknown. It is safe to state that an institution that has been in place as many years such as tenure must have some value.

Criticisms of tenure stem from a variety of academic scandals, such as grade inflation, the over use of teaching assistants to perform a large percentage of the instruction, and the faculty member's failure to pay adequate attention to their students by not keeping posted office hours, etc. The tenure system came under attack after World War II, and has been blamed for some of the

uprisings on college campuses in the 1960s. The attack on tenure has taken several forms: direct, such as legislation to abolish tenure, and indirect, which comes from internal and external sources (DeGeorge, 1997). Internal criticisms include junior faculty's disdain for tenure, administration's frustration with slow change stemming from shared governance, and presidents who doubt their ability to lead when tenure allows professors to strive to fulfill personal goals and not work toward institutional goals (Trower, 1999). Many external attacks on tenure are economic. The most frequent is the deadwood argument. It claims that pre tenure professors work hard until they become tenured, after which they become lazy--teaching, but not doing research, or being published, but spending little time and exerting little energy with students (DeGeorge, 1997).

The next charge is inefficiency. Comparing an educational institution with a corporation, critics claim that colleges and universities are saddled with too many tenured professors in the wrong area, and because of tenure they cannot downsize that area. Critics also claim that colleges and universities have no incentive to be productive because they do not face any real competition and are usually not for profit (DeGeorge, 1997). Critics often question the cost effectiveness of tenure. Tenure holds inherent value. This is proven in the exercise of thinking of two identical jobs, only one of which has a lifetime guarantee. Which one is more likely to be chosen? The one with the lifetime guarantee. If lifetime employment were cost effective, why is it not more widespread? In reality, lifetime appointments reduce flexibility, and a profitable business must have the ability to eliminate unneeded resources. Tenure prevents efficient resource allocation. Though it is commonly believed that tenure keeps costs down, in reality, overall labor costs may increase because additional faculty may need to be hired to fill needs in popular disciplines (DeGeorge, 1997).

Mortimer, Bagshaw and Masland (1985) found that a high tenure ratio is one indicator of potential danger in faculty personnel systems. If an institution has a high tenure ratio, it will have more difficulty in opening and closing academic programs, freeing resources to respond to shifts in student demand and/or improving the quality of existing programs, and providing for institutional renewal by hiring new faculty (Mortimer, Bagshaw & Masland, 1985).

Dismissing deadwood faculty can prove to be difficult. DeGeorge (1997) states that it is expensive and time consuming as in the example Michigan set with passing the Teacher Tenure Act in 1937. Labor law in Michigan has evolved so that tenure is no longer necessary. Dismissing an incompetent instructor is expensive, averaging between $50,000 and $70,000 (DeGeorge, 1997). Tenure adds costs to the education system by burdening institutions with high labor costs without adequate output in return (Morrell, 1994).

Is tenure necessary for academic freedom? Many say no. Novelists, playwrights, journalists, editors, songwriters, clergy, film producers, actors, cartoonists, and whistleblowers challenge orthodoxy without lifetime employment (DeGeorge, 1997). The consumers of education, students and taxpayers, cannot pick and choose what they find acceptable to support, like the typical consumer can when watching television or reading a periodical. The main threat to academic

freedom is a tenured professor who may not like the views of a tenure track professor, or an institution that will not allow certain speakers on campus because of their lack of political correctness (DeGeorge, 1997). According to Worth (1999), the arguments for tenure and academic freedom fail because the two issues are separate.

Does tenure guarantee high quality? Again, many say no. Many times good professors are denied tenure at the most prestigious universities. As some critics state, in the modern university, no act of good teaching goes unpunished. The probationary period is too short to properly evaluate a faculty member. Many times the probationary period is too short for a candidate to complete and evaluate research to be published. This is a lose lose situation for everyone involved. The university's policy of up or out may lose an outstanding faculty member, also causing upheaval in the professor's life (DeGeorge, 1997; 2001).

Other criticisms of tenure include the out of touch professor who does not keep abreast with changes in their field and loses interest in teaching. Eventually, research will become paramount, and even a self justifying enterprise (List, 2001). Tenured professors teach less than ever before (Worth, 1999). Tenure prevents schools from holding faculty accountable or changing with the times. The tenure process can cause candidates to over-specialize, limiting their scholarly value to marginal areas. Worth (1999) states that tenure's rigidity makes it difficult for schools to adopt changes in knowledge.

The elimination of tenure would deny job security to incompetent faculty members, and it would expand the flexibility the administration has to improve education quality by improving faculty quality (Mortimer, Bagshaw & Masland, 1985). DeGeorge (1997) believes that few changes would occur if tenure were abolished. Deadwood professors would not be fired, and it would be impossible to abolish tenure retroactively. DeGeorge (1997) maintains that it would make an impact on academic freedom and would possibly increase faculty unionization. In 1995, the American Association for Higher Education (AAHE) released the following observation: "In a 1989 survey of 5,000 faculty by the Carnegie Association for the Advancement of Teaching, 29 percent of all faculty, 32 percent of female faculty, and 39 percent of faculty under the age of 39 agreed with the statement concerning the abolition of tenure would, on the whole, improve the quality of higher education" (DeGeorge, 1997). When such a long standing tradition is dissolved, something must be available to take its place. Are there feasible alternatives?

## ALTERNATIVES TO THE TRADITIONAL SYSTEM

Florida Gulf Coast University (FGCU) broke new ground when it opened its doors. This university is a business based model that recruits faculty using multi year contracts instead of tenure. For the 1997 98 academic year, FGCU hired 92 new faculty. Seventy-five percent of the new hires had doctorates, more than 80 percent of the new hires were previously employed at other colleges or universities, 15 percent relinquished tenured positions, and 22 percent abandoned tenure track

positions (Chait & Trower, 1998). Surprisingly, the university was able to hire first and second choices without the promise of tenure. Many of the new faculty members were burned out by other tenure systems. FGCU offered a clean slate for many, and the idea of team teaching appealed to many (Chait & Trower, 1998). This university, if successful, will serve as a model for other institutions that want off the tenure track.

There are some alternatives to tenure. Perley (1998) suggests that it be sold for higher salaries. Yarmolinski (1996) suggests the idea of greater institutional flexibility and the positive advantages of tenure. If tenure contracts were negotiated at the time the candidate was hired, through the department, or even traditionally, through the institution, the scope of tenure could be renegotiated from time to time to fit each candidate individually. Another alternative is to offer tenure to general education instructors, or a team of teachers. This could avoid the burnout that is so common (Yarmolinski, 1996). Three ways are offered to reconcile academic tenure and institutional change:

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|---|---|
| 1. | Individual scholars need assurance that they can pursue their interests freely, |
| 2. | Institutions must be able to allocate and reallocate resources, including scholarly talent, and |
| 3. | Tenure is in place to protect the nonconformists (Yarmolinski, 1996). |

Worth (1999) suggests that academic institutions offer faculty a choice: traditional tenure or a limited term contract with a higher salary. North Carolina's Evergreen College started offering 10 year contracts as an alternative to tenure in 1992. About half of the faculty have accepted the contracts. The Boston University School of Management offered the same 10-year contracts in 1995 with similar results (Worth, 1999). Trower (1999) agrees with the premise of offering a choice between tenure track and multi year contracts. A balance between the two is the most desirable, allowing faculty more flexibility (Worth, 1999).

Term contracts have an efficiency appeal. In reality, according to McPherson (1983), the resources required to evaluate all faculty members seriously every few years would be enormous. The threat of job insecurity might make it more difficult to hire quality faculty at a competitive wage, one that is comparable to those at institutions offering more security. A more than likely result of term contracts will become instant tenure, because contract renewals could have a tendency to become routine. If contracts prevail and renewals are decided on by fellow professors, there is pressure to be compassionate toward their fellow contract holder (McPherson, 1983).

Mortimer, Bagshaw and Masland (1985) suggest growth contracts for faculty to counteract complacency. Growth contracts would be used concurrently with tenure. All faculty members state their own personal goals for the next five years. These goals will be held as an expectation by the institution and can inject new life into potential deadwood. Benefits of this idea include unity within departments, motivation of faculty, and consistency with an institution's educational objectives

(Mortimer, Bagshaw & Masland, 1985). Early retirement incentives are also important when dealing with tenure alternatives. Five basic incentives are listed:

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|---|---|
| 1. | Early retirement benefits that are larger than actuarial tables would justify, |
| 2. | Lump sum severance payments, |
| 3. | Annuity enhancements that increase early retirement income to the amount the employee would have received at normal retirement age, |
| 4. | Phased retirement or part time employment, and |
| 5. | Continuation of fringe benefits (Mortimer, Bagshaw & Masland, 1985). |

Reduction in workload is an option for many aging professors, and incentives for this could include continued contributions to a pension fund and supplemental income. The extra costs can be recovered by not filling the vacated positions. This is a viable way to reallocate resources from one department to another.

DeGeorge (1997) offers this advice: allow colleges and universities the freedom to choose if they want tenure or not without fear of losing accreditation. This gives consumers a choice. Consumer dollars are the best way to reward good academic institutions and punish marginal ones. This is only possible if the government is taken out of the picture. Government funding prevents colleges and universities from being sensitive to consumer demands. If the present education system changed into a consumer oriented one, many possibilities would emerge. Some might hold on to traditional tenure systems, while others might eliminate it altogether, while others might mix tenure and renewable contracts. The market might develop unique alternatives to this problem (DeGeorge, 1997).

Post tenure review is a source of great debate. High turnover is an anticipated problem with multi year contracts and post tenure review. Trower (1999) suggests that a truly effective and meaningful post tenure review process is like having a contract. Once teaching productivity increases and reaches a summit (after tenure is abolished), there is a balance and turnover will not be a problem (Trower, 1999).

There are consequences for the suggested structural changes. Richardson (1999) argues that eliminating tenure threatens not only academic freedom, but also higher education and the democratic society in which it exists. The corporate mentality is chipping away at tenure and academic freedom, with the hiring of non tenure track faculty and part time faculty instead of full-time faculty. It appears as if decision makers have determined that academic freedom is an unneeded luxury. Term contracts are offered and often snatched up because of the state of the academic labor market. This in turn will continue to damage the labor market by making educated people, who want a teaching career, into laborers with little economic security. Little opportunity,

insecurity, and frustration have become commonplace in the academic labor market (Richardson, 1999). This scenario affects the consumers of education worst of all. Richardson (1999) states that the U.S. needs to attract the best minds, and this is only possible if they have a secure future.

## CONCLUSION

Is there an answer to the tenure debate? In these rapidly changing economic times, it is necessary to review long standing policies such as tenure and determine what course of action should be taken, if any. Though there are many opposing views concerning tenure and its abolition or continuation, the single issue they all revolve around is whether or not an academic institution should operate by the same standards and goals as a corporation. The conclusion is no, but colleges and universities can make positive changes to provide for better efficiency and consumer satisfaction. There are many credible arguments on both sides of the issue. They do not solve all the problems associated with the inefficiency in the academic institution, academic freedom, shared governance, or education quality. If a university could be set up as a corporation, the issue of academic freedom might not be addressed to the satisfaction of the faculty. One has to question the motivation of the argument of academic freedom. Does it truly exist?

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# A PROPOSED MODEL TO EVALUATE FACULTY RESEARCH PRODUCTIVITY

**Johnny C. Ho, University of Texas at El Paso**


## ABSTRACT

*Faculty annual evaluation is one of the most important responsibilities of academic administrators, as annual evaluation results are generally used to determine merit pay raises for faculty. Without an effective evaluation system in place, it is very difficult, if not impossible, to assign the proper monetary rewards to faculty. This paper explores the issue of research evaluation and proposes a model that may be used to quantitatively determine research productivity level of faculty. The aim of this article is to remove one of the most pressing problems facing college deans and department chairpersons today by coming up with an objective and yet easy-to-understand approach to conduct annual reviews of faculty research. The proposed model considers not only quantity of publication, but it also takes quality of publication and degree of individual scholarship into consideration.*


## INTRODUCTION

Faculty annual review is one of the most, if not the most, crucial tasks of college and university-level academic administrators, since annual evaluation results are almost always used to determine merit pay increases for faculty and, for longer term, to make promotion and tenure decisions. Without an effective evaluation system in place, it is very hard, if not impossible, to assign proper monetary rewards to faculty. The failure of the compensation management system can lead to numerous costly administrative problems later on. These problems include the departure of many outstanding faculty members to other institutions, as they doubt that they have been properly compensated via annual merit pay raises. Other serious consequences are low faculty morale and short tenure of administrators.

There are generally three major areas of evaluation employed by institutions of higher education: teaching, research, and service. Teaching and research are routinely viewed as the most critical components among the three. Depending on the type of institutions, either teaching or research may be considered as the most important factor in faculty annual evaluation. An overwhelming amount of research has been published on the subject of teaching evaluation and effectiveness. Abrami et al. (1982) examined the relationship between student personality characteristics, teacher ratings, and student achievement. Wright et al. (1984) reviewed the research

findings on validity and reliability of student ratings. Eiszler (2002) conducted a study to test whether the use of student evaluations of teaching effectiveness had contributed to a trend of grade inflation in colleges and universities and found that such a relationship was supported. Ho and Shalishali (2001) examined the issues of grade inflation and grade variation and developed an effective approach to measure student competencies. Other research related to teaching can be found in Centra (1979), Hildebrand et al. (1979), Doyle (1983), Fairweather and Rhoads (1995), Greenwald (1997), and Greenwald and Gillmore (1997).

Faculty publishing productivity is often used as a barometer of departmental and institutional prestige and is strongly associated with an individual faculty member's reputation, visibility, and advancement in the academic reward structure, particularly at research institutions (Creamer, 1998). Moreover, Root (1987) pointed out that there is a generally held view that "publications are paramount" in the determination of salary and promotion. This viewpoint is supported by the fact that faculty salaries in research universities are higher than those in teaching universities. There are a lot of articles written on faculty research performance. Baird (1991) studied publication productivity in doctoral research departments and found that there were substantial variations in publishing rates among and within disciplinary groups, as well as across programs. Hattie and Marsh (1996) studied the relationship between research and teaching and found a negative relationship between faculty time allocated to teaching and time allocated to research. Ward and Grant (1996) examined the gender and publishing productivity issue. Sax et al. (2002) examined the role of several family-related factors, including marriage, children, and aging parents, in family research productivity. They concluded that family variables contributed little or nothing to the prediction of faculty research productivity and that professional variables, such as academic rank and salary, were the more important predictors. Other publications on research productivity include Golden and Carstensen (1992), Omundson and Mann (1994), Massy and Wilger (1995), McDonald (1995), Tierney (1999), and Fairweather (2002).

In this paper, we propose a model which can be used to quantitatively determine the research productivity level of faculty. The goal of this article is to remove one of the most challenging issues facing college deans and department chairpersons today by bringing forth an objective and yet easy-to-understand approach to perform annual reviews of faculty research. The proposed model not only considers the quantity of publication, but most importantly it also takes the quality of publication into account. Furthermore, the model may be extended to incorporate the degree of individual scholarship.

The rest of this paper is organized as follows. The next section discusses the criteria that are commonly used in assessing research productivity and justify the measures used in this paper. Section 3 introduces and explains the proposed model for research evaluation. We also discuss the applications of the proposed model by presenting two procedures for research evaluation. In section 4, we provide a complete numerical example using hypothetical data and solve it via Microsoft Excel. Finally, section 5 summarizes and concludes this paper.

## CRITERIA FOR RESEARCH PRODUCTIVITY

Research productivity in this paper is defined as the productivity of publishing scholarly materials, including, but not limited to, articles in journal and proceedings, and books. In the research literature, quantity of journal articles and quality of publications are two of the most prevalent measures used to determine research productivity. Quantity of articles is the more popular of the two due to the ease of measuring them (Ward and Grant, 1996). Campbell et al. (1983) studied the perceptions of accounting educators with respect to the present importance and desired importance of some twenty factors considered in promotion and tenure decisions. For doctoral AACSB-accredited institutions, the quantity and quality of journal articles were ranked first and fourth, respectively, based on the present importance. However, according to the desired importance, they were ranked sixth and second, respectively. Similar switching of ranking orders between these two factors was also found in both non-doctoral AACSB-accredited and non-doctoral non-AACSB accredited institutions. These survey results strongly suggest that the quality factor should be valued even more highly than the quantity factor.

Academic administrators often seek to reward productive faculty with annual merit-based salary raises. Unfortunately, faculty's desires to maximize merit raises could be in conflict with their incentives to improve the quality of their research if annual evaluations fail to take quality into consideration. One of the reasons for the research conflict is that faculty would be motivated to publish in non-refereed journals and/or proceedings so as to maximize the quantity of outputs and hence merit-based raises.

In view of the significance of research quality, we develop a model that is capable of capturing both quantity and quality of publications. To account for research quality, Creamer (1998) affirmed that quantity counts could be weighted by the impact of the particular volume of the journal, as reported by the Institute of Scientific Information (ISI), based on the average citation rate of articles in that volume of the journal. Research quality may also be determined by the number of citations an article receives; however, citations may not appear for many years, if at all, after the article is published. Hence, this approach is not very practical for the purpose of routine annual evaluation. We therefore propose that colleges and departments classify their relevant publication outlets into categories according to factors such as types of publication outlets (journal and proceedings, etc.) and prestige of the publication outlets (degree of peer recognition and caliber of editorial board, etc.). In short, the publication outlet directly determines research quality. The categorization of intellectual contributions should be made with both internal and external inputs. Internal inputs may be obtained from periodic surveys on the current faculty members; and external inputs may be obtained from similar classifications of the peer institutions. This approach is straight-forward since it judges quality by publication outlet rather than the impact of each article and is flexible enough to be applicable to various disciplines. Furthermore, the proposed model allows all forms of scholarly contributions (books, journal papers, and proceedings articles, etc.) to

be included and counted because different quality ratings can be associated with different forms of scholarly contributions to reflect the quality criterion.

## THE PROPOSED MODEL

Before introducing the proposed model for research performance evaluation, we first define the following notation which will be used in the development of the proposed model.

| | |
|---|---|
| $T$ | Length of evaluation time period in years. |
| $L_i$ | Level $i$, $i = 1,2,...n$ research publication, such that $L_1$ and $L_n$ represent the lowest and highest quality publications. |
| $e_i$ | Amount of research expected in terms of number of $L_i$ publications per faculty member per year. |
| $E_i$ | Amount of research expected in terms of number of $L_i$ publications per faculty member during the evaluation period, such that $E_i = e_i * T$ |
| $R$ | Research productivity index, such that $R = 0, 0 + x, 0 + 2x, \ldots, 1$, where $x$ is the desired increment. |
| $R^k$ | Research productivity index of faculty member $k$, $k = 1,2,...m$ |

The research productivity index of a faculty member may be interpreted as that faculty member's probability of getting a manuscript accepted for publication in a level 1 publication. Furthermore, having a manuscript accepted for publication in a level $j$ ($1 \leq j \leq n$) publication, it is assumed that the requirement would be $j$ times as much as the original contribution would be in a level 1 publication. Hence, a faculty member where $R$ has an 81% ($=(0.9)^2$) chance that he or she will get his or her manuscript accepted for publication in a level 2 publication, assuming the independence of acceptance probability of level 1 and level 2 original contributions.

**Table 1: Probability of Acceptance for Selected Values of $R$ and $L_j$**

| $R$ | $L_1$ | $L_2$ | $L_3$ | $L_4$ |
|---|---|---|---|---|
| 0.500 | 0.500 | 0.250 | 0.125 | 0.063 |
| 0.525 | 0.525 | 0.276 | 0.145 | 0.076 |
| 0.550 | 0.550 | 0.303 | 0.166 | 0.092 |
| 0.575 | 0.575 | 0.331 | 0.190 | 0.109 |
| 0.600 | 0.600 | 0.360 | 0.216 | 0.130 |

| Table 1: Probability of Acceptance for Selected Values of $R$ and $L_j$ | | | | |
|---|---|---|---|---|
| $R$ | $L_1$ | $L_2$ | $L_3$ | $L_4$ |
| 0.625 | 0.625 | 0.391 | 0.244 | 0.153 |
| 0.650 | 0.650 | 0.423 | 0.275 | 0.179 |
| 0.675 | 0.675 | 0.456 | 0.308 | 0.208 |
| 0.700 | 0.700 | 0.490 | 0.343 | 0.240 |
| 0.725 | 0.725 | 0.526 | 0.381 | 0.276 |
| 0.750 | 0.750 | 0.563 | 0.422 | 0.316 |
| 0.775 | 0.775 | 0.601 | 0.465 | 0.361 |
| 0.800 | 0.800 | 0.640 | 0.512 | 0.410 |
| 0.825 | 0.825 | 0.681 | 0.562 | 0.463 |
| 0.850 | 0.850 | 0.723 | 0.614 | 0.522 |
| 0.875 | 0.875 | 0.766 | 0.670 | 0.586 |
| 0.900 | 0.900 | 0.810 | 0.729 | 0.656 |
| 0.925 | 0.925 | 0.856 | 0.791 | 0.732 |
| 0.950 | 0.950 | 0.903 | 0.857 | 0.815 |
| 0.975 | 0.975 | 0.951 | 0.927 | 0.904 |

In the proposed model, we therefore define the probability of $L_j$ publication acceptance based on research productivity index $R$, i.e., $P_R(j)$ as follows:

$$P_R(j) = (R)^j \qquad \text{Formula (1)}$$

This definition takes the form of an exponential function with base $R$. Suppose that an academic department classifies publication outlets into four categories ($n = 4$) and employs a 0.025 increment ($x = 0.025$) for the purpose of determining the research productivity index. Table 1 gives the probability of manuscript acceptance according to four research publication levels and some selected research productivity indices. The Table shows that the probabilities of getting a manuscript accepted for publication in $L_1$, $L_2$, $L_3$ and $L_4$ publications, for faculty members with a 0.90 research productivity index, are 0.90, 0.81, 0.73, and 0.66, respectively. An implication from Table 1 is that faculty members with larger research productivity indices possess more incentives to target higher level publications than members with smaller research productivity indices. This is because faculty

members with lower research productivity indices have much lower probability of gaining acceptance in higher level publications and therefore more likely focus on lower level publications so as to be fruitful.

Moreover, we define the standard required to achieve level *R* research productivity with regard to the number of $L_i$ publications as $S_{i,R}$. It is computed as follows:

$$S_{i,R} = P_R(i) * E_i \qquad \text{Formula (2)}$$

Suppose that the amount of research expected by the department is three $L_1$ articles per faculty member per year ( $e_1 = 3$) and the length of evaluation is two years ($T = 2$). The amount of research expected is then six $(E_1 = e_1 * T = 6)$ $L_1$ publications during the two years. Table 2 provides the values of $S_{i,R}$ obtained from Equation (2) for some selected values of *R* and $L_i$. For instance, a faculty member needs to contribute 5.40 $L_1$ publications or 3.94 $L_4$ publications in order to attain a 0.9 research productivity index.

**Table 2: Standard Required to Attain Selected Values of *R* and $L_i$, where $E_1 = 6$**

| *R* | $L_1$ | $L_2$ | $L_3$ | $L_4$ |
|---|---|---|---|---|
| 0.500 | 3.000 | 1.500 | 0.750 | 0.375 |
| 0.525 | 3.150 | 1.654 | 0.868 | 0.456 |
| 0.550 | 3.300 | 1.815 | 0.998 | 0.549 |
| 0.575 | 3.450 | 1.984 | 1.141 | 0.656 |
| 0.600 | 3.600 | 2.160 | 1.296 | 0.778 |
| 0.625 | 3.750 | 2.344 | 1.465 | 0.916 |
| 0.650 | 3.900 | 2.535 | 1.648 | 1.071 |
| 0.675 | 4.050 | 2.734 | 1.845 | 1.246 |
| 0.700 | 4.200 | 2.940 | 2.058 | 1.441 |
| 0.725 | 4.350 | 3.154 | 2.286 | 1.658 |
| 0.750 | 4.500 | 3.375 | 2.531 | 1.898 |
| 0.775 | 4.650 | 3.604 | 2.793 | 2.165 |
| 0.800 | 4.800 | 3.840 | 3.072 | 2.458 |
| 0.825 | 4.950 | 4.084 | 3.369 | 2.780 |
| 0.850 | 5.100 | 4.335 | 3.685 | 3.132 |

| Table 2: Standard Required to Attain Selected Values of $R$ and $L_i$, where $E_1 = 6$ | | | | |
|---|---|---|---|---|
| $R$ | $L_1$ | $L_2$ | $L_3$ | $L_4$ |
| 0.875 | 5.250 | 4.594 | 4.020 | 3.517 |
| 0.900 | 5.400 | 4.860 | 4.374 | 3.937 |
| 0.925 | 5.550 | 5.134 | 4.749 | 4.393 |
| 0.950 | 5.700 | 5.415 | 5.144 | 4.887 |
| 0.975 | 5.850 | 5.704 | 5.561 | 5.422 |

Most, if not all, faculty members contribute in more than one level of publications. Hence, a conversion system is necessary to determine the numerical equivalence of one level of publication into another level of publication so as to facilitate comparisons and further analyses. We define $U_{ij,R}$ as the numerical equivalence of $L_j$ publication with regard to $L_i$ publication for research productivity index $R$. The $U_{ij,R}$ is given below:

$$U_{ij,R} = P_R(j)/ P_R(i) \qquad \text{Formula (3)}$$

Table 3 presents the numerical equivalence of $L_j$ ($j$ = 1, 2, 3, and 4) publication in terms of $L_1$ ($i$ = 1) publication for selected values of $R$. It should be emphasized that the numerical equivalence may be computed in terms of any publication level. As shown in the Table, faculty members with a research productivity index of 0.8 view one $L_4$ publication worth or equivalent to 1.95 $L_1$ publications. On the other hand, faculty members with a research productivity index of 0.6 view a $L_4$ publication worth 4.63 $L_1$ publications. This large disparity is explained by the fact that publishing in $L_4$ outlets requires significantly more original contributions than publishing in $L_1$ outlets, and this statement is more pertinent from the viewpoint of faculty members with a lower research productivity index.

| Table 3: Numerical Equivalence in Terms of $L_1$ for Selected Values of $R$ and $L_j$ | | | | |
|---|---|---|---|---|
| $R$ | $L_1$ | $L_2$ | $L_3$ | $L_4$ |
| 0.500 | 1.000 | 2.000 | 4.000 | 8.000 |
| 0.525 | 1.000 | 1.905 | 3.628 | 6.911 |
| 0.550 | 1.000 | 1.818 | 3.306 | 6.011 |
| 0.575 | 1.000 | 1.739 | 3.025 | 5.260 |
| 0.600 | 1.000 | 1.667 | 2.778 | 4.630 |

| Table 3: Numerical Equivalence in Terms of $L_1$ for Selected Values of $R$ and $L_j$ | | | | |
|---|---|---|---|---|
| $R$ | $L_1$ | $L_2$ | $L_3$ | $L_4$ |
| 0.625 | 1.000 | 1.600 | 2.560 | 4.096 |
| 0.650 | 1.000 | 1.538 | 2.367 | 3.641 |
| 0.675 | 1.000 | 1.481 | 2.195 | 3.252 |
| 0.700 | 1.000 | 1.429 | 2.041 | 2.915 |
| 0.725 | 1.000 | 1.379 | 1.902 | 2.624 |
| 0.750 | 1.000 | 1.333 | 1.778 | 2.370 |
| 0.775 | 1.000 | 1.290 | 1.665 | 2.148 |
| 0.800 | 1.000 | 1.250 | 1.563 | 1.953 |
| 0.825 | 1.000 | 1.212 | 1.469 | 1.781 |
| 0.850 | 1.000 | 1.176 | 1.384 | 1.628 |
| 0.875 | 1.000 | 1.143 | 1.306 | 1.493 |
| 0.900 | 1.000 | 1.111 | 1.235 | 1.372 |
| 0.925 | 1.000 | 1.081 | 1.169 | 1.263 |
| 0.950 | 1.000 | 1.053 | 1.108 | 1.166 |
| 0.975 | 1.000 | 1.026 | 1.052 | 1.079 |

**Applications of the Proposed Model**

Academic administrators, such as deans and chairpersons, may apply the proposed model to determine the research productivity index for their faculty members. Let $Q_{ij,R}$ be the number of $L_i$ publication research points associated with one $L_j$ publication based on research productivity index $R$, such that $Q_{ij,R} = U_{ij,R}$ For instance, a faculty member receives 1.563 $L_1$ research points by contributing a $L_3$ publication if he or she is evaluated according to research productivity index of 0.8, i.e. $Q_{13,0.8} = 1.563$, (see Table 3). Then, the total $L_i$ research points earned by faculty member $k$ based on research productivity index $R$, $TQ^k_{i,R}$ , are computed as follows:

$$TQ^k_{i,R} = \sum_{j=1}^{n} N^k_j \cdot Q_{ij,R} \qquad \text{Formula (4)}$$

where $N_j^k$ is the number of $L_j$ publications contributed by faculty member $k$ in time period $T$.

The computed $TQ_{i,R}^{k}$ of faculty member *k* is compared to the standard required to obtain research productivity index *R* in terms of the number of $L_i$ publications, that is, $S_{i,R}$. If $TQ_{i,R}^{k} \geq S_{i,R}$, then faculty member *k* achieves a research productivity index of at least *R*. The following procedure, called Procedure A, is designed to determine the research productivity index for faculty member *k*. Procedure A therefore has to be employed *m* times to derive the research productivity indices for the entire faculty.

**Procedure A**

Step 1: Initialize $R^k = x$

Step 2: If $R^k \leq 1$,then compute $TQ_{i,R}^{k}$ using Equation (4) and enter Step 3; else, go to Step 4.

Step 3: If $TQ_{i,R}^{k} \geq S_{i,R}$, then set $R^k = R^k + x$ and return to Step 2.

Step 4: Output $R^k + R^k - x$.

Procedure A will be applied to the following data: $e_i = 3$, $T = 2$, $n = 4$, $x = 0.05$, and $i = 1$. In addition, suppose that faculty member #1 produces two $L_1$ publications ($N_1^1 = 2$), one $L_3$ publication ($N_3^1 = 1$) and one $L_4$ publication ($N_4^1 = 1$) during the evaluation period *T*. Step 1 initializes $R^1 = 0.05$. Since $R^1 \leq 1$, the procedure computes $TQ_{1,.05}^{1}$ using Equation (4) according to Step 2. In Step 3, since $TQ_{1,.05}^{1} \geq S_{1,.05}$, the value of $R^1$ is increased from 0.05 to 0.10 and the procedure returns to Step 2. This loop involving Steps 2 and 3 continues until $R^1$ is updated to 0.85. Procedure A now calculates $TQ_{1,.85}^{1} = 2(1.00) + 1(1.42) + 1(1.63) = 5.05$ and $S_{1,85} = 5.10$ (see Table 2). Since $TQ_{1,.85}^{1} < S_{1,.85}$, the procedure outputs $R^1 = .085 - .05 = 0.80$ in Step 4. Therefore, faculty member #1 earns a research productivity index of 0.80. It should be noted that if *x* is reduced to 0.025, Procedure A would yield a productivity index of 0.825 for the faculty member. Hence, the smaller the value of *x*, the more precise the research productivity index becomes. Generally, employing a very small *x* becomes essential if the range of the faculty research productivity indices is rather small.

In order to avoid the undesirable scenario where most faculty members only target and publish in $L_1$ outlets but receiving high research productivity indices, we propose that additional constraints be imposed so as to promote high quality and diversity of scholarly activities. These constraints may take any one or a combination of the following forms. First of all, administrators may impose limitations on the publication outlets. For examples, at least one publication must

belong to a level 4 in order to be considered for a 1.00 research index; at least one publication must be a level 3 or higher so as to be eligible to a maximum of 0.80 research productivity index. Second, administrators may add constraints to ensure that at least $y$%, $0 < y \leq 100$, of total research points must be earned in level $i_{min} (1 < i_{min} \leq n)$ or higher publication outlets in order to qualify a certain research productivity index. Third, administrators can focus on the degree of sole-authorship. For example, the mean number of authors allowed per publication must be no more than $A_{min}$, say 3.33. Fourth, administrators may consider the level of publication and the degree of individual authorship factors simultaneously. For example, at least one single-author contribution must be published in a level 3 or higher outlet to become eligible to earn a 0.90 research productivity index. The above constraints can certainly be used in combination with Procedure A to derive the final research productivity index.

**Incorporating the Degree of Individual Authorship**

We propose the concept of adjusted research points to explicitly factor in the effect of single- vs. multiple-authorship. The adjusted research points, $Q_{ij,R}{}^{a}$, are derived from simply discounting $Q_{ij,R}$. Let $z$ be the number of authors of a scholarly publication. Then the *adjusted* research points associated with a $L_j$ publication based on research productivity index $R$ are defined as:

$$Q_{ij,R}{}^{a} = \frac{Q_{ij,R}}{z^{1-1/z}} \qquad \text{Formula (5)}$$

where $z^{1-1/z}$ represents the discount factor.

**Table 4: Effect of the Discount Factor**

| Number of Authors | Exponent | Discount factor | Proportion | Total Research Points |
|---|---|---|---|---|
| 1 | 0.0000 | 1.0000 | 1.0000 | 1.0000 |
| 2 | 0.5000 | 1.4142 | 0.7071 | 1.4142 |
| 3 | 0.6667 | 2.0801 | 0.4807 | 1.4422 |
| 4 | 0.7500 | 2.8284 | 0.3536 | 1.4142 |
| 5 | 0.8000 | 3.6239 | 0.2759 | 1.3797 |
| 6 | 0.8333 | 4.4510 | 0.2247 | 1.3480 |
| 7 | 0.8571 | 5.3011 | 0.1886 | 1.3205 |
| 8 | 0.8750 | 6.1688 | 0.1621 | 1.2968 |

The effects of discounting are shown in Table 4. If a publication has only one author, then the discounting factor is one and the adjusted research points are identical to the research points of the publication. As the number of authors goes up, the value of the exponent of the discount factor (1 - 1/*z*), as shown in column 2 of Table 4, also increases. This allows the formation of larger discount factors assigned to articles with larger number of authors as shown in column 3. The next column provides the proportion of research points each author receives. For example, for a publication with two authors each author receives 70.71% of $Q_{ij,R}$. The proportion of research points that each author receives is therefore not simply defined as 1/*z* so as to encourage collaboration among scholars. Since the vast majority of publications are multiple-authored, this is especially true in academic journal publications where the refereeing process may take many months. On the other hand, to safeguard the negative effect of excessive collaboration for the sole purpose of earning research points, Equation (5) ensures that the total adjusted research points per publication (see column 5) begins declining when the number of authors becomes large, i.e., four or more.

Once the adjusted research point concept is defined in Equation (5), the adjusted total research points are calculated as follows:

$$TQ_{i,R}^{k\ a} = \sum_{j=1}^{n}\sum_{z=1}^{z_{\max}} N_{j,z}^{k} \cdot Q_{ij,R}^{\ a} \qquad \text{Formula (6)}$$

where $N_{j,z}^{k}$ is the number of $L_j$ publications with *z* authors contributed by faculty member *k* and $z_{max}$ is the maximum number of authors allowed per publication.

Procedure B given below supplies the steps to determine the research productivity index for faculty member *k* with the degree of individual authorship explicitly taken into consideration. Similar to Procedure A, the output from Procedure B can be easily modified to incorporate the quality assurance constraints discussed earlier.

**Procedure B**

Step 1: Initialize $R^k = x$.

Step 2: If $R^k \leq 1$, then compute $TQ_{i,R}^{k\ a}$ using Equation (6) and enter Step 3; else, go to Step 4.

Step 3: If $TQ_{i,R}^{k\ a} \geq S_{i,R}$, then set $R^k = R^k + x$ and return to Step 2.

Step 4: Output $R^k = R^k - x$.

Lastly, we end this section by summarizing the inputs and outputs of the proposed model. The inputs are:

1. Base publication level, i.e., *i*.
2. Number of $L_i$ publications expected per year per faculty member, i.e.,$e_i$ .
3. Number of years in evaluation time period, i.e., *T*.
4. Number of publication levels, i.e., *n*.
5. Number of faculty members, i.e., *m*.
6. Desired research productivity index increment, i.e., *x*.
7. Maximum number of authors allowed per publication, i.e., $z_{max}$
8. Faculty publication record during the evaluation period, i.e., $N^k_{j,z}$
9. Any additional constraints used to promote publications in higher level outlets.

The outputs consist of research productivity indices computed for each faculty member, i.e., $R^k$ for $k = 1, 2, \ldots, m$.

## AN EXAMPLE

The chairperson of Department of Management at State University is responsible for performing an annual evaluation of faculty every April of each year. There are three areas of evaluation: research, teaching, and service. The chair has decided to employ the proposed model to review faculty research performance. The Department of Management consists of the chairperson plus nine professors. The faculty of the department has agreed to use a two-year moving window as the length of evaluation period for research. The advantage of using multi-year moving window is its ability to smooth out short-term fluctuations in research outputs and year-to-year variations in merit raises. The faculty has also concurred to use an increment of 0.025 in deriving the research productivity index.

The department has traditionally categorized publications into four levels. Levels 1 and 2 are for proceedings outlets; while levels 3 and 4 are for journal outlets. Book publishing is considered as a level 4 publication. Each year each faculty member is expected to contribute 2.5 $L_1$ publications, that is, five $L_1$ articles over the two-year evaluation window. The department would like to take the degree of individual authorship into consideration. The maximum number of authors permitted per publication is seven, that is, a publication will not contribute any research points to its authors if the number of authors of the publication is eight or more. Furthermore, the department imposes the following restrictions to encourage a proper mix of research quality.

- At least one $L_4$ publication to be eligible to earn a 1.00 $R$.
- At least two $L_3$ publications to be eligible to receive a 0.90 $R$.
- At least one $L_3$ publication to be eligible to receive a 0.80 $R$.
- At least one $L_2$ publication to be eligible to receive a 0.70 $R$
- At least one $L_1$ publication to be eligible to receive a 0.60 $R$.

Each faculty member has been requested to submit his or her research record for the past two years. Moreover, each publication included must be sorted by the submitter with regard to the level of publication and the number of authors. The chair has the responsibility to confirm the accuracy of the submitted data. Table 5 provides an example of data collection form with data completed from all ten professors. As shown in the Table, faculty member #1 has primarily targeted $L_1$ outlets and produced seven $L_1$ publications during the evaluation period: one is single-authored, five are double-authored, and one is triple-authored. Faculty member #2 has contributed a more balance mix of research portfolio with five publications: one is double-authored $L_1$ publication, two are double-authored $L_2$ publications, and two are double-authored $L_3$ publications. Faculty member #3 has principally targeted $L_4$ outlets and sole-authored one publication of this level.

We have programmed the proposed model using Microsoft Excel spreadsheet program to facilitate computations. The data described earlier was entered into the spreadsheet program. Table 6 offers a summary of the results for the example. The results are broken down into three categories. The first research productivity index is derived solely from the total adjusted research points. The second research productivity index reflects the upper limit entailed by the additional quality constraints. The third line provides the final research productivity index, which is derived from taking the minimum of the first two indices. As shown in Table 6, faculty members #1, #2, #3, #4, #5, #6, #7, #8, #9, and #10 have final research productivity indices of 0.60, 0.85, 0.65, 0.575, 0.875, 0.85, 0.90, 0.825, 0.70, and 0.80, respectively. It is interesting to note that the final research productivity indices of faculty members #1, #9, and #10 are capped by the quality assurance constraints; while the other seven faculty members' indices are limited by the total adjusted research points. Faculty member #1's final research productivity index is severely restricted by the quality constraints, since all of faculty member #1's seven publications belong to $L_1$. On the other hand, faculty member #3's final research productivity index is seriously confined by the total adjusted research points. This is because faculty member #3 contributed only one publication belonging to the highest publication level and so there is no limit imposed by the quality constraints. Lastly, the Microsoft Excel program with the embedded data for this example is available from the author upon request.

**Table 5: An Example of Completed Data Collection Form**

| Level | z | Fac.#1 | Fac.#2 | Fac.#3 | Fac.#4 | Fac.#5 | Fac.#6 | Fac.#7 | Fac.#8 | Fac.#9 | Fac.#10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | | | | | | 1 | | | 3 |
| | 2 | 5 | 1 | | | | | | | 2 | |
| | 3 | 1 | | | | | | | | 2 | |
| | 4 | | | | | | | | 2 | | |
| | 5 | | | | 1 | | | | 2 | | |
| | 6 | | | | | | | | | | |
| | 7 | | | | | | | | | | |
| 2 | 1 | | | | | 1 | | 1 | | 2 | 1 |
| | 2 | | 2 | | | 1 | | | | 2 | |
| | 3 | | | | | | | | | | |
| | 4 | | | | | | | | | | |
| | 5 | | | | 1 | | | | | | |
| | 6 | | | | | | | | | | |
| | 7 | | | | | | | | | | |
| 3 | 1 | | | | | | | 1 | | | 1 |
| | 2 | | 2 | | | | 2 | | | | |
| | 3 | | | | | | | | 3 | | |
| | 4 | | | | | | | | | | |
| | 5 | | | | 1 | | | | | | |
| | 6 | | | | | | | | | | |
| | 7 | | | | | | | | | | |
| 4 | 1 | | | 1 | | 1 | | 1 | | | |
| | 2 | | | | | 1 | 2 | | | | |
| | 3 | | | | | | | | | | |
| | 4 | | | | | | | | 1 | | |
| | 5 | | | | 1 | | | | | | |
| | 6 | | | | | | | | | | |
| | 7 | | | | | | | | | | |

| Table 6: Summary Results for the Example | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Faculty # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| *R* based on total research points | 0.975 | 0.850 | 0.650 | 0.575 | 0.875 | 0.850 | 0.900 | 0.825 | 0.975 | 0.975 |
| Upper limit on *R* due to constraints | 0.600 | 0.900 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.700 | 0.800 |
| Final research productivity index | 0.600 | 0.850 | 0.650 | 0.575 | 0.875 | 0.850 | 0.900 | 0.825 | 0.700 | 0.800 |

## CONCLUSIONS

Faculty annual evaluation is one of the most, if not the most, important responsibilities of university-level academic administrators, since annual evaluation results are generally used to determine merit pay increases for faculty. There are generally three areas of evaluation employed by colleges and universities: teaching, research, and service. Depending on the type of institutions, either teaching or research is considered as the most critical component among the three. Therefore, this paper proposes a model that can be used to quantitatively determine the research productivity level of faculty. We describe the development of the proposed model and the application of the model by introducing two straight-forward procedures, known as A and B. The difference between these two procedures is that Procedure B explicitly takes the degree of sole-authorship into account, while Procedure A does not. Both procedures may be modified to incorporate constraints to stipulate additional research quality and diversity requirements. We illustrate the proposed approach using a complete numerical example based on data of a hypothetical department with ten faculty members and discuss the results of the example.

The proposed model incorporates four important and desirable characteristics. First of all, the proposed model is objective and complete because it takes both quality and quantity of scholarly contributions into account. The degree of individual scholarship factor may also be incorporated into the model. Secondly, the proposed model is easy for administrators to understand and simple to apply and implement. A Microsoft Excel program has been written to implement the proposed model and is available from the author on request. Thirdly, the input data requirements of the model, as discussed in section 4, are nominal. Finally, the proposed approach is flexible because it can easily be extended and customized to meet the specific requirements (e.g., including other forms of research productivity such as grants) of departments.

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# TAKING TIME TO CONDUCT A NEEDS ANALYSIS IN CREATING AN ONLINE COURSE

**Bonita Barger, Tennessee Technological University**


## ABSTRACT

*How do you design an online International Management course that simulates the issues global managers face in managing and motivating virtual teams? How do you incorporate stakeholder feedback (i.e. students, faculty, university administrators, etc.) to ensure that you produce a quality product? This paper presents the theoretical underpinning and practical issues of "taking time" to conduct a needs analysis to design an online technology mediated learning (TML) environment for an undergraduate International Management course. Various models are reviewed, and an overall model design for creating an online course is presented with a brief sample of a needs analysis; also discussed are the choices made during the process.*


## INTRODUCTION

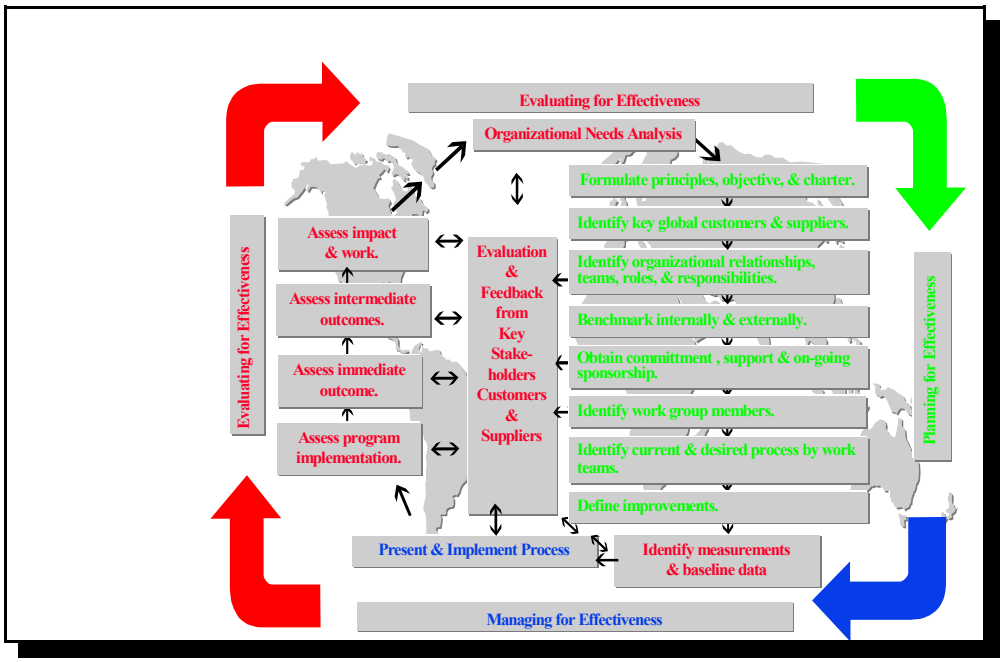
Business faculty today face increased momentum to teach online using technology mediated learning (TML) programs such as WebCT, Blackboard, Elluminate, and Virtual Classroom. While recent publications--such as *Digital Technology in Teaching International Business: Is a Tradeoff Between Richness and Reach Required?* Wymbs, C. & Kijne, H., (2003)--attest to some of the issues that exist, empirical evidences are mixed as to the positives (Parker & Gemino, 2001) and negatives (Arbaugh, 2000) of these programs to outperform traditional teaching. Nevertheless, more than their counterparts in other colleges, Business School faculty are encouraged to create e-commerce courses and teach online using TML programs.

Approaching the task of creating an online International Management course draws into question not the content which is readily available online through various textbook authors websites, but rather a whole series of questions. How does one simulate the issues of constant assessment and appraisal that occurs in working across borders without face to face contact? How can students, many of whom have not traveled outside of the United States, understand the issues created in managing virtual relationships? How can one create curiosity? This paper presents a model I used, focusing on the application of a needs analysis to gather key stakeholder input in the design of an International Management online course. In addition, I describe the choices I made in my role as needs analyst? (See Table B)

## THE MODEL AND MODELS CONSIDERED

Upon review of course design literature on International Management courses, it was obvious that there was a knowledge void. Thus, a model was constructed that integrated three models and formed the foundation of the course design. Nadler (1989) stated that "developing a model is not a unique experience reserved for the privileged few. All of us are constantly "designing models" as we try to make sense of the everyday world around us. Without those models, it is doubtful if we could solve the problems that are a constant part of daily life" (p. 4). The model presented here was adapted from L. Nadler (1989), Chalofsky and Reinhart (1988), and Brinkerhoff (1991), and laid the foundation for a process to design the online course.

**Figure 1. Design Model for Creating an Online International Management Course**
Model accepted for publication in T.H.E. Journal 2004.




## THE NEED FOR NEEDS ANALYSIS

The design model highlights the macro and micro levels of planning, managing, and evaluating for effectiveness. The first step requires an organizational needs analysis. With the demand to create an online course by the next semester, and the literature stating that it can take up to 1,000 hours to create online courses with accompanying CD's, the last action faculty consider is conducting an organizational needs assessment. There just is not time to ask questions such as,

"Does the administration want or need an online International Management course?" or "What are the students needs as they relate to working virtually with complex subject matter?" The tendency, then, is to respond with, "I don't have time for a needs analysis. Just take the WEBCT/Blackboard training and create the course." Or the response is something like: "Why should I do a needs analysis? A needs analysis, while it works in theory, takes too much time in actual practice. A needs analysis is for training programs. Will it add value in designing an online course?" In reality, the resistance is strong to "cut to the chase and produce the product without prior analysis." Slowing down the process becomes an obstacle versus value added.

Ensuring that the right programs, services, and outcomes are offered at the right time for the best value is a key role of any business professional. The creation of cost-effective, value-adding services and programs involves planning to meet the business needs. Needs analysis serves as the cornerstone of effective planning and is one of the foremost activities to accomplish this (Tracey, 1992). Evaluating needs and goal setting establish evaluation criteria (Brinkerhoff, 1991). A needs analysis begins to lay the groundwork for student and administration commitment, sponsorship, and ownership of course or program.

Although needs analysis is perceived as an important activity in planning, ownership, and the criteria for goal setting and evaluation, less than half of Human Resource Development (HRD) programs are preceded by an analysis (Meigs-Burkhart, 1986, in Brinkerhoff, 1991). Brinkerhoff (1991) contended that the HRD practitioner does not conduct regular systematic needs analysis because of time and resource limitations, and he called for "at least some evaluation prior to all HRD efforts" (p. 54). This fact was evident, for there was a knowledge void from a review of the literature in design creation of online courses in International Management.

A study of HRD in Fortune 500 companies revealed that when a needs analysis was used, informal discussions (63%) and observation (53%) were the methods of choice (Ralphs & Stephan, 1986). The authors argued that "with all the emphasis on more 'scientific' needs analysis methods, one would have expected to see other methods rate higher than the informal methods" (Ralphs & Stephan, 1986, p. 74). They addressed the informal and infrequent use of needs analysis and conjectured:

> It is our experience that the need for training in many organizations is so strong-and in some cases so obvious--that often there is no justification for a more formal needs analysis method. In addition, even when a more formal needs analysis is used, seasoned training professionals realize that the informal discussion is often needed to gain the necessary commitment from the clients to accomplish a project or program. (p. 74)

## THE ROLE OF NEEDS ANALYST

The role of needs analyst is defined as the "identification of ideal and actual performance and performance conditions and determinant causes of discrepancies" (Rothwell & Sredl, 1992, p. 130).

This description of the role of needs analyst is one of four needs assessment methods presented by Tracey (1992). It is defined as a discrepancy need, the difference between "an ideal, normative, or expected level of performance and an actual level of performance" (Tracey, 1992, p. 71). The definition was reported by Brinkerhoff from the work of Daniel Stufflebeam of Western Michigan University at Kalamazoo in 1977 (in Tracey, 1992).

## ONLINE BUSINESS COURSE-A NEEDS ANALYSIS

Education expects prophets, educators that can prepare students for the world in 20-30 years. Industry expects profits. It wants organizations that can produce quality results that add to the bottom line in the next quarter. In order to achieve these results, however, a needs analysis is requisite. The literature shows that less than half of the Human Resource Development programs are preceded by a needs analysis; a knowledge void also existed for online creation of International Management courses. Nevertheless, time, effort, and resources were used to conduct an analysis of student needs before creating an online course.

## NEEDS ANALYSIS MEASUREMENT TOOL: A METHOD FOCUSING ON HUMAN RESOURCE MANAGEMENT PRACTICES

Multiple methods exist that can be used to gather data for analysis. The selection or creation of the right analysis tool that will provide valid and reliable data is one of the basic challenges posed for educators and business professionals working in the role of needs analyst. The Human Resource Management Practice Orientations (HRMPO) was chosen as the measurement tool. The orientation instrument was adapted from Schuler (1987) and Cyr (1994). The HRMPO is a method of measuring discrepancy between the desired and the current state of human resource practices using a semantic differential scale (L. Nadler, 1989). The survey is intended to supplement individual interviews and serve as a visual vehicle for needs analysis. The data received is a static snapshot in time, while the instrument is multidimensional. HRMPO serves as a data collection method and also a needs analysis tool that can be used by management for business planning in the future.

The following considerations were reviewed and discussed in the selection and adaptation of HRMPO for an analysis of stakeholders (past, current, and future students):

| | |
|---|---|
| (a) | Is it easy to use for the university administrators, current, and future students? |
| (b) | How much time and knowledge are required to accurately complete it? |
| (c) | Are the concepts and language familiar to the stakeholders? |
| (d) | Are the data trackable over time? |
| (e) | Does it allow for creating ownership of findings and implementation action? |

## IMPLEMENTATION FORMAT, BRIEF SAMPLE OF THE SURVEY, CHOICES MADE

Students who had completed the on-ground International Management course were asked to assist in designing an online version. The instrument took about five minutes to deliver. A sample size of 80 students from three on-ground courses over three semesters was used. In addition, students were asked to provide written feedback during the final course evaluations on how to deliver the content, group process dynamics, and interactions online. The written suggestions were incorporated into the online component.

A brief sample of the survey and simulated findings can be found in Table A below. The X's represent *Current State of Affairs* and O's represent *Desired State of Affairs*. The amoebae-like structures provided a visual summary. Table B highlights choices I made supported by the literature.

**Table A: Brief Survey Sample**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PLANNING** | | | | | | | |
| **How important is planning (creating a project management plan) when applied to** | | | | | | | |
| | strong | moderate | slight | both | slight | moderate | strong |
| Onground Classes<br>Online Classes | | | | X | | O | |
| **ASSESSMENT** | | | | | | | |
| **How important is peer assessment when applied to Assessment** | | | | | | | |
| | strong | moderate | slight | both | slight | moderate | strong |
| Onground Classes<br>Online Classes | | | | X | | O | |
| **How important is self assessment when applied to** | | | | | | | |
| | strong | moderate | slight | both | slight | moderate | strong |
| On ground Classes<br>Online Classes | | X | | O | | | |
| **How important is instructor assessment when applied to** | | | | | | | |
| | strong | moderate | slight | both | slight | moderate | strong |
| On-ground classes<br>Online Classes | | | | X | | O | |
| **COMMUNICATION** | | | | | | | |
| **How important is instructor communication when applied to** | | | | | | | |
| | strong | moderate | slight | both | slight | moderate | strong |
| Onground Classes<br>Online Classes | | | | X O | | | |

Note: X=Current State; O=Desired state. Adapted from Schuler (1987) and Cyr (1994).

| Table B: Choices, Principles/Theories, and Theorists/Mentors for the Role of Needs Analyst | | |
|---|---|---|
| Choice made | Principles/theory | Theorist/mentor |
| Chose to do a needs analysis | Completed a needs analysis based on information from administrators | L. Nadler, 1989 |
| Chose to identify gaps in ideal and actual states | Identified ideal and actual performance, performance conditions and recommendations. | Rothwell & Sredl, 1992 |
| Chose to adapt an existing instrument from prior research on joint ventures and applied it to the creation of an online class | Adapted the instrument from work by Schuler and Cyr outlining HRM and HRD indicators.<br>Strove to include strategic human resource management as "all those activities affecting the behavior of individuals in their efforts to formulate and implement the strategic needs of the company" such as competencies and the role of the HRM/HRD functions. | Cyr, 1994<br><br>Schuler, 1992, p. 365 |
| Chose to use semantic differential scales in the adaptation and creation of the needs analysis instrument | Used a semantic differential scale much like a Likert scale. It is "usually presented with words that are diametrically opposed, with a line between them". | L. Nadler, 1989, p. 67 |
| Chose to give needs analysis survey to three on ground classes with a response rate of 80 students. | For surveys to be valid, the sample must be large enough to generalize to the larger population. In addition, the return rate must be adequate. | Borg & Gall, 1989 |
| Chose to follow extensive ethical standards in implementation of the needs analysis | Created consent forms outlining the project, confidentiality, and how the information was to be used.<br>implementation. | Borg & Gall, 1989 |

## SUMMARY

When creating an online course for the first--or even second--time, pressures exist. There are pressures to create and produce, learn the technology, review the literature, and meet with publishers to determine what electronically exists to support the course. These pressures take priority over asking students what they would like to see if they were taking the course online. But taking the time to do so added value to the overall design. In addition, the needs analysis instrument became a discussion trigger on course improvement with students. They appreciated the opportunity to have input and to have their thoughts heard.

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# CONDITIONS OF TECHNOLOGY PROGRESS IN THE LEARNING ENVIRONMENT

**Mark R. Young, Winona State University**


## ABSTRACT

*This article presents an examination of the basic conditions of the learning environment that are necessary for effective technology-based teaching and learning. First, an overview of nationally utilized instruments purporting to measure a school's technology progress is provided. Next, four common dimensions in the measurement of technology progress (learning strategies, faculty proficiency, technology resources, and students) are presented and discussed. A discussion of how this information can be used as a foundation for those interested in developing their own gauges of technology progress in the learning environment is then provided.*


## INTRODUCTION

The information technologies of the New Economy have enhanced business productivity and have allowed new technology-based business strategies to revolutionize many industries. The implication for business education is that new technology-based teaching and learning strategies may have the same potential impact in education. Business Week's (January 10, 2000) prognosis for the education industry is a record flow of venture capital into for-profit E-learning companies. They suggest that education may be the next "killer application" for the Internet and that there will be a tremendous migration away from classroom learning to online learning.

The real question facing business educators is not if we should integrate technology into the curriculum, but how we can best integrate technology. Smart, Kelley, and Conant (1999) emphasize that business educators are uniquely qualified to recognize the changing needs of students and should lead in the transformation of curriculum. The challenge to educators is in creating a learning environment, which brings together the rigor of the academics, and the new technology-enriched, online communications, resulting in improved student performance. We must chart a course toward effective use of technology in the learning environment and track our journey with evidence, not just anecdotes.

The purpose of this article is to examine the basic conditions of the learning environment that are necessary for effective technology-based teaching and learning. A summary of the dimensions and indicators from nationally utilized instruments measuring technology progress is provided. Based on these indicators, four core dimensions of the learning environment are identified and

discussed. Business departments wishing to track their progress of integrating technology into their curriculum can develop quantifiable measures based of these four core dimensions.

## INSTRUMENTS TO MEASURE TECHNOLOGY PROGRESS

Tracking the impact technology has on teaching and learning is a challenging task. Without prior planning and embedding assessment within the technology implementation process, the validity of reported results will be suspect. Clear goals and measurable indicators for process and outcome objectives must be agreed upon to track and report results. An important first step is the assessment of the current status of the learning environment in order to understand and benchmark the present technology profile. Table 1 presents a list of organizations that have developed instruments intended to measure and document the impact of technology on education. These different technology progress gauges are self-evaluation surveys that typically classify the instructor and/or school along a continuum of technology progress.

Representative of the list of indicators in Table 1, is The Milken Exchange on Education Technology's seven-dimension framework that provides a set of indicators to consider when assessing whether or not schools have established the "essential conditions" necessary to improve student learning through technology. While this framework represents a synthesis of thinking of its authors who represent national, regional and state departments of education and associations, private educational companies, and universities, the model has only just begun to be researched and tested. When developing the framework, their focus was on the deployment of technology and telecommunications in K-12 public schools. The framework can be used as a self-assessment tool, a planning tool, an accountability system and/or a research agenda.

## FOUR CORE DIMENSIONS OF TECHNOLOGY PROGRESS

The subsequent sections introduce four core dimensions (Learning Strategies, Faculty Proficiency, Technological Resources, and Students) for gauging technology progress. After a review of the dimensions and indicators in Table 1, these four dimensions were selected because they tend to be represented across the various organizations' assessment instruments. The following discussion is meant to provide an overview of these dimensions of technology progress and provide a foundation for those interested in assessing their current status or in developing their own gauges of progress.

### Learning Strategies

> *"One of the enduring difficulties about technology and education,"* according to Dr. Martha Stone Wiske, co-director of the Educational Technology Center at the Harvard Graduate School of Education*, "is that a lot of people think about the technology first and the education later."*

Improving student learning through enhanced instructional strategies should be the motivation for change and not simply the technology. Business educators are at a crossroads today, setting the direction for how technology will be incorporated into the teaching and learning processes. Technology complexity is creating an environment where no one person can even begin to know all that needs to be known. New roles for both students and teachers are being created, both becoming active learners and instructors. Teaching and learning may become much more holistically integrated, where the norm is to seek information and input and move toward the creation of knowledge by all that are involved in the process. Technology may be the major change agent for transforming the practice, the art, and the meaning of teaching (Johnson, Schwab, Foa, 1999).

The business education literature is rapidly expanding with examples of pedagogy based on new learning strategies involving living cases (Leclair and Stottinger, 1999), interactive web based cases (Owen, 1999), integrating practitioners into the course (Linrud and Hall, 1999), students as consultants (Kumcu and Kumcu, 1998), special issues of the Journal of Marketing Education devoted to experiential learning (April 2000), integrating technology and distance learning in marketing education (April 2001). The traditional learning strategy involves the transmission of knowledge and proven practices with the role of the educator to guide the student to think in such a way as to arrive at the 'correct answer'. Characteristics of new learning strategies (see Table 2) involve the student in the learning process, stress questioning, and problem solving by placing the student in authentic tasks that develop the necessary skills and concepts. The educator is a facilitator of the student's self-directed learning rather than an instructor or manager. Table 2 presents a comparison of the traditional versus the new learning strategies and was compiled from the technology profiling instruments created by the organizations in Table 1.

**Table 1: Indicators of Technology Progress**

| Organizations | Dimensions | Indicators |
|---|---|---|
| National Study of School Evaluation (www.nsse.org) | • Instructional System<br>• Organizational System | Curriculum development, instructional strategies & learning activities, assessment of learning<br>Leadership, vision & planning, policies, professional development, resources, community |
| North Central Regional Technology in Education Consortium (www.ncrtec.org) | • High-Performance Technology<br>• Engaged Learning | Access, operability, organization, engagability, ease of use, functionality<br>Vision of learning, tasks, assessment, instructional model, learning content, grouping, teacher roles, student roles |

**Table 1: Indicators of Technology Progress**

| Organizations | Dimensions | Indicators |
|---|---|---|
| Milken Exchange on Education Technology (www.milkenexchange.org) | • Learners | Fluency, strengthening the basics, developing higher-level proficiencies, increasing relevancy, motivation to learn, recognition of tradeoffs |
| | • Learning Environments | Learning content, learning context, school culture, technology access, information & communications |
| | • Professional Competency | Core technology fluency, curriculum, learning & assessment, professional practice & collegiality, classroom & instructional management, administrative competencies |
| | • System Capacity | Vision, alignment & planning, ensuring capacity, leadership & system thinking |
| | • Community Connections | Commitment, collaboration, clarity, communications |
| | • Technology Capacity | Installed base, connectivity, technical support, client orientation, facilities |
| | • Accountability | Deliverables & benchmarks, data collection/interim progress, data-driven decision making, communication plan |
| Educational Technology Planners, Inc. (www.edtechplanners.com) | • Readiness | Collective vision, community support/benefits, leadership readiness, information technologies readiness, innovators, staff capacity |
| | • Learning | Information technologies readiness, libraries as information centers, instructional practices, equitable opportunities, home/school connection, ubiquitous access |
| | • System Capacity | Community support/benefits, policies & procedures, staff development program, purchasing decisions, budget support, accountability |
| | • Technology Development | Ubiquitous access, tool capacity, connectivity, facilities, technical support |
| South East and Islands Regional Technology in Education Consortium (www.seirtec.org | • Student Engagement | |
| | • Teacher Engagement | |
| | • Appropriate Resources | |
| | • Organizational Support | |
| | • Community Involvement | |

**Table 1: Indicators of Technology Progress**

| Organizations | Dimensions | Indicators |
|---|---|---|
| CEO Forum (www.ceoforum.org) | • Hardware<br>• Connectivity<br>• Content<br>• Professional<br>• Development<br>• Integration and Use | Students/computer, students/multimedia computer, students/CD-ROM, maintenance<br>LAN, Internet connection, connection speed<br>Availability of drill & practice, applications for creation, simulation software, research resources, networked communication<br>Content of training, professional development practices, technology access & usage<br>Role of teacher, pattern of student technology use, class length |

Almost a century ago, John Dewey emphasized that learning is based on discovery guided by mentoring rather than on the transmission of information. Making research-based learning the standard and constructing an inquiry-based freshman year, were two of the Boyer Commission's (1998) fundamental recommendations for improving undergraduate education. Technology may provide the impetus, tools and structure to make inquiry-based teaching and learning a widespread reality.

The advent of the knowledge economy requires that people continually invest in the acquisition of knowledge, skills and abilities. As the need to become life-long learners increases, so does the ability for employees to take responsibility for their own learning and their capability to effectively utilize convenient flexible learning strategies. Student-centered teaching and learning strategies are designed to provide these capabilities and develop the students' ability to "learn how to learn".

## Faculty Proficiency

Technology, when not used appropriately, can have a negative impact on student learning (Wenglinsky, 1998). Simply providing the technology is not enough; faculty must be proficient in the use of technology tools as well as a variety of learning strategies supported by technology. The U.S. Department of Education (1996) recommends that at least 30 percent of the technology budget be allocated toward professional development. Effective professional development needs to accommodate the current level of competency of the teacher, the available technology and the goals of the marketing program.

A decade long research project by Apple Computer (The Apple Classrooms of Tomorrow) has identified five phases that teachers pass thorough before they become education technology integrators and innovators. The five stages of instructional evolution listed below suggest that

faculty development is an ongoing process that takes time and requires different assistance for faculty in different phases.

| | |
|---|---|
| Phase 1: | *Entry* - Educators struggle to learn the basics of using technology. Students use technology in computer labs or independently without much guidance from instructor. |
| Phase 2: | *Adopter* - Instructor typically self-taught by trial and error and utilizes essentially same content as previous with technology layered on top. Example assignments might have students look up specific URLs and incorporate information from these sites into assignments or papers. Technology is used to enhance teacher's own productivity. |
| Phase 3: | *Adaptation* - Technology is used to enrich the curriculum in familiar ways typically by directing student inquiry to pre-selected web sites and increase productivity through the use of word processing, spreadsheets, etc. Instruction is still teacher-centered. |
| Phase 4: | *Appropriation* - Instructor has achieved mastery over the technology and has integrated technology for its unique capabilities. Learning experiences and environments are designed to take advantage of its capabilities to meet learning objectives. |
| Phase 5: | *Innovation* - Discover entirely new uses for technology. Instructors are redefining the classroom environment in ways that leverage technology and develop student's higher order thinking skills as well as mastering the basic concepts and skills. Learning becomes more collaborative, interactive, customized and student-centered. |

Faculty proficiency development is complex because of the emphasis and constant trap of developing technical skills without improving instructional practices that lead to enhanced learning. Faculty must possess certain core technology skills, understand models of curriculum design and learning strategies, and develop learning management strategies in order for them to recognize how technology might effectively be used in the classroom (Milken Exchange, 1999). The ability to learn and quickly adapt new computer systems, software, networks, electronic resources, multimedia and discipline-specific technologies are baseline technology skills needed to function in technology-rich classrooms. Faculty must also understand new instructional strategies where new roles (see Table 3) of the teacher and students may arise. Faculty should be able to match learning strategies with learning needs of individual students, and possess skills in a variety of assessment strategies that may be more relevant in the technology-rich classroom.

Successful faculty development should enable faculty to use technology and the resources it makes available to improve teaching and learning, not to create independent technical experts. Professional development must not be a substitute for technical support specialists.

| Table 2: Learning Strategies | | |
|---|---|---|
| | Traditional Learning Strategies | New Learning Strategies |
| Pedagogy | Teacher-centered | Student-centered |
| Responsibility for learning | Teacher sets goals, assignments, grades | Students with their teacher sets goals, assessment standards & timelines |
| Problem-solving | Paper and pencil tasks to determine right answer | Student selects resources and strategies to apply |
| Collaborative | Individual tasks & isolated work, sharing information may be considered "cheating", competing against classmates | Interdependent group work with individual accountability, multiple sources of information and feedback |
| Learning Progression | Single path progress for entire class | Multipath progression for individuals |
| Information | Factual information delivered to passive learner | Critical thinking, information exchange to active, inquiry-based learner |
| Context | Isolated, artificial context, students respond by recall basics from textbooks and teachers | Authentic, real-world complex problems requiring multi-disciplinary solutions |
| Assessment | Paper/pencil tests, standards set by teacher often shared with students after work is graded, viewed as separate from instruction | Focus on what student can do or demonstrate with their subject knowledge, written & oral presentations for authentic purposes evaluated by teacher, audience and themselves; jointly created assessment criteria used throughout their work |
| Textbook | Textbook defines and outlines the curriculum | Text is a reference book providing only very general structure and information |
| Instruction | Students respond to questions or solve problems posed by teacher | Students engage in research and problem solving based on their needs and interests |
| Technology Use | Focus on technology skills, same teaching tasks | Focus on learning, new ways of learning new knowledge |

| Table 3: Faculty Roles | |
|---|---|
| Faculty's Traditional Role | Faculty's Technology-Centered Role |
| Faculty is the primary source of information and resources. | Faculty, in collaboration with others, e.g. library specialists, creates learning opportunities and suggests resources as requested or appropriate. |
| Faculty gives explicit directions on how to complete assignments and what is on the exam. | The faculty and other instructional partners model their thinking processes, help students to learn how, when, and why to use different strategies on a student-by-student basis and as-needed. |
| Faculty has expertise in the area of study and experience in using the instructional materials. | The faculty extends his or her own knowledge as a co-learner or co-investigator. |

## Technology Resources

Technology resources should be provided in sufficient volume to enable faculty to develop and deliver new curricula, and for students to have convenient access with necessary technical support to implement the curriculum and meet the learning goals. Up-to-date computer hardware and peripherals such as printers, scanners, digital cameras, and projectors must be readily accessible and numerous enough for both faculty and students to make use of the technology conveniently. User friendly and integrated software for communications, web browsing, e-mail, and productivity (word processing, spreadsheets, etc.) must be provided along with technical help and training. Connectivity to access resources within the university and beyond the university must be widespread, fast, and reliable. Technical support must be developed to help trouble shoot problems, provide technical assistance, regularly upgrade and maintain systems and do so in a timely manner with a customer oriented attitude. Ideally, technology will be integrated into the classroom so it becomes a tool to assist learning, not a focus of the learning activity. Classroom design and infrastructure may need major remodeling to accommodate the technology-rich learning environment.

## Students

Students should have a basic proficiency in use of technology and have an understanding of the relevancy of computers and communication networks for business. If students lack the technology proficiency when starting a business course, they tend to focus on learning how to use the technology and the true course content becomes overshadowed and secondary. Student-centered learning requires the student be able to begin to take on more responsibility for their own learning and develop an ability to locate and select resources to help creatively solve problems.

Technology's ability to increase opportunities for new ways of learning and provide relevant, authentic business applications should enhance students' intrinsic motivation to learn. By having classroom experiences parallel relevant real-life applications of business, students need to understand how their coursework is preparing them for their careers.

The following indicators help monitor students' progress toward effectively being able to use technology and purport to measure the student's readiness to learn.

| | |
|---|---|
| *Technology skills* | - proficient enough to complete learning tasks without the primary focus on the technology skill. |
| *Responsible learner* | - able to recognize and work with teacher to set learning goals. |
| *Intrinsic Motivation* | - actively engaged and has a desire to learn. |
| *Content Focused* | - able to use technology to acquire the basic content and develop higher-level proficiencies. |

## DISCUSSION

The resources listed in Table 1 can provide complete assessment programs for departments or colleges to benchmark and track their progress. Most assessment instruments are simple survey-based tools that can facilitate goal setting and prioritization of efforts and resources; however, most of the instruments were not designed specifically for college level program evaluation. Assessment can be done at a very broad level (institution or college levels) or can be conducted at a department or even the individual faculty level depending on the purpose of the assessment. What stage of faculty instructional development are you in? Are your learning strategies - teacher or student centered? Does your school provide sufficient technology resources? How proficient are your students in using technology? This article is intended to provide business educators with a starting point for developing their own gauges of technology progress tailored to their department's needs and emphasis.

The four core dimensions of learning strategies, faculty proficiency, technology resources, and student proficiency seem to be embedded within these self-assessment tools. Measuring these four dimensions not only can help appraise a department's or faculty's current status, but may also encourage faculty to think beyond the traditional learning strategies and roles they now play in the education process.

For business educators, the digital age is not about technology but what learners are doing with technology to extend their knowledge, skills, and abilities. The challenge before us is to establish the conditions that are essential to make these technology tools truly effective in improving student performance. Educators should be able to answer the question "what do we have now that we could not have had without the technology?"

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# REVIEW AND ANALYSIS OF E-BUSINESS EDUCATION: A LOOK AT U.S. COLLEGES AND UNIVERSITIES

**Sumaria Mohan-Neill, Roosevelt University**
**Carl L. Witte, Roosevelt University**
**Robert M. Clark, RMC Solutions**

## ABSTRACT

*The overall research objectives of this paper were to explore the prevalence of E-business programs in a broad, representative sample of U.S. institutions of higher education, and to provide an overview of E-business education in this sample. It also examines the correlation between industry sponsorship and the location of schools (metro versus non-metro). A stratified sample of 139 schools was drawn from U.S. News and World Report.*

## INTRODUCTION

The giddy ascent of the NASDAQ stock index in the late nineties was driven by the expansion of Internet technology. Investors felt that this expansion would revolutionize the economy through electronic business (E-business) applications. In response, E-business education also began taking off during this period driven by student demand for courses. As the stock market plummeted, many Internet companies collapsed as quickly as they had appeared. Anecdotal evidence revealed that schools were also paring back programs, as the stock market and demand for E-business courses fell in tandem (Harrington, 2001; Keenan, 2001).

Despite the bursting of the stock market bubble, few would argue that Internet technology has not revolutionized both the overall economy and how businesses operate. McGrath and Lomerson (2001) emphasize the real need to incorporate new technologically driven business models into business pedagogy. They argue that small businesses in particular will benefit from a trained pool of knowledgeable students because they do not have the resources to take on such instructional activities themselves. However, questions continue to arise about the proper way to incorporate e-commerce into the curriculum (Harrington, 2001; Durlabhji & Fusilier, 2002).

In terms of industry and educational cooperation in the development of curricula, it remains to be seen how much influence industry will have on the depth and speed of higher education's adoption of E-business offerings. There is some evidence of cooperation between business and educational institutions, as a number of firms are supporting E-business curriculum development with large grants (Dobbs, 1999). Additionally, some colleges are soliciting guidance from business

(Fedorowicz & Gogan, 2001) without receiving external funding. Yet, student interest was reported as the number one reason that E-business courses were established by member schools of the Association to Advance Collegiate Schools of Business (AACSB) (Etheridge & Hsu, 2001).

So, now that the dust has settled, we still need E-business education, but definitely not along the lines of the previous pattern of a knee-jerk addition of courses and programs. This paper seeks to provide an objective overall perspective of E-business education in the U.S. and seeks to establish a foundation for future research.

## PERSPECTIVES ON THE E-BUSINESS CURRICULUM

In the last several years, a growing body of research literature on the E-business curriculum has begun to develop. Several authors have addressed the issue of program content. Mitchell and Strauss (2001) investigated the views of practitioners and academics, active in the field, regarding the significant skills and topics required as content for e-commerce and Internet marketing programs. Results of the survey research indicated agreement on five major skills that should receive the most classroom time. These were web-page design, database design, transaction management, information architecture, and programming page interactivity (Mitchell & Strauss, 2001). In terms of curricula, both e-commerce academics and practitioners believed that graduates of e-commerce programs should complete a significant number of course credits in the subject area. The average number of course credits recommended in the area was 53 credits versus a usual 30-credit business major (Mitchell & Strauss, 2001). These findings were interpreted as indicating a need for the development of entire e-commerce programs. Finally, the authors recognized and acknowledged the "moving target" aspect of tracking necessary skills due to the rapidly changing technological environment.

Celsi and Wolfinbarger (2001) focused on the requirements of employers, and concluded that the convergence between information technologies and business strategy has created a need for employees who are able to act and make decisions cross-functionally. They argued for a business curriculum that integrates IT with the business disciplines. They argued against separate tracks or programs, but rather recommended offering students the flexibility to design their own majors with less rigid degree or major requirements. They also recommended that business schools concentrate on broad concepts and topics, with specific skills being taught through support mechanisms such as outside firms or distance learning. Finally, they called for faculty to develop cross-functional knowledge and expertise, and they encouraged the use of new technologies such as the internet to connect communities of scholars enabling them to respond more quickly to the rapidly changing technological environment.

A number of authors have examined the specific curriculum of an individual program. Bartholome and Olsen (2002) detailed the course components of the formal e-commerce emphasis program offered by the Business Information Systems department at Utah State University. They

emphasized a need for the curriculum to contain technical, business, and managerial aspects of e-commerce.

Tomkovick et al. (2000) described the content of an e-commerce module developed as part of the undergraduate business program at the University of Wisconsin-Eau Claire. They argued for a cross-functional multi-disciplinary approach based on a need for less rigidity and more creativity to meet the wide-ranging requirements of E-business activities. Quantitative feedback collected from students was found to be generally positive. Qualitative narrative feedback revealed a broadly favorable response toward both the teaching and the curriculum developed (Tomkovick et al., 2000).

Fedorowicz and Gogan (2001) reported that the E-business program at Bentley College (Waltham, Mass.) might serve as a model for schools wishing to move forward with a full-fledged program in E-business. Bentley has one of the most comprehensive E-business programs in the United States (Fedorowicz & Gogan, 2001). The new president of the college made the development and implementation of an E-business program his personal mission. Not only did he drive the development process, but he also actively participated in its design and execution. The development process included: 1) conducting case studies and reviews of existing literature on E-business strategies at start-up and traditional firms, 2) fact finding initiatives among stakeholders and faculty to identify fruitful avenues they should follow in their research, 3) training to ensure the quality of instruction in IT skills and E-business models, 4) a review of offerings by top B-schools, and 5) continuing reviews of the successes/failures of early actions.

Other studies have been conducted at a broader level. Etheridge, Hsu and Wilson (2001) examined course offerings and requirements at a number of existing E-business programs of AACSB-affiliated institutions. Of 77 programs examined, 40% were classified as MBA, approximately 30% MS, 6.5% were BS, and approximately 23% were certificate oriented non-degree programs (Etheridge, Hsu & Wilson 2001). Overall, wide variations were found among programs offered. It was concluded that no real agreement exists regarding the composition of an E-business curriculum in terms of the content and number of course offerings.

Morrison & Oladunjoye (2002) collected survey data from classroom business educators regarding the degree of integration of e-commerce topics into business education programs. Their sample included data on 4-year collegiate programs, as well as community colleges and secondary schools. Specifically they looked at *infusion,* which they defined "as the integration of e-commerce topics into existing curricula by means of initiating an entire course or revising an existing course for inclusion of a new segment or unit," (Morrison & Oladunjoye, 2002). Infusion of the topic required any course revisions to existing courses to be significant, not just a simple discussion of e-commerce for a day or two. Morrison and Oladunjoye (2002) found that all groups of respondents (including 4 year college educators) indicated that programs were lacking an emphasis on teaching: 1) success factors of dot-com companies, 2) e-commerce related advertising, 3) e-commerce fraud and 4) government regulation of e-commerce. In addition, all groups of business educators reported low levels of personal involvement across a range of e-commerce activities, from reading one book on e-commerce within the last 6 months, to attending an e-commerce seminar within the past year.

It was also discovered that all business educators felt that they lacked expertise in exchanging opinions and ideas about e-commerce issues. Overall findings indicated that business educators were not *infusing* e-commerce topics adequately into the existing curricula, and that as a result students were not being properly prepared for positions in companies where e-commerce activities are an important part of operations (Morrison & Oladunjoye, 2002).

Durlabhji and Fusilier (2002) described and enumerated master's e-commerce programs in their study of e-commerce curricula, conducted through a review of websites. They also examined issues surrounding the growth of various programs, and sought to determine the comparative emphasis on technical (emphasis on technology) versus non-technical (emphasis on functional business areas) content of various programs.

Their study indicated a rapid growth of new courses and degrees; for the period studied from February 2000 - November 2000. A total of 67 graduate programs were examined. Of 855 courses reviewed, 406 were found to have a specific e-commerce component, of these 292 were classified as non-technical courses and 114 were classified as technical (Durlabhji & Fusilier, 2002). Findings suggested a greater emphasis on non-technical courses, which may have resulted from the dot-com collapse and a consequential increase in demand by employers for students with a strong grounding in business basics.

## BACKGROUND AND OBJECTIVES OF CURRENT STUDY

During the exploratory phase of this research, an initial review of the relevant literature was carried out. Then an in-depth analysis of the websites at 15 top B-schools was conducted to learn more about the range and types of E-business courses and programs that were being offered. Subsequently, a summary of the initial findings was published (Mohan-Neill & Clark, 2003).

This paper expands and updates the literature review, and further extends the research findings. The research objectives of this paper are as follows:

1) To develop a broad, representative sample of U.S. institutions of higher education, and to provide an overview of E-business education in this sample/population.
2) To determine what schools were offering in terms of a quantity measure (such as number of courses or program offering).
3) To determine what schools were offering with respect to their focus or orientation (for example, were the offerings predominantly a) business, b) technical or c) interdisciplinary).
4) To determine whether there were course offering differences in terms of the measure in objective 2, based on location (metro versus non-metro).
5) To determine whether there were course offering differences in terms of the measure in objective 3, based on location (metro versus non-metro).
6) To determine whether there is any correlation between industry sponsorship and location (metro versus non-metro).

## METHOD

The exploratory phase of this research, as reported by Mohan-Neill and Clark (2003), consisted of an initial literature review followed by an in-depth review of the websites of the 15 top U.S. B-schools as ranked by *U.S. News and World Report.* The in-depth review of fifteen highly ranked B-schools' websites was performed, to determine the type of data that was available. Websites were analyzed for applicable information relating to E-business offerings. These areas included those relating to: marketing, finance, management, engineering, computer science, and any other likely source. The search also included a review of any research links and any industry participation. Finally, the schools' search engines provided a way to search the full school website, using relevant terms to capture any information that might have been missed previously.

## QUANTITATIVE/DESCRIPTIVE RESEARCH DESIGN

Data were collected from a sample of 139 schools' websites. The process included navigating the "Academic" section of Business, Information Systems/Computer Science/Engineering departments, or other likely locations to provide an overview and path to follow in locating the desired data. Then the "Research" section, if available, was reviewed to locate any appropriate data. These two sections of a school's website sometimes led to other areas that had useful data. Both the terms E-business and e-commerce were used.

| | | |
|---|---|---|
| University Name | Reputation Score | Telephone Contact |
| *USN &WR* Category | Metro Area | E-business Program Scale--# of courses |
| *USN &WR* Sub-Category | State | # E-Bus courses offered---Graduate |
| Special Category | Web Site URL | # E-Bus courses offered---Undergrad |
| Rank in Group | Email Address—up to three | Outside constituency sponsoring/supporting E-Bus |

The research sample for the data came from, "America's Best Colleges," on the website of *U.S. News and World Report* (*USN&WR*) <http://www.usnews.com/usnews/home.htm>. This well-respected publication has been ranking colleges for many years, and therefore was chosen as the source to develop a stratified sample. The data also included results from the fifteen "Top Graduate Business Schools" on the *USN&WR* website. A stratified sample was drawn from the publication's rankings based upon the multiple national and regional categories of the undergraduate school rankings. Due to the inclusion of all fifteen "Top Graduate Business Schools" the overall sample was enriched with respect to those schools. The categories used to create the stratified sample were Top Graduate Schools, National Universities, National Liberal Arts Colleges, Regional Universities (Tier I through Tier IV schools.), and Regional Liberal Arts Colleges (Tier I through Tier IV schools). A minimum of two schools was included from each group category or sub-group

category. The following variables were collected during late Summer and the Fall of 2001 and used in the analysis. Some data were updated during the Winter of 2001-2002. Additional data were collected that could be used for further research, including one to three contacts, where possible, for each school.

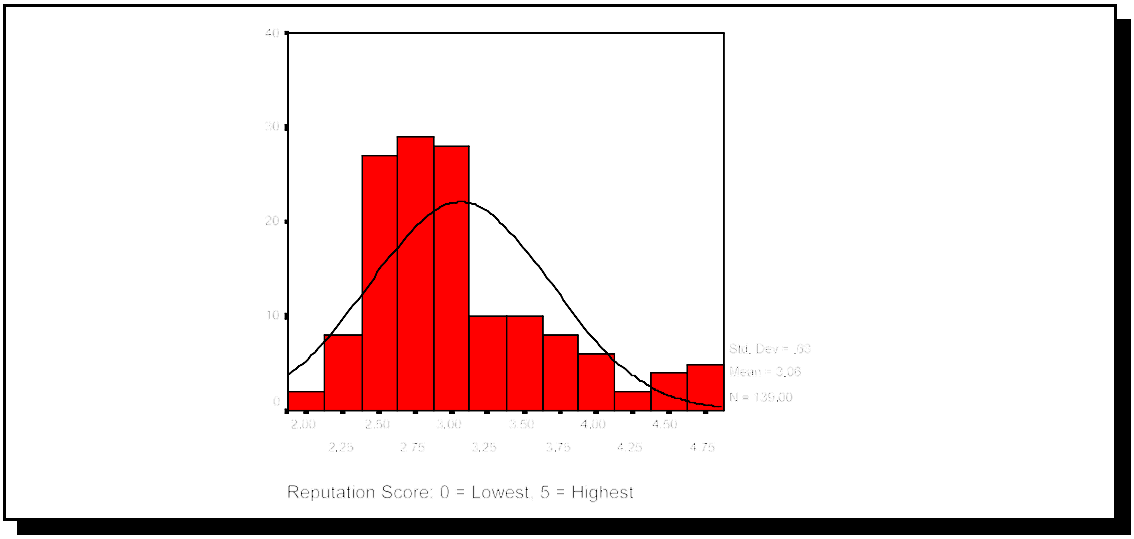
## EXPLORATORY RESULTS

The exploratory results from Mohan-Neill and Clark's (2003) website review were enlightening in terms of the breadth and variance of E-business data collected on the 15 initial websites reviewed. Detailed results of the in-depth reviews can be found in Mohan-Neill and Clark (2003). The in-depth reviews, of these 15 B-schools, were then used to formulate the selection and classification criteria for data to be collected from the remaining schools in the sample.

## DESCRIPTIVE RESEARCH RESULTS

The first research objective was to develop a broad, representative sample of U.S. institutions of higher education, and to provide an overview of E-business education in this sample/population. A sample of 139 of schools was selected from *U.S. News and World Reports* list of 1440 schools. Figure 1 illustrates the distribution of the sample by Reputation Score, based upon a *USN&WR* score range of zero (for lowest ranking) to five (for highest ranking).

**Figure 1**



## DISCUSSION OF RESULTS

### Exploratory Results

Table 1 shows the sample distribution by location. Approximately 40% were in metro areas and 60% were non-metro schools. The sample also represented 41 states. Therefore, the first objective of sample diversity and representativeness was achieved.

**Table 1. School Location Metro or Non-metro**

| Location | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Non-metro | 83 | 59.7 | 59.7 | 59 |
| Metro | 56 | 40.3 | 40.3 | 100 |
| Total | 139 | 100.0 | 100.0 | |

## QUANTITY OF E-BUSINESS COURSE OFFERINGS

The second research objective was to determine what schools were offering in terms of a quantity measure (such as number of courses or program offerings). An ordinal scale was used to measure the quantity of E-business course offerings, where 0=no courses, 1=a few courses, 2=more than a few courses, 3=many courses, and 4=a degree or concentration. Table 2 shows the results concerning E-business course offerings. Sixty-eight percent of schools in the sample offered no courses. About 32% of 139 schools offered some type of E-business course or offering. About 12% offered a program of some type, such as a degree or concentration.

**Table 2. Quantity of E-business Course Offerings**

| Course Scale | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| 0 = no courses evident | 95 | 68.3 | 68.3 | 68.3 |
| 1 = a few courses | 21 | 15.1 | 15.1 | 83.5 |
| 2 = more than a few courses | 5 | 3.6 | 3.6 | 87.1 |
| 3 = many courses | 1 | .7 | .7 | 87.9 |
| 4 - major or concentration offered | 17 | 12.2 | 12.2 | 100.0 |
| Total | 139 | 100.0 | 100.0 | |

## ORIENTATION OF E-BUSINESS COURSE OFFERINGS

The third research objective was to determine what schools were offering with respect to their focus or orientation (for example, were the offerings predominantly business, technical or interdisciplinary). A nominal scale was used to capture this variable. Classifications include the following measures for the nature of E-business offerings: 0=none evident, 1=maybe, 2=mostly tech courses (technical orientation), 3=interdisciplinary (interdisciplinary orientation), and 4=mostly business courses (business orientation). The data were collected based upon an analysis of each school's website by reviewing courses and programs in the Business/Management School or other schools such as Computer Science at both the graduate and undergraduate level.

Table 3 shows interdisciplinary or discipline-specific E-business course offerings available at the sample of U.S. colleges and universities. About 71% of the schools have no E-business offerings. Less than 2% offer mostly technical courses. About 12% of the offerings appeared to be interdisciplinary, and 5% are predominantly business courses. Therefore, an interdisciplinary approach seemed to be the most favored orientation.

**Table 3. Frequency of Interdisciplinary or Discipline Specific E-business Offerings**

| Orientation Scale | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| 0 = none evident | 99 | 71.2 | 71.2 | 71.2 |
| 1 = maybe has some offerings | 14 | 10.1 | 10.1 | 81.3 |
| 2 = technical orientation | 2 | 1.4 | 1.4 | 82.7 |
| 3 = interdisciplinary orient. | 17 | 12.2 | 12.2 | 95.0 |
| 4 = business orientation | 7 | 5.0 | 5.0 | 100.0 |
| Total | 139 | 100.0 | 100.0 | |

## QUANTITY OF COURSE OFFERINGS RELATIVE TO LOCATION

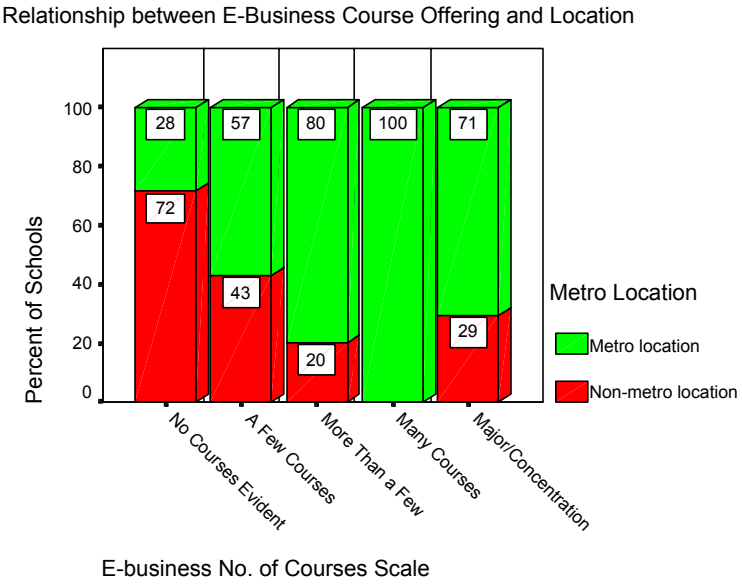
The fourth research objective was to determine whether there were differences in the quantity of course offerings relative to location. To determine the quantity of course offerings, an ordinal scale was used to measure the quantity of E-business course offerings, where 0=no courses, 1=a few courses, 2=more than a few courses, 3=many courses, and 4=a degree or concentration. Figure 2 shows the results concerning the quantity of E-business course offerings relative to location (metro versus non-metro). It was found that 71 % of schools offering an E-business major or concentration were located in metro areas versus 29%, which were in non-metro locations.

All or 100% of schools described as offering "many courses" were in metro areas, and 80% of schools offering “more than a few courses” were located in metro areas versus 20%, which were

in non-metro locations. Additional findings indicated that 57% of schools offering "a few courses" were located in metro areas versus 43%, which were in non-metro locations.

Of schools with no courses evident, 28% were located in metro areas versus 72%, which were in non-metro locations. Overall, the results indicate than schools in metro areas are more likely to have significant course and program offerings in E-business.

**Figure 2**



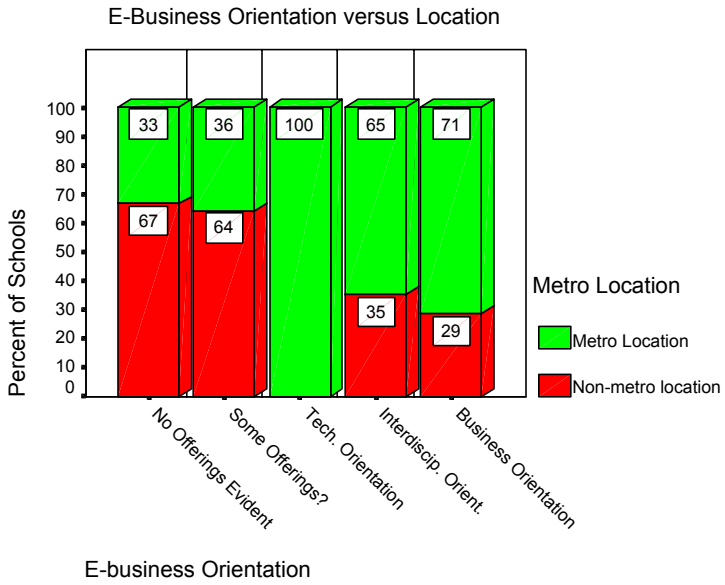

## ORIENTATION OF COURSE OFFERINGS RELATIVE TO LOCATION

The fifth research objective was to determine whether there were differences in the focus or orientation of course offerings relative to location. A nominal scale was used to measure the nature of E-business offerings: 0=none evident, 1=maybe, 2=mostly tech courses (technical orientation), 3=interdisciplinary (interdisciplinary orientation), and 4=mostly business courses (business orientation). Figure 3 shows the results concerning the type of E-business course offerings relative to location (metro versus non-metro).

It was found that 71% of schools, with a predominantly “Business orientation” in their E-business offerings, were located in metro areas versus 29%, which were in non-metro locations. In addition, 65% of schools, with a predominantly “Interdisciplinary orientation” in their E-business offerings, were located in metro areas versus 35%, which were in non-metro locations. Finally, all schools with a “Technical orientation” were located in metro areas. The results show that metro schools have defined the direction of E-business orientation (both business and interdisciplinary).

Interestingly, no schools in non-metro areas had a technical orientation (such as computer science) in E-business.

**Figure 3**




## INDUSTRY SPONSORSHIP RELATIVE TO LOCATION

The sixth research objective was to determine whether there was any correlation between industry sponsorship and location (metro versus non-metro). Figure 4 shows the results of sponsorship relative to location. Of all the schools with "industry sponsorship," 86 % were located in metro areas versus 14% in non-metro areas. Industry sponsorship overwhelmingly favored schools in metro areas.

## CONCLUSIONS

About 32% of 139 schools studied offered some type of E-business course or offering. About 12% offered a program of some type, such as a degree or concentration, which may be considered a significant E-business offering. Of the schools with any type course or program offering, less than 2% offer mostly technical courses. About 12% of the offerings appeared to be interdisciplinary, and 5% are predominantly business courses. Therefore, an interdisciplinary approach seemed to be the most favored orientation.

Overall, the results indicate than location matters. Schools in metro areas are more likely to have significant course offerings in E-business compared to non-metro schools. The results also

show that metro schools have a more defined E-business orientation (both in business and interdisciplinary). Interestingly, no schools in the non-metro areas had a technical orientation (such as computer science) in E-business. Of all the schools with industry sponsorship, 86 % were located in metro areas versus 14% in non-metro areas. Industry sponsorship overwhelmingly favored schools in metro areas.

**Figure 4**


Some of the limitations of this paper are related to the observational mode of data collection. The data collected from websites may be out-dated or incorrect. However, it can be argued that the observational mode of data collection is more objective than survey methodology, where questioning may give schools the opportunity to embellish their offerings. However, an obvious advantage of collecting data through questioning methods is related to the fact that one can gain greater insight into current and future programs.

The stock market hysteria is over, but the internet has truly revolutionized the world economy. Business education needs to seriously reflect that fact. E-business is an area where industry is leading academics. If academics do not want to become irrelevant, business educators need to participate in the research and the ongoing debate on how to integrate E-business into the curriculum.

Research and the integration of E-business courses and programs into B-schools' curriculum must be managed in ways that are meaningful and add value to students' education. B-schools need to do more than institute a simple change of course titles, or offer isolated courses and programs in E-business. Some are adamant that interdisciplinary instruction across marketing/ management and

technology/computer science-engineering or other applicable disciplines is required for students' success in learning, and this deserves further investigation. If so, there is a need for schools to encourage collaboration among functional areas: marketing, management, engineering and information technology, etc. to properly prepare students to deal with the complexities they will face in the electronic world upon graduation or in their current employment.

We have more questions than answers at this point (e.g., what types of courses or programs would add to the depth and understanding of E-business education in the U.S.). Instructor training appears to be a major issue for many schools and could likely benefit from broad insight on what is successful for schools with existing programs. The degree of industry involvement is another area of importance, as schools train students in this emerging discipline. It is also important to look at schools large and small, across all geographical areas. E-business can be an important tool for firms in less populated areas allowing them to reach customers around the globe. Many of these firms might rely upon local educational institutions for the training of current and/or future employees.

Granted, the fundamentals of business education may not have changed significantly but the ways in which business research, transactions, and strategies *are executed* have undergone a phenomenal revolution. Thus, B-schools must develop curricula that effectively train students to use the new technologies to execute more cost effective research, transactions, and strategies. The competitive race is the same, but the mode of winning has changed, and the winners will be those who can best harness and utilize E-business technology. The question is no longer whether E-business belongs in the curriculum, but rather what is the most effective way of integrating it into the curriculum. The best answers will be the result of meaningful and objective research in this area.

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