PROFESSOR KNOWLEDGE ASSESSMENT

(See Research, Portfolio Section A.3)

Jule Dee Scarborough, Ph.D. and Jerry Gilmer, Ph.D.

Assessment of the professor's knowledge on teaching and learning served as one of the research and evaluation variables to determine the success of the CEET faculty development program. Therefore, a pretest was administered before each program component, and a post -test was administered upon the completion of each program component. With some program components, however, a third assessment was administered, as we were interested in observing retention. Also, note that some of the assessments were performance based. For example, once the professors were tested traditionally on test analysis, they were also required to perform two test analyses during the research semester on the new midterm and final exams. All seven professors performed the midterm analysis; six of seven performed the analysis of the final exam; they all prepared a diagnostic write up. The performance assessment program component was totally performance based with the baseline being that none of the professors had used performance assessment before. See each individual knowledge assessment analysis below.

Table B.2.1: Program Knowledge Content Assessments

	Administration 1		Administration 2		Administration 3	Administration 4
See pages noted for each analysis below on following pages.	Statistically Significant Gain (.05)		Statistically Significant Gain (.05) or performance		Statistically Significant Gain (.05)	
Orientation (p.2)	Baseline		Yes		NA	Yes
Course Analysis (p.3)	Baseline		Yes		NA	NA
Student Learning Outcomes (p.4)	Baseline		Yes		Yes	NA
Test Analysis (p.5)	Baseline		Knowledge increased, but not statistically sig. -No		Yes and Performance	Yes and Performance
Performance Assessment (p.6-13)	There was no traditional pretest, as professors had not used performance tasks or rubrics- performance assessment; therefore, they designed and developed 3 complex tasks and corresponding rubrics. Baseline data was -0-		Yes, this was performance based assessment, thus no statistical analysis. A rubric with standards and criteria was used. Professors performed to the top criteria for each standard on the rubric.		None. However, the scored rubrics returned to each individual student in each of the professors' classes were reviewed to determine the quality of the scored rubrics and feedback to students. The rubrics were consistent in scoring and appeared to be done appropriately. Professors were so impressed with performance assessment, they all reported that they would continue to use it in the experimental course and their other courses as well.	NA
Educational Research (p.14)	Baseline		Yes		No	NA

Clearly, the chart above reveals that the CEET Faculty Development on Teaching and Learning resulted in knowledge gain by the professors on teaching and learning. For individual data analyses, see each description below:

DISCUSSION OF PROFESSORS' CONTENT KNOWLEDGE ON PROGRAM ORIENTATION CONCEPTS

(see Program A.5; Instruments in C.1; Worksheets in C.1 - Scarborough)

Jerry Gilmer, Ph.D.

An assessment of the professors' general knowledge of the concepts covered during the program orientation was administered prior to the orientation on 2/2/06 and again after the orientation on 2/16/06. On Orientation Day, the Faculty Development Program was fully explained as well as the learning process to be used throughout the Program. The process of analysis, active, problem-centered, and performance based learning was described. Concepts, primary theories, and expected products were explained (e.g., Teaching Portfolios). Some of the primary theories or concepts introduced were learning styles, teaching models and styles, performance assessment and rubrics, test analysis and development. There was a strong emphasis on the Scholarship of Teaching and the National Call for Action by the Carnegie Foundation and Boyer (1990) for research on teaching and for educational research to count as scholarship alongside the other three types of scholarship – also explained. The argument about what professors are supposed to do, teach or research was mentioned. In addition, the concepts of Faculty Learning Communities and Circles were introduced and explained. The assessment was intentionally subjective and short answer so professors could express in their own words what they absorbed. The maximum number of points from the assessment is 23. The table below contains the professors' scores for both administrations of the assessment.

Table B.2.a.1

	Admin 1 (2/2/06)	**Admin 2 (2/16/06)**
Abdel-Motaleb	0	10
Azad	6	12
Coller	9.5	11
Gupta	1	6
Moraga	2	3.5
Rahn	5.5	13.5
Tatara	2	8
Mean =	3.71	9.14
SD =	3.39	3.52

The differences between the means across all seven professors from the different administration times were analyzed statistically and the results are presented in the table below. The significance levels are from a paired samples t-test on the data from seven professors (df = 6).

Table B.2.a.2

	Mean	**SD**	**Difference From Admin 1**	**Sig. Level**
Admin 1 (2/2/06)	3.7	3.4	--	**--**
Admin 2 (2/16/06)	9.1	3.5	5.4	**.004**

The data in the table indicate that the increase in scores between the two administrations was *statistically significant* at the .05 level of significance.

DISCUSSION OF PROFESSORS' CONTENT KNOWLEDGE ON COURSE ANALYSIS

(see Program A.5; Instruments in C.2; Worksheets in C.1 - Scarborough)

Jerry Gilmer, Ph.D.

An assessment of the professors' general knowledge of the concepts of Course Analysis was administered prior to the presentation of the concepts on 2/2/06 and again after the presentation of the concepts on 2/16/06. The Course Analysis process involved the professors in analyzing their courses and instructional practices for a wide variety of factors. They performed analyses to determine the quality of their course content (e.g., concepts, theories, information, and skills; underlying math and science requirements or general education needed to be successful in their course, and whether the content was factual, conceptual, procedural, or meta-cognitive). This aspect of the analysis also involved them in comparing the content to the ABET/NAIT standards and examining their course objectives and outcomes. The course content was prioritized into three categories, primary, secondary, and important to mention; they reconsidered or added a course timeline or schedule. Furthermore, the professors then analyzed their courses for instructional practices or teaching models and styles and student learning styles to determine their primary practices, determining what could be changed. They also analyzed their courses using Dale's Cone of Learning and Bloom's Taxonomy of Learning to determine the level of engaged or active learning as well as attempt to determine levels of critical thinking involved. The result was a GAPs Analysis Summary showing current course reality and identifying a wide realm of changes that could occur. Finally, another aspect of the analysis process was to examine their student learning assessments, identifying strengths and weaknesses through test analysis and then making the decision to add performance tasks and rubrics. This program component assessment was also subjective short answer to provide opportunity for professors to express what they absorbed in open-ended expression. The maximum number of points from the assessment is 12. The table below contains the professors' scores for both administrations of the assessment.

Table B.2.b.1

	Admin 1 (2/2/06)	**Admin 2 (2/16/06)**
Abdel-Motaleb	3	3.5
Azad	2	7
Coller	4.5	6
Gupta	4	4
Moraga	1	3
Rahn	5.5	9
Tatara	6	8
Mean =	3.71	5.79
SD =	1.82	2.34

The differences between the means across all seven professors from the different administration times were analyzed statistically and the results are presented in the table below. The significance levels are from a paired samples t-test on the data from seven professors (df = 6).

Table B.2.b.2

	Mean	**SD**	**Difference From Admin 1**	**Sig. Level**
Admin 1 (2/2/06)	3.7	1.8	--	**--**
Admin 2 (2/16/06)	5.8	2.3	2.1	**.019**

The data in the table indicate that the increase in scores between the two administrations was *statistically significant* at the .05 level of significance.

DISCUSSION OF PROFESSORS' CONTENT KNOWLEDGE ON STUDENT LEARNING OUTCOMES

(see Program A.5; Instruments in C.2; Worksheets in C.1 - Scarborough)

Jerry Gilmer, Ph.D.

An assessment of the professors' general knowledge of the concepts in Student Learning Outcomes was administered three times: prior to the presentation of the concepts on 3/23/06, after the presentation of the concepts on 5/15/06, and again at the conclusion of the program training sessions on 5/24/06. This program component engaged the professors in further analysis of their current course student learning objectives or outcomes. This involved them in identifying the appropriate ABET/NAIT standards and then in the development of student learning outcomes. As part of the learning process, the history of learning objectives, outcomes, behavioral objectives, etc., and the language and definitions leading up to the use of learning outcomes were presented so the engineering and technology professors could grasp the meaning and controversy more deeply. Although another subjective and open-ended short answer assessment, the assessment did require them to try to remember some definitions and meanings. The maximum number of points from the assessment is 13.5. The table below contains the professors' scores for both administrations of the assessment.

Table B.2.c.1

	Admin 1 (3/23/06)	Admin 2 (5/15/06)	Admin 3 (5/24/06)
Abdel-Motaleb	2	4.5	7.5
Azad	1.5	5	4
Coller	2	10	9
Gupta	5.5	6	6.5
Moraga	1.5	4	4
Rahn	5.5	9.5	11.5
Tatara	4	9.5	10.5
Mean =	3.14	6.93	7.57
SD =	1.82	2.64	2.96

The differences between the means across all seven professors from the different administration times were analyzed statistically and the results are presented in the table below. The significance levels are from paired samples t-tests on the data from seven professors (df = 6).

Table B.2.c.2

	Mean	SD	Difference From Admin 1	Sig. Level
Admin 1 (3/23/06)	3.1	1.8	--	**--**
Admin 2 (5/15/06)	6.9	2.6	3.8	**.006**
Admin 3 (5/24/06)	7.6	3.0	4.4	**.003**

The data in the table indicate that the increase in scores between the first administration and the other two administrations was *statistically significant* at the .05 level of significance.

DISCUSSION OF PROFESSORS' CONTENT KNOWLEDGE ON TEST ANALYSIS

(see Program A.5- and Instruments in C.2 - Gilmer)

Jerry Gilmer, Ph.D.

A knowledge test covering the test analysis content was administered to the professors four times: immediately prior to the test analysis teaching sessions (2/16/06), immediately after the test analysis sessions (3/30/06), immediately after the conclusion of the formal teaching sessions (5/15/06), and at the end of the semester during which the professors where practicing the concepts learned (12/15/06). A short review of the test analysis content occurred just prior to the administration of the test on 5/15/06. The maximum number of points from the test is 10. The table below contains the professors' scores for each administration of the test.

Table B.2.d.1

	Admin 1 (2/16/06)	Admin 2 (3/30/06)	Admin 3 (5/15/06)	Admin 4 (12/15/06)
Abdel-Motaleb	3	4	7	4
Azad	3	7	4	6
Coller	2	10	10	8
Gupta	4	4	7	7.5
Moraga	6	3	7	7
Rahn	2	10	8	8
Tatara	5	6	5	8
Mean =	3.6	6.3	6.9	6.9
SD =	1.5	2.9	1.9	1.5

The differences between the means across all seven professors from the different administration times were analyzed statistically and the results are presented in the table below. The significance levels are from paired samples t-tests on the data from seven professors (df = 6).

Table B.2.d.2

	Mean	SD	Difference From Admin 1	Sig. Level
Admin 1 (2/16/06)	3.6	1.5	--	**--**
Admin 2 (3/30/06)	6.3	2.9	2.7	**.134**
Admin 3 (5/15/06)	6.9	1.9	3.3	**.025**
Admin 4 (12/15/06)	6.9	1.5	3.4	**.005**

The data in the table indicate that, although the professors' knowledge in test analysis concepts increased from the first administration to the second, the increase was *not statistically significant* at the .05 level of significance. However, the professors' knowledge gains after the 5/15/06 review and after they had an opportunity to apply the knowledge in their own classrooms were statistically significant compared to the first, pre-teaching, administration.

DISCUSSION OF PROFESSORS' CONTENT KNOWLEDGE ON PERFORMANCE ASSESSMENT
PERFORMANCE TASK AND RUBRIC DEVELOPMENT
(see Program A.5 and Instruments in C.2 - Scarborough)
(pages 6-13; Educational Research follows on page 14)
Jule Dee Scarborough, Ph.D.

The learning and professional growth on the Performance Assessment program or knowledge component was measured by the professors' performance on the task of designing and developing three complex performance tasks and three corresponding rubrics for scoring task achievement. Using the Rubrics below as guiding criteria, they each designed three complex performance tasks and corresponding rubrics. These assessments were added to their course as new assessment strategies and assessment procedures.

It is important to note that one performance task/rubric was designed to correspond with the midterm and another to correspond with the final exam using the logic that objective tests usually reflect what students know or know about rather than what they can do. Therefore, we used an unusual scenario where the professors "linked" the objective midterm exam to a midterm performance task/rubric and an objective final exam to a final performance task/rubric. They also developed a third performance task/rubric and choose how and when to use it. They were asked to "match" where they thought the test items and performances "overlapped" and measured the same or similar content. It was assumed from studying the literature that performance assessment measures different aspects of learning, sometimes deeper levels of learning through use of knowledge in more active or engaging ways, problems, projects, etc. But performance assessment can also measure some of the same aspects of learning as objective tests. Also some of the professors designed their tests to incorporate some level of performance in subjective or problem-based items. In examining the tests and analyzing them, the objective items were separated from the more performance-based items. Professors were provided a presentation about Performance Assessment. Performance Tasks and Rubrics were discussed, and they received a portfolio of sample tasks and rubrics. They were given books on the topic as part of their new library on teaching and learning.

Their performance tasks and rubrics reflect the ABET or NAIT standards with corresponding rubrics. Perhaps one professor had used simple and less formalized rubrics before, but none of the professors had developed or used formal, written, scenario-based performance tasks with corresponding rubrics before this initiative. Thus, there were no previous instruments to view from the baseline semester, Fall 2005, and compare to these. Therefore, we judged them based upon the Rubrics below.

Performance Task: Design and develop three complex performance tasks with corresponding rubrics. The tasks must be based upon the ABET outcomes or NAIT standards and corresponding student learning outcomes for the course; they must also reflect real world, authentic performances or tasks in the appropriate community of practice, e.g. industry. The performance tasks and rubrics must be used to measure student learning

in the experimental research course, Fall 2006. See the **Rubrics** below for the achievement criteria to use in accomplishing the task.

Professors' Performance: The professors accomplished the performance task well. The process involved drafting initial and authentic real world scenarios with embedded task clusters and a corresponding rubric instrument for each task (3). The program leader provided feedback one-on-one as the performance tasks were developed. The professors shared their drafts with each other and benefited from the group critique process. The group process worked especially well. The tasks and rubrics were finalized; the program leader approved them; and then, each professor used the tasks and corresponding rubrics successfully with students during the 2006 experimental research semester. After the semester was completed, the professors copied all rubrics returned to each student in their classes for all three performance tasks. The program leader reviewed the scored/with comments rubrics that each student received back from the professors. Thus, the use of the rubrics was also reviewed. Finally, the professors completed a feedback/evaluation form about the use of performance assessment for the first time. As with test analysis and development, the feedback from the professors on the value of learning to design, develop, and use performance tasks/rubrics was extremely positive.

The following rubrics were used to guide the professors in the development of the three performance tasks and corresponding rubrics for each task.

Also, the feedback and evaluation questionnaire and professor responses are provided below, following the rubrics. The faculty members truly felt that expanding their assessments to include performance tasks with rubrics was extremely positive. They all indicated that they will continue to use performance assessment, tasks and rubrics, and also expand the use of performance assessment to other courses.

Rubric for Assessing the Quality of a Performance Task

Key Components - Properly Designed Performance Tasks must

I. Be based on content standards established by ABET or NAIT
II. Describe a "real-life" scenario; are real world, authentic tasks; require active performances
III. Involve students in complex reasoning – critical thinking at upper levels of Bloom's Cognitive Dimension
IV. Require students to collect and process information, using it for an authentic purpose
V. Incorporate "habits of mind"
VI. Require student collaboration and cooperation; incorporates "individual" and "group" learning and performance accountability
VII. Result in a tangible product and/or communication activity

For each component, there are descriptors reflecting levels of achievement possible:

I. The Performance Task is based on the ABET or NAIT standards
a. The Performance Task is directly related to the ABET or NAIT standards.
b. Learning standards are apparent, but the relation to the task and/or national standards is sketchy or not apparent.
c. The Performance Task does not appear to be based on the standards/outcomes, course or national.

II. The Performance Task describes a "real-life" scenario that is authentic and requires active performance.
a. The scenario described in the task accurately mirrors an activity in the community of practice outside the classroom.
b. The scenario described in the task simulates an activity in the community of practice outside the classroom.
c. The scenario described in the task contains some aspects of activity outside the classroom but is largely contrived.
d. The scenario described in the task is an academic exercise that usually takes place only in the context of an academic setting.

III. The Performance Task involves students in complex reasoning-critical thinking processes at upper levels of Bloom's Cognitive Dimension.
a. The task requires students to utilize complex reasoning – critical thinking skills, such as induction/deduction, diagnosis, abstracting, experimental inquiry, problem solving; evaluation, creation, synthesis, etc.
b. The task requires students to utilize complex reasoning components, such as comparing, classifying, decision making, or investigation.
c. The task requires students only to recall facts.

IV. The Performance Task requires students to collect and process information, using it for an authentic purpose.
a. The task incorporates a variety of information gathering techniques and information resources. Students are required to interpret and synthesize information and accurately assess the value of information gathered. They are required to collect the right information for an authentic purpose, e.g. solve a problem, apply or use in a complex project, etc.
b. The task requires students to gather and synthesize information, but the value of the information gathered is not assessed. Information may not be used for a purpose.
c. The task requires the students to gather information, but not to interpret it.
d. The task requires no gathering or processing of information.

V. The Performance Task incorporates "Habits of Mind."
a. The task requires students to make effective plans, use necessary resources, evaluate effectiveness of their own actions, seek accuracy, and engage in activities when answers or solutions are not immediately apparent.
b. The task only requires students to effectively plan or use resources.
c. The task does not require students to engage in self-regulation, critical, or creative thinking.

VI. The Performance Task requires student collaboration and cooperation; incorporates "individual" and "group" learning and performance accountability.
a. The task requires students to use interpersonal skills, work toward the achievement of team goals, and perform a variety of roles within the team. There is a formal team structure and process.
b. The task requires students to work together in teams but there are no measures described that ensure collaboration or cooperation among team members.
c. The task is completed largely by students on an individual basis rather than in student teams.

VII. The Performance Task results in a tangible product and/or communication activity.
a. The task result is a tangible product or communication activity comparable to that commonly produced in business or industry community of practice.
b. The task results in a product that is similar to those completed in business or industry community of practice, but lacks several components that make the product realistic.
c. The task does not result in a product or communication activity relevant to a business or industry community of practice.

(Scarborough, 2006 [Based upon White & Scarborough, 2004])

Rubric for Assessing the Quality of a Rubric

Properly Designed Rubrics Must

- **I. Contain a set of key components/standards to be assessed that reflect the student learning outcomes for the course, which are directly linked to the national outcomes.**
- **II. Include descriptors for each component/standard that are measurable.**
- **III. Have descriptors-criteria that are indicative of observable student performances or behaviors.**
- **IV. Incorporate a clear and well-defined scoring system**
- **V. (Optional) Include appropriate weights for each component and descriptor**

For each component, there are descriptors reflecting levels of achievement possible:

I. The rubric contains a set of key components (standards) to be assessed.

a. A complete list of key components-standards is provided for the performance task, including the embedded subtasks, if a cluster. The task(s) are directly connected to student learning outcomes for course and the national outcomes.

b. Key components/standards listed are not exhaustive for the performance task and/or subtasks embedded are not clear enough for student response or action; components or standards are not clearly connected to student learning outcomes for course.

c. Not all key components/standards describe student outcomes; some are not directly linked to national outcomes.

d. No key components are listed.

II. The rubric includes a set of descriptors-criteria for each key component or standard.

a. Descriptors-criteria for each component or standard are arranged in a clear hierarchy from non-achievement to full-achievement.

b. Descriptors-criteria are present for each component/standard, but obvious levels in some are missing.

c. Each component does not have an associated set of descriptors-criteria.

III. The rubric descriptors/criteria are clear and contain observable or measurable student performances or behaviors.

a. All descriptors-criteria clearly delineate levels of observable student performances or behaviors.

b. Most descriptors-criteria clearly delineate levels of observable student performances or behaviors.

c. Only a few descriptors-criteria clearly define levels of observable student performances or behaviors.

d. Descriptors-criteria do not describe observable student performances or behaviors.

IV. **Incorporate a clear and well-defined scoring system**

a. There is a well defined and clear system for scoring each component-standard and its descriptors-criteria. Points or percentages are assigned appropriate to instructional and performance values.

b. The scoring system lacks definition, clarity, and although there is a scoring system, some aspects are ambiguous, subjective or unclear.

c. There is no scoring system.

V. Optional: Appropriate weights are assigned to components and descriptors.

a. Component-standards and descriptors-criteria are each properly weighted according to instructional emphasis and performance values.

b. Weights are assigned, but point values do not reflect proper instructional emphasis or performance values in all cases.

c. Weights are assigned to some performance standards and descriptors, but not others.

(Scarborough, 2006 [Based upon White & Scarborough, 2004])

CEET Initiative on Teaching and Learning - Performance Assessment Feedback, Jan, 2007

(7/7 respondents)

1. Was the time spent developing <u>performance</u> <u>tasks</u> worth your time – worthwhile?

(7) Yes Not really

Why?

- *"A lot of work, but they really engage students"*
- *"Allowed me to think about what students should be able to perform after completing the course."*
- *"Invaluable." "Although I always give 'projects', I was naïve to many of the aspects of a true performance task."*
- *"Performance tasks made students (1) solve open ended problems; (2) work in groups; (3) identify problems and try to have multiple solutions and then justify the solution."*

2. Was the time spent developing <u>rubrics</u> for scoring the performance tasks worth your time – worthwhile?

(7) Yes Not really

Why?

- *"Students knew what was expected of them; grading was a bit easier; fewer students challenged their grades."*
- *"Allowed me to set expectations from the PAs."*
- *"The students really responded well to them! They liked knowing the expectations for performance tasks."*
- *"I didn't have this experience before."*
- *"Rubrics helped students understand what is expected of them and how they will be graded."*

3. Would you <u>recommend</u> the <u>performance task</u> program content for other faculty members?

(7) Yes Not really

Why?

- *"Valuable"*
  "It will be a good exercise for others."
- *"I think any new faculty should be exposed to this experience."*
- *"I feel students learned a lot because of the performance tasks."*

4. Would you recommend the rubric program content for other faculty members?

(7) Yes Not really

Why?

- *"It will be a good exercise for others."*
- *"This, I believe, is a necessity."*

5. Were the performance tasks a beneficial addition to the student assessment plan for your course?

(7) Yes Not really

Why?

- *"It was another dimension of assessment. Some students who did not do well on tests…really shined in performance."*
  "Provides additional form of assessment method."
- *"It added a new dimension of student assessment; also these performances tasks involved various learning styles."*

6. Were the rubrics beneficial for scoring the performance tasks?

(7) Yes Not really

Why?

- *"Students knew what was expected of them; grading was a bit easier; fewer students challenged their grades."*
- *"Makes the scoring process easier."*
- *"It made it easier for me – and the students also responded well. IT is necessary to have a procedure mapped out for them to understand the expectations and levels."*
- *"They make grading progress easier."*
- *"Otherwise, it would be very subjective or arbitrary."*

7. Were the performance tasks an effective tool for enhancing student learning?

(7) Yes Not really

Why?

- *"Bigger, more authentic tasks."*
- *"Students can demonstrate what they can perform after completing the course."*
- *"(1)It allowed for many more teaching styles to be incorporated in the course; (2) more learning styles were also included; (3) a good tool for group work as well."*
- *"They really understand expectations."*
- *"Students' learning involves various learning and teaching style, and models and performance tasks provided these opportunities."*

8. Were the performance tasks an effective tool for measuring student learning?

(7) Yes Not really

Why?

- *"It was another dimension of assessment. Some students who did not do well on tests…really shined in performance."*
- *"Students can demonstrate what they can perform after completing the course."*
- *"(1) It demonstrated their abilities to communicate effectively; (2) It demonstrated their abilities to synthesize, apply, and evaluate subject matter content."*
- *"Students' learning may not be completely assessed by only exams and homework."*

9. Were the rubrics an effective tool for scoring the outcomes of student performances on the tasks?

(7) Yes Not really

Why?

- *"It was another dimension of assessment. Some students who did not do well on tests…really shined in performance."*
- *"See previous comments."*
- *"Rubrics provide the details of expected outcomes."*

10. Were the rubrics effective in helping students to understand more about what you expected them to do by revealing the standards and scoring mechanism with them up front?

(7) Yes Not really

Why?

- *"It was another dimension of assessment. Some students who did not do well on tests…really shined in performance."*
- *"Students know the expectations."*
- *"See previous comments."*
- *"They know what is expected of them."*

11. Do you feel that more formalized performance tasks and rubrics improve the opportunity for students to provide evidence of learning?

(6) Yes (1) Not really

Why?

- *"It was another dimension of assessment. Some students who did not do well on tests…really shined in performance."*
- *"Not everyone is good in taking tests. Also exams and homework do not provide the opportunity through performance tasks."*
- *"Two is enough."*

12. Would you <u>recommend</u> that other faculty members get the opportunity to learn to develop and use performance tasks and rubrics as student assessment tools?

(7) Yes Not really

Why?

- *"I believe this was one of the <u>most</u> beneficial aspects of the program with regard to student learning and assessment. It ties in with active learning and Bloom's Taxonomy."*
- *"It was a big help for me."*

13. Was the performance/rubric development process used with this group – *"developing while learning from presentation, examples, and one-on-one feedback"* - effective?

(7) Yes Not really

Why?

- *"One-on-one feedback especially helpful."*

14. Will you <u>continue</u> to use <u>performance</u> <u>tasks</u> and <u>rubrics</u> in this and/or other classes?

(7) Yes Not really

Why?

- *"To improve student learning."*

15. Strengths of the performance task/rubric program component.

- *"Already stated in above [responses]."*
- *"Measures what students can really perform with their learned tools."*
- *"Quantified student performance; gave students guidance and goals."*
- *"I liked the development of the Performance Tasks, especially with the rubric. Discussions were enlightening, as well as our group discussions and evaluations."*
- *"Very good way in presenting material; Different styles of rubrics presented; also working in our same classes helped to learn how to do rubrics and performances."*
- *"Provide other teaching styles, learning styles, and teaching models."*
- *"Allow for active learning. Results show improvement when Performance Tasks were done in groups."*

16. Areas to improve in the performance task/rubric program component.

- *"Revisit and revise."*
- *"None."*
- *"Streamline the time scale."*
- *"Good as is."*

17. General comments:

- *"This part was exceptional—I will always use this info in my classes in the future."*
- *"Very good program."*

"Results indicate conclusively that learning level was enhanced [by students in experimental

DISCUSSION OF PROFESSORS' CONTENT KNOWLEDGE ON EDUCATIONAL RESEARCH

(see Program A.5 and Instruments in C.2 - Gilmer)

Jerry Gilmer, Ph.D

A knowledge test covering research topics was administered to the professors three times: immediately prior to the research teaching sessions (5/25/06), the same day immediately after the research sessions (5/25/06), and at the end of the semester during which the professors were practicing the concepts learned (12/15/06). The maximum number of points from the test is 14. The table below contains the professors' scores for each administration of the test.

Table B.2.f.1

	Admin 1 (5/25/06)	Admin 2 (5/25/06)	Admin 3 (12/15/06)
Abdel-Motaleb	0	9	8
Azad	2	5	3
Coller	7	11	11
Gupta	5	14	9
Moraga	8	9	6
Rahn	--	--	11
Tatara	5	11	7
Mean =	4.5	9.8	7.9
SD =	3.0	3.0	2.9

The differences between the means across the professors from the different administration times were analyzed statistically and the results are presented in the table below. The significance levels are from paired samples t-tests on the data from six professors (df = 5).

Table B.2.f.2

	Mean	SD	Difference From Admin 1	Sig. Level
Admin 1 (5/25/06)	4.5	3.0	--	**--**
Admin 2 (5/25/06)	9.8	3.0	5.3	**.010**
Admin 3 (12/15/06)	7.3	2.7	2.8	**.095**

The data in the table indicate that the increase in the professors' knowledge on research topics from the first administration to the second was statistically significant beyond the .05 level of significance. However, the professors' knowledge tended to decline slightly during the semester in which they were applying the knowledge in their own classrooms, rendering the difference between Admin 1 and Admin 3 not statistically significant.