Progress Report
to the
Middle States Commission on Higher Education
from
THE CITY COLLEGE OF NEW YORK
New York, NY 10031

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October 1, 2011

Subject of the Follow-Up Report:
To acknowledge receipt of the substantive change request and to include the following Ph.D. programs within the scope of the institution's accreditation: Biology, Biochemistry, Biomedical Engineering, Chemical Engineering, Chemistry, Civil Engineering, Electrical Engineering, Mechanical Engineering, and Physics. To request a progress report, due by October 1, 2011, documenting (1) the use of appropriate assessments of the attainment of learning goals at the institutional and course levels for the doctoral programs and (2) evidence that student learning assessment information is used to improve teaching and learning in the doctoral programs (Standard 14). The Periodic Review Report is due June 1, 2013.

Date of the Evaluation Team's Visit: April 13-16, 2008

PROGRESS REPORT

INTRODUCTION

As a result of the substantive change request submitted by The City College of New York (CCNY) on March 16, 2010, the Middle States Commission on Higher Education (MSCHE) included the following Ph.D. programs within the scope of the institution's accreditation in its letter dated June 29, 2010: Biology, Biochemistry, Biomedical Engineering, Chemical Engineering, Chemistry, Civil Engineering, Electrical Engineering, Mechanical Engineering, and Physics. The Commission requested that CCNY report its progress, documenting (1) the use of appropriate assessments of the attainment of learning goals at institutional and course levels for the doctoral programs and (2) evidence that student learning assessment information is used to improve teaching and learning in the doctoral programs (Standard 14).

This report responds to the Commission's request.

BACKGROUND

DOCTORAL EDUCATION IN ENGINEERING AT THE CITY COLLEGE OF NEW YORK

On August 19, 2008, Governor David A. Paterson authorized The City College of New York to grant doctoral (Ph.D.) degrees in five engineering programs. This resolution was approved by the Faculty Senate of The City College of New York on May 17, 2007, followed by the CUNY Board of Trustees on February 25, 2008, and then by the New York State Board of Regents and the State Education Department. The change was effective in Fall 2008. The affected doctoral programs are: Biomedical Engineering (HEGIS Code 0905.00, Program Code 32554); Chemical Engineering (HEGIS Code 0906.00, Program Code 32556); Civil Engineering (HEGIS Code 0908.00, Program Code 32560); Electrical Engineering (HEGIS Code 0909.00, Program Code 32558); and Mechanical Engineering (HEGIS Code 0910.00, Program Code 32552).

This change formalized what had been the *de facto* organization of engineering doctoral education at CCNY and CUNY since 1963. Although the Graduate Center follows a consortial model for its doctoral education, involving active participation by doctoral faculty from across the CUNY campuses, the engineering program with its five departments has been, from its inception, located at only one campus – The City College; no other CUNY campus offers doctoral engineering education. In the forty plus years since its inception, the campus-based

doctoral engineering program at CCNY has grown substantially, and now involves more than 100 nationally and internationally renowned faculty and research associates working with about 200 talented and engaged students.

DOCTORAL EDUCATION IN SCIENCE AT THE CITY COLLEGE OF NEW YORK AND THE CUNY GRADUATE CENTER

Also on August 19, 2008, Governor David A. Paterson authorized The City College of New York and the CUNY Graduate Center to jointly grant doctoral (Ph.D.) degrees in four science programs. This resolution was also approved by the Faculty Senate of The City College of New York on May 17, 2007, the CUNY Board of Trustees on February 25, 2008, and by the New York State Board of Regents and the State Education Department. The change was effective in the Fall of 2008. The affected doctoral programs are: Biology (HEGIS Code 0401.00, Program Code 32541); Biochemistry (HEGIS Code 0414.00, Program Code 32542); Chemistry (HEGIS Code 1905.00, Program Code 32543); and Physics (HEGIS Code 1902.00, 32544).

In contrast to engineering, joint CUNY & CCNY degree-granting authority for doctoral education in the sciences follows the consortial model, which involves active participation by doctoral faculty from across the CUNY campuses. However, CCNY alone of all the CUNY consortial participants has been granted the authority to offer *joint* Ph.D. degrees in the sciences with CUNY's Graduate School in recognition of CCNY's unique strengths in science doctoral education.

RELEVANCE OF THE TWO MODELS TO THIS REPORT

The primary purpose for the restructuring plan was to enable The City College to be publicly recognized for the doctoral education that is conducted on its campus and to enhance its academic profile. It was also intended to enhance CCNY's ability to showcase its doctoral programs to federal funding agencies, private corporations, and foundations in order to secure direct financial support for doctoral-level education, allowing it, for example, to qualify for IGERT grants. The new structure was also expected to significantly improve opportunities for CCNY to attract, support and retain first-class doctoral-level faculty as well as outstanding doctoral students.

The differences in the two models of doctoral education at CCNY will necessarily lead to two avenues of assessment.

For the programs in science, the curriculum remains the responsibility of the doctoral faculty and curriculum committees of the CUNY Graduate Center; learning outcomes assessment of those programs remains within its purview as well. As a result, assessment of the programs in science will be included in the progress report requested by MSCHE from CUNY's Graduate Center due April 1, 2012. In its letter dated August 10, 2011, the CUNY Graduate Center confirmed its intention to include the science programs in its progress report (Appendix I).

As a fundamental component of the consortial model in science Ph.D. education, the CUNY Graduate Center and CCNY are in constant communication regarding assessment. The Graduate Center's Office of Institutional Research and Program Evaluation and the CCNY's Office of the Provost provide leadership in the institutional research and program evaluation functions. They design and conduct research studies, provide analyses of institutional data, communicate the results of research to the campus community, and manage the doctoral programs' external reviews. As members of the doctoral faculty, CCNY faculty participate fully in these assessment activities and in the activities of the CUNY Assessment Council.

In contrast, the engineering Ph.D. programs are entirely located at CCNY, and their assessment is conducted fully within the Grove School of Engineering. Therefore, the remainder of this report deals with the progress in learning outcomes assessment in the Ph.D. programs in Biomedical Engineering (BME), Chemical Engineering (CHE), Civil Engineering (CE), Electrical Engineering (EE), and Mechanical Engineering (ME).

The scope of this report was discussed and confirmed in a telephone conversation between Ms. Leslie Galman, CCNY's Accreditation Liaison Officer, and Dr. Mary Ellen Petrisko, Vice President, MSCHE, on March 2, 2011.

SIGNIFICANT DEVELOPMENTS

This report addresses the progress in learning outcomes assessment in the Ph.D. programs in Biomedical Engineering (BME), Chemical Engineering (CHE), Civil Engineering (CE), Electrical Engineering (EE), and Mechanical Engineering (ME) (the Ph.D. program in Computer Science continues to operate under the consortial model through the Graduate Center and is therefore not addressed in this report).

In the substantive change request, the GSOE indicated that it did not anticipate a change in faculty, curricula or admission requirements as a result of the program transfer; this has proven to be the case. Student enrollment was projected to decrease from approximately 200 students to a maximum of 150 full-time students through a targeted reduction in part-time enrollment. Full-time enrollment is associated with higher standards for the degree, improved time to degree, and more stable funding for student support.

In Fall 2008, the GSOE admitted its first group of 26 Ph.D. students. As of Fall 2010, there were 118 Ph.D. students at CCNY and 85 still completing their degrees at the Graduate Center. Since no new engineering Ph.D. students have been admitted to the Graduate Center since Fall 2008, this number will decline to zero. Table 1a shows enrollment from Fall 2004 to Fall 2010.

Table 1a: Enrollment in Ph.D. programs in Engineering, Fall 2004-Fall 2010

	FALL 2004	FALL 2005	FALL 2006	FALL 2007	FALL 2008	FALL 2009	FALL 2010
Biomedical Engineering					5	11	21
Civil Engineering					6	12	18
Chemical Engineering					6	14	26
Electrical Engineering					7	22	32
Mechanical Engineering					2	10	21
Total at GSOE					26	69	118
Total at Grad Center	201	193	202	194	160	130	85

The first Ph.D. student from the Grove School of Engineering is expected to graduate in Spring 2012.

The important parameters for the Ph.D. programs are enrollment, number of graduates, and time-to-degree. There is very little attrition in the engineering Ph.D. program. The cohort of Fall 2008, the first to enter the GSOE, appears to be an anomaly; the cohort of Fall 2009 shows the usual high retention rate. An overview of first- and second-year retention of the doctoral students registered at the GSOE is shown in Table 1b. The attainment of level 2 (passing the qualifying exam and completion of at least 45 credits) and level 3 (passing of the second exam, mastery of "tools of research," and completion of 60 credits) is higher for the Fall 2009 cohort than for the Fall 2008 cohort (Table 1c). This is encouraging news.

Table 1b: Number and percentage of doctoral students at GSOE retained in the second and third year

Cohort	Number in Cohort	Retained in 2nd year	Retained in 3rd year
Fall 2008	26	17 (65 %)	17 (65 %)
Fall 2009	49	46 (94 %)	
Fall 2010	53		

Table 1c: Number and percentage of doctoral students at GSOE and level obtained by the second and third year

Cohort	Number in Cohort	Level 2 or 3 in 2nd year	Level 2 or 3 in 3rd year
Fall 2008	26	4 (15 %), 0 in level 3	9 (35 %), 3 in level 3
Fall 2009	49	13 (28 %), 3 in level 3	
Fall 2010	53		

The majority of Ph.D. students graduate, with an average time to degree of six years (Table 1d). The challenge is to ensure that students graduate in a timely manner, and we expect that the systematic learning assessment described in this report will help achieve that goal.

Table 1d: Number and percentage of Ph.D. graduates by time to degree (2007-2011)

Time to Degree	Number of Students	% of Total Graduates
4 years or less	11	9.9
4.5 to 5 years	33	29.7
5.5 to 6 years	31	27.9
6.5 to 7 years	19	17.1
7.5 to 8 years	7	6.3
8.5 years or more	10	9.0
Total Graduates	111	100.0

PROGRESS TO DATE AND CURRENT STATUS

This section addresses the organizational structure and resources for a sustained and organized learning outcomes assessment process for the Ph.D. programs, the progress in formulating and implementing multi-year assessment plans, evidence showing the use of assessment results to improve teaching and learning, and challenges being addressed.

SUBSTANTIVE SUMMARY

The Grove School of Engineering has a strong organizational structure and provides ample resources and expertise to support a sustained and organized learning outcomes assessment process for the recently incorporated doctoral programs in Engineering.

All departments have formulated and aligned missions, educational objectives, and program learning outcomes for their Ph.D. programs. They have developed tools (Appendix 3,6,7, and 8) to assess the program learning outcomes for the first and second exams and the dissertation defense. They are in the process of reviewing learning outcomes for their graduate courses and aligning them with the program outcomes. We expect to complete this process in Spring 2012.

All departments have drafted assessment plans addressing:

1. Departmental mission, program, and course learning outcomes;
2. Outcomes for the qualifying exam, proposal (second exam), and dissertation;
3. Alignment of courses and exams with program outcomes;
4. A timeline for assessment;
5. Assessment instruments (direct and indirect); and
6. Application of results for improvement.

Plans are to be completed and adopted by the faculty during the Fall 2011 semester.

Pilot studies have been conducted for direct assessment of the qualifying exam, proposal and dissertation for both the students at GSOE and for the engineering Ph.D. students at the Graduate Center. In addition, the Department of Civil Engineering conducted an "End-of-Course Survey" in one course, which is modeled on similar surveys being used in the undergraduate courses (Appendix 7). To ensure regular communication between student and advisor about goals to be formulated and completed in each semester, a "graduate student progress review form" was developed and is currently being implemented. The form will provide additional assessment data.

Assessment results from existing indirect assessments (alumni survey and employer input) have been used for many years at the Graduate Center. The GSOE has taken over the state-mandated alumni survey from the Graduate Center. In addition, direct assessment of learning outcomes is now taking place through systematic data collection at the qualifying exam, proposal evaluation and dissertation levels.

DISCUSSION

"The Grove School of Engineering has a strong organizational structure and provides ample resources and expertise to support a sustained and organized learning outcomes assessment process for the recently incorporated doctoral programs in Engineering."

In October 2010, the Grove School of Engineering hosted an ABET accreditation visit for its undergraduate programs. Since the early 2000s, ABET accreditation has required that each program provide a self-study, documenting the program's educational objectives, program and course learning outcomes, program assessment and evidence that assessment is used to improve the program. During the accreditation visit, evidence, including randomly selected student transcripts and student work, is inspected by the visiting team. This thorough review ensures that all GSOE faculty members are well-acquainted with learning outcomes assessment, that all undergraduate courses and syllabi have student-centered learning outcomes that are aligned with program outcomes, and that the learning outcomes are assessed on a regular basis, both directly and indirectly. A culture of assessment was already in place when the GSOE initiated learning outcomes assessment in their Ph.D. programs.

Each GSOE department with a Ph.D. program has appointed one to three faculty members who, together with the Department Chair, are responsible for the assessment of their Ph.D. program. The Office of Assessment and Information Support (OASIS) works closely with the departmental assessment liaisons and the Office of Graduate Studies to coordinate, support and document assessment activities and results.

"All departments have formulated and aligned missions, educational objectives and program learning outcomes for their Ph.D. programs. They have developed tools to assess the program learning outcomes for the first and second exams and the dissertation defense. They are in the process of reviewing learning outcomes for their graduate courses and aligning them with the program outcomes."

Mission statements, educational objectives and learning goals for the first and second exams and criteria for the thesis were already in place for the doctoral programs in engineering at the Graduate Center, and there has been no change in mission, objectives, and goals since then. However, although the student's achievement of each of the learning goals was considered by the exam committee, the final assessment measure generally resulted in an overall evaluation of "Pass" or "Fail." Detailed information on achievement of separate learning outcomes was not systematically collected and analyzed. Therefore, assessment forms have been developed that ask the examiner(s) to indicate to what extent the examinee achieved each of the learning outcomes, with an option to add comments not covered by the stated outcomes. Appendix 3 contains the assessment forms. Appendix 4 contains sample syllabi for graduate courses showing learning outcomes. Learning outcomes for the remainder of the graduate courses are to be finalized during AY 2011-2012. Given the nearly 100% compliance for inclusion of learning outcomes on the undergraduate syllabi, there is a high degree of confidence that the same degree of compliance for the graduate syllabi will be achieved.

"All departments drafted assessment plans addressing:

1. *Departmental mission, program and course learning outcomes;*
2. *Outcomes for the qualifying exam, proposal (second exam), and dissertation;*
3. *Alignment of courses and exams with the program outcomes;*
4. *A timeline for assessment;*
5. *Assessment instruments (direct and indirect); and*
6. *Application of results for improvement.*

The plans are to be completed and adopted by the faculty during the Fall 2011 semester. "

The plans follow a common template developed by the Director of Assessment in cooperation with department chairs and faculty. The plans embed assessment firmly in existing policies and procedures and provide a continuous process for improvement. Table 2 shows the projected timetable for completion. Appendix 5 contains the draft assessment plan and timeline for Civil Engineering (other programs have similar plans).

Table 2: Doctoral Program Assessment Plan as of August 1, 2011

Plan Element	Stage of Completion
1. Departmental mission, program and course learning outcomes	Mission and program outcomes for all doctoral programs have been completed, course learning outcomes are partially completed and expected to be completed for all courses during AY 2011-2012.
2. Outcomes for the qualifying exam, proposal (second exam), and dissertation	Completed
3. Alignment of courses and exams with the program outcomes (grids)	Exam alignment completed. Course alignment in progress, as a process of making explicit the role of course work in preparing the student to achieve the learning outcomes in the first and second exams
4. Timeline for assessment	Completed
5. Assessment instruments (direct and indirect)*	Pilot instruments for direct assessment have been developed and tested in Spring 2011 at the first and second exams and dissertation defense. A mandatory alumni survey is adopted from the Graduate Center and is under review. A "Graduate Student Progress Review Form" (Appendix 5), to be used by faculty advisors on a regular basis, has been drafted and will be piloted in Fall 2011. An End-of-Course survey was piloted for a Civil Engineering course in Spring 2011 (Appendix 6).
6. Application of results for improvement	In progress. For now, results are used to refine the assessment instruments and process, but ultimately, results are to be used to improve student success in the doctoral program, e.g., graduation rates, time to degree, and level of achievement of the learning outcomes. The assessment results will also be used to improve the curriculum and to aid decision making about resource allocation and improvement of institutional processes, e.g., advising and registration, tracking of student progress, etc.

*In developing the assessment instruments, we started out with a survey of what other institutions had done; we particularly liked the way the University of Virginia School of Engineering and Science (SEAS) embedded learning outcomes assessment in the student advising and evaluation process. This approach ensures regular feedback to the student and his/her advisor, and as such can already be considered an improvement of the advising process, but at the same time it provides useful assessment data that can be easily aggregated and analyzed. It also ensures an efficient, simple, useful and sustainable assessment process, enabling us to assess not only *learning* (knowledge, skills and competencies), but also the *creating* that is so characteristic of doctoral study (Caramello, 2010).

USE OF RESULTS

"Pilot studies have been conducted for direct assessment of the qualifying exam, proposal and dissertation, both for students at GSOE and for Ph.D. students at the Graduate Center. In addition, the Department of Civil Engineering conducted an "End-of-Course Survey" in one course, which is modeled on similar surveys being used for the assessment of student learning in the undergraduate courses in Engineering."

As of the writing of this report, 27 students have been assessed on the applicable learning outcomes for their exam: First (qualifying) exam - 10 students (3 in ME, 7 in CHE); Second (proposal) exam – 6 students (4 in EE, 1 in CE and 1 in BME), and Third (dissertation) exam – 11 students (4 EE, 3 CHE, 3 CE, 1 ME). The dissertation and two other students were registered at the Graduate Center, while the remaining five were GSOE students. Forty-two forms were completed; some students were evaluated by more than one person, especially on their dissertation defense.

Initial feedback shows that examiners have no problems completing the assessment forms, that opportunities for providing qualitative comments are used often and that the scoring options are appropriate. The scores are in the 2 (weak) to 5 (excellent) range. Interestingly, two students received scores ranging from 2 to 5 on the same learning outcome from different examiners, reflecting perhaps different standards among examiners and/or the need for a clearer formulation of the learning outcome. The comments will be analyzed to evaluate the variation. We plan to continue to aggregate and analyze data and determine possible areas for improvement each semester.

In the assessment of the CE course "Transportation Project Evaluation," students were asked how much they thought they had learned on each of the five course learning outcomes addressing different aspects of performing a cost benefit analysis. All sixteen students filled out the survey and none of the average scores for the learning outcomes showed cause for concern, at least from the students' point of view: on a scale from 1 (learned not at all) to 4 (learned a lot), the lowest average score for a learning outcome was 3.50. In the feedback to the Civil Engineering department, the director of assessment recommended to also have the instructor score the student work on the same learning outcomes and compare this direct assessment with the scores from the student survey.

The "Graduate Student Progress Review" instrument will be piloted in Fall 2011.

The alumni survey (Appendix 8) will continue to be conducted at least every five years; employer input will be collected in the same way as for the undergraduate assessment.

The Office of Assessment in cooperation with the faculty assessment liaisons will support the use of assessment as noted below (items in bold have been implemented):

Uses of assessment results:

a. Make changes in course content;
b. Make changes in course delivery/pedagogy;
c. Add/delete courses;
d. Make changes in pre- and co-requisites;
e. Make changes in degree requirements;
f. Make changes in the emphasis for new/vacant faculty positions;
g. Develop and/or implement guidelines for new faculty for supervising doctoral students;
h. Include assessment results in faculty meetings, curriculum committee meetings, and faculty retreats;
i. Make changes in degree programs and the development of new degree program options;
j. Justify past curriculum changes and show program improvement resulting from those changes;
k. Make changes in the advising processes of doctoral students;
l. Develop academic services for students;
m. Develop new career explorations and/or career services for students;
n. Make changes to student academic facilities such as computer labs, science labs, and study areas;
o. Develop program-based web sites to provide students with academic and program information;
p. Share assessment information with alumni and industrial review boards;
q. Further refine assessment methods or implement new assessment methods; and
r. Make changes in instructional emphasis for current faculty.

ANALYSIS OF ACTIONS

The Grove School of Engineering is confident it has made significant progress in the use of appropriate assessments of the doctoral programs, and there is strong evidence of the use of assessment results being collected and used for improvement. The implementation of a sustained process is well underway and is greatly facilitated by the "culture of assessment" that already exists as a result of the ABET accreditation process and the genuine interest of the faculty and administration in reliable information and data to improve their programs and courses.

NEXT STEPS

As the next steps in the intermediate and longer term, we plan to:

- Finalize the assessment plans, including course learning outcomes and grids;

- Fully implement the assessment process for the doctoral programs, (i.e., regular data collection, regular data aggregation and analysis reported to the departments for discussion, decision-making and action);
- Publicize learning outcomes and assessment results on the GSOE web site; and
- Integrate learning assessment with program reviews of doctoral programs.

APPENDICES

Appendix 1: Letter from the CUNY Graduate Center Regarding Science Ph.D. Assessment
Appendix 2: Organizational Structure for Assessment of Doctoral Programs
Appendix 3: Assessment Forms
Appendix 4: Sample Syllabi for Graduate Courses
Appendix 5: Sample Assessment Plan
Appendix 6: Graduate Student Progress Review Form
Appendix 7: End-of-Course Survey for "Transportation Project Evaluation"
Appendix 8: Alumni Survey for CUNY Graduate Degree Holders

References:

"ASSESSMENT AND REVIEW OF GRADUATE PROGRAMS –DOCTORAL: REGIONAL ACCREDITATION". Presentation by: Charles Caramello, Associate Provost and Dean of the Graduate School, University of Maryland, December 1, 2010.

For exam assessment forms:
University of Virginia School of Engineering and Applied Science, graduate program assessment: http://www.seas.virginia.edu/advising/gradprogassessment.php (retrieved 07/27/2011)