The identification and assessment of student learning outcomes (SLOs) is a key component in the process of continuous program improvement. The Quantitative Methods in Education (QME) track in the Department of Educational Psychology is committed to continuous improvement and since the areas of concentration include measurement and evaluation, are committed to the highest standards of assessment and evaluation, at all levels, including faculty, staff, and student performance. In that spirit, we are pleased to participate in the pilot efforts for the Graduate School’s Student Learning Outcomes Implementation Project.

The first section of this report briefly describes the process through which QME faculty, staff, and students addressed the goal of continuous improvement. In this section, we review the program Mission and Vision statements and program objectives. Following this, the second section describes the initial articulation of student learning objectives. Finally, the third section identifies potential sources of evidence.

**PROCESS**

In 2010-2011, the QME track participated in a strategic planning process to support the 2020 planning efforts of the Department of Educational Psychology and the College of Education and Human Development (CEHD). This process involved faculty, staff, and students, and included a half-day strategic planning session, preceded and followed by several monthly faculty meetings to address various aspects of the process and the requirements of the department and college. This included responding to reviews by the Department Chair, the CEHD 2020 Blue-Ribbon Review Panel, and the CEHD Dean’s Office leadership. The development of student learning outcomes occurred more recently, 2013-2014, through extending the strategic planning process.

1. **Mission & Vision**
   We initially developed the program mission (practical and immediate) and vision (aspirational) statements. Mission statements, as they were available, were reviewed from similar programs at research universities around the country. The two statements evolved through several iterations over the year.
The mission statement identifies the core content areas of the QME program (areas of concentration):

1. Educational Measurement,
2. Statistics,
3. Evaluation,
4. Statistics Education;

across the three functions of the University:

1. teaching,
2. research,
3. service & outreach.

**QME Mission:**

To prepare students to become cutting-edge professionals in educational measurement, evaluation, statistics, and statistics education, through excellence in teaching, research, and service; and through investigating and developing research methodology in education.

**QME Vision:**

To be a premier quantitative methods in education programs; uniquely recognized for providing leadership, innovation, and excellence in the field; producing graduates whose work is recognized as advancing the field and more generally enabling human potential through advancements in education.

These statements were developed to be brief, reflective of the reality of the program, and consistent with the mission statements of the Department of Educational Psychology, CEHD, and the University of Minnesota.

**2. Program Objectives**

During the 2010-2011 strategic planning process, we developed program objectives and initial strategies to achieve those objectives. The objectives were described in terms of how they addressed the functions of teaching, research, and service & outreach. We included a set of programmatic objectives regarding administrative functioning of the QME program. As we recently reviewed these program objectives and proposed strategies, developed in 2010-2011, we note that we have accomplished several of them successfully as of 2013-2014.
3. Student Learning Outcomes
From the program objectives and consideration of the requirements for the MA and PhD degrees in QME, we recently developed an initial set of SLOs. We met with current students, including students new to the program and more advanced students, to include them in the discussion of SLOs appropriate to QME. The discussions with students included issues and outcomes related to their immediate goals as students and expectations upon graduation as degree recipients – again, in terms of the claims they and we hope to make about what graduates know and can do.

These outcomes were identified and described in ways to be consistent with the Intellectual Principles of Graduate Education (provided at the end of this document) developed through the Graduate Student Learning Outcomes Implementation Project of the University of Minnesota Graduate School. The six principles made sense and were deemed appropriately applied to the QME track.

However, the principle of Global Context was seen as less central to the mission and objectives of the program. We recognize the importance of Global Context and students and faculty continue to build such awareness through international travel, research, and educational experiences, and interaction with a large proportion of international QME students from countries throughout Central and South America, the Caribbean, Europe, Asia, and Africa.

We next describe the elements of the QME track objectives and strategic plan, followed by the articulation of SLOs and identification of evidence sources.
Scholarly Formation

The Department of Educational Psychology and the QME core courses required for the MA and PhD degrees provide the content necessary to achieve the primary outcomes regarding scholarly formation. Other programs on campus provide training in statistics and evaluation, and even measurement. However, the training we provide differs in two important ways. First, our focus is in educational applications of these methodologies. The statistics department provides solid training in the field of statistics, largely from a mathematical perspective. Organizational Leadership and Professional Development (OLDP, in CEHD) includes a program in evaluation studies, focused on qualitative approaches and the training of evaluators. Psychology includes a program in Quantitative Psychology including psychological measurement, but again focused in psychological applications with a significant mathematical orientation. Second, our focus is on the methodologies themselves, addressing the application of existing methods to new problems, modification of methods to address new challenges, the examination of methods under constraints and assumption violations, and the development of new methods in each area of measurement, statistics, evaluation, and statistics education. The QME program is the only in the world to offer a PhD in Statistics Education, focusing on the study and advancement of teaching and learning statistics.

QME-SLO 1. Core knowledge of theory, methods, and applications of measurement, evaluation, and statistics in education, and foundations of educational psychology.

QME-SLO 2. Advanced knowledge of theory, methods, and applications in one area of measurement, evaluation, statistics, or statistics education.

QME-SLO 3. Contribution to the body of knowledge in one area of QME.

QME-SLO 4. Advanced knowledge of research design, data management, and the research process (as defined by the core research methods courses).

QME-SLO 5. Membership, participation in, and contribution to a research methodology professional community.
Communication

Training in quantitative methods in education includes not only the knowledge of theory and application of research methods, but the ability to communicate research principles and results to both technical and non-technical audiences. Our focus is on the preparation of future faculty – with the expectation of teaching technical materials to novice students. Through TA and RA positions in the department, the participation in internships, and participation in the Office of Research Consultation and Services as a graduate student research consultant, students have multiple opportunities to develop and demonstrate communication of technical material to non-technical audiences. In addition, courses provide opportunities for students to present research ideas, study designs, and results of research. Students are also encouraged, although not required, to participate in the CEHD Graduate Student Research Day and present their research at national research conferences in their field. Finally, QME students initiated a student organization in 2011, officially filed with the University of Minnesota, to provide additional opportunities for students to present their work and explore collaboration with other students. As part of the claims QME makes about its graduates, we expect degree recipients to be able to write and speak authoritatively about research methodology and present their work to technical and non-technical audiences.

QME-SLO 6. Advanced written skills and ability to write technical material consistent with APA Style to technical and non-technical audiences.

QME-SLO 7. Advanced speaking and presentation skills and ability to present and speak about technical material to technical and non-technical audiences.

QME-SLO 8. Ability to teach and engage in instruction through multiple modes in a formal educational/training setting.
Leadership and Collaborative Skills

QME graduates are prepared to take leadership roles in many settings, including industry positions (e.g., testing companies), educational settings (e.g., public school research, evaluation, and assessment offices), government settings (e.g., state departments of education), and consulting roles (e.g., private consulting in measurement, statistics, evaluation). As research methodologists, QME graduates will be called on to contribute research expertise to a large variety of research endeavors. Most QME students contribute to research projects in CEHD and other colleges around campus. They provide technical expertise to support the work of substantive experts in a variety of fields and research methodologies. Collaboration is a key attribute of a high quality research methodologist. We recognize that advances in measurement, evaluation, and statistics often result from addressing unique and interesting challenges in ongoing research in many fields. Although the methodologies we teach and focus on in our research agendas focus on applications in education, many of us (faculty, staff, and students) contribute to similar efforts in other fields, including public health, public affairs, environmental sciences, medical and dental health sciences, marketing, journalism, American studies, library sciences, and others.

QME-SLO 9. Ability to lead a team of researchers, evaluators, or measurement practitioners.

QME-SLO 10. Ability to contribute to a team effort, providing technical expertise at a level consistent and appropriate to the project and other team members.
Professional Responsibility

As a research methodology program, we attend to issues related to ethics and human subject protection at a high level. The history of educational and social science research involves research participants that include vulnerable individuals, including young children and youth and adults in special education, including individuals with cognitive, behavioral/emotional, and physical impairments. The protection of human subjects, and more specifically, the procedures of the University of Minnesota Institutional Review Board (IRB) are important components of research planning and communication. Faculty, staff, and students regularly participate in responsible research training and are required to follow IRB procedures. We are also regularly called on to support IRB documentation as collaborators on external research projects. But beyond the IRB requirements of formal research projects, we also engage in IRB protocols in courses where students collect data from human subjects. In addition, the core research methods courses cover the issues of research ethics and responsible professional conduct of researchers. In addition, there is a more sensitive issue with respect to the ethical and appropriate treatment of data and study variables. This includes the appropriate treatment of person characteristics such as gender, race, ethnicity, age, and others that could be used for inappropriate purposes. The conduct of research requires a strong theoretical grounding, as well as appropriate and meaningful treatment of data and variables – to support the mission of the QME program, the Department of Educational Psychology, and CEHD – for the improvement of education and human development.

QME-SLO 11. Ability to design and conduct research in an ethical and responsible manner.
**Personal and Professional Management Skills**

As a product of the many experiences students have in the QME program, including courses, TA/RA positions, internships, participation and presentation at research conferences, independent research activities, participation in student organizations, and interaction with faculty, staff, and students in social settings, a certain level of personal and professional management skills are transmitted and developed. The completion of a graduate research degree requires certain personal characteristics and professional management – much of which is evaluated at the admissions stage. Among the personal characteristics that contribute to successful completion of the graduate research degree are knowledge and creativity, resilience, communication skills, planning and organization, teamwork, and ethics and integrity. At least four of these are addressed in other SLOs, including knowledge, communication, teamwork, and ethics/integrity. The others, including resilience and planning and organization, are important personal and professional management skills that lead to successful completion of the degree. Resilience and persistence is an absolute requirement, particularly for the PhD degree – completion of the Dissertation and the many milestones preceding it requires resolute persistence. In addition, as a research methodologist, a high level of attention to detail, ability to plan and organize workload on several concurrent activities, will be important characteristics to succeed professionally. These are the characteristics the faculty frequently describe when writing letters of recommendations for graduates seeking professional positions. This also includes an important role for advisors, supporting the professional development of advisees through exploration of professional options, CV development, and identification of appropriate experiences relative to professional goals.

QME-SLO 12. Ability to persist in achieving long-term goals.

QME-SLO 13. Ability to plan and manage projects with uncertain outcomes or unanticipated challenges.
EVIDENCE OF STUDENT LEARNING OUTCOMES

The QME track has begun to articulate important SLOs and the purposes of assessment:

*Considering the missions of QME, CEHD, and the University; considering the unique goals and needs of our students; and considering our expertise and experience; what do we expect our students to achieve upon completing a research degree (MA or PhD) in our program?*

The QME program employs an evidence-centered model of assessment for the purpose of gathering evidence of the achievement of SLOs. The evidence-centered approach includes three primary phases, beginning with the articulation of learning objectives, identification of evidence of the achievement of the SLOs, and design/selection of assessment methods.

1. Articulate SLOs or the claims we hope to make about graduates.
   “*What do we want to say about our graduates?*”
2. Identify evidence to support the claims.
   “*What can our students do to demonstrate the knowledge, skills, and abilities that are claimed by the program?*”
3. Design or select assessment methods.
   “*How can we gather evidence to allow students to demonstrate core knowledge, skills, and abilities resulting from program completion?*”

These three steps are integrated to produce a coherent assessment system that supports continual program improvement. It also provides a way to recognize, acknowledge, and publicize accomplishments of program faculty, staff, and students. In doing so, we also support the efforts of recruitment of high quality students as well as future faculty and staff.

We also note that currently, the SLOs are not written in specific measurable terms. That is, we have not specified the level of performance expected. We will continue to consider these issues as we examine the following proposed sources of evidence to inform this process, both in terms of supporting intended claims about degree recipients and in providing information to support continued program improvements.
Measuring QME Graduate Student Learning Outcomes

In this initial attempt to identify measures of QME SLOs, we focus on existing evidence. In part, this evidence is considered during the annual review of student progress late in Spring term. Such evidence is also reviewed periodically through advisor-advisee meetings, although this is less standardized or structured. Finally, major milestones are recorded and monitored by the Department, College, and Graduate School, particularly the completion of the Plan-B paper or MA thesis and for PhD candidates, completion of the pre-dissertation research project, written preliminary exam, oral preliminary exam, prospectus, and final defense. These milestones are associated with written products. The program does not collect these in a systematic manner, but will begin to do so.

Documentation has been improved during the past several years to track and monitor timely progress in degree completion. A student planning form has been created to support the annual evaluation of student progress, including courses, relevant external experiences, student employment, all of the above milestones, and immediate and future goals with a statement regarding support needed to achieve degree completion.

As we move forward with refining this initial set of SLOs, we will continue to examine the need for evidence of the achievement of SLOs. This may include the adoption or design of new assessments. Below, we provide an initial summary of existing evidence of each SLO. We will begin the process of identifying methods to summarize the evidence in a meaningful and appropriate manner to report on the achievement of QME SLOs.

Many of the sources of evidence are not currently being evaluated as measures of SLOs. In most cases, no records are retained about student performance or quality of work or achievement (aside from courses). Other sources of evidence, including the written products (Plan-B paper, pre-dissertation research project, dissertation) are evaluated for pass-fail decisions, where we miss the opportunity to provide deeper evaluative information regarding the accomplishment of SLOs.

At this time, we are developing a series of rubrics to collect information about outcome achievement across evidence sources – rubrics that can be applied at the time of performance (e.g., research presentations, paper defenses, RA and TA performance). We are also developing tools for self-ratings by students. We are developing a culture of evidence to support continuous improvement of the program. Rubrics and self-rating systems will clarify levels of expectations for all.

Sources of evidence not currently evaluated and recorded are denoted with an *.
Scholarly Formation – Evidence Sources

QME-SLO 1. Core knowledge of theory, methods, and applications of measurement, evaluation, and statistics in education, and foundations of educational psychology.

- Successful completion of core courses. If a student does not complete core courses with a 3.5 average, the student must take a written preliminary exam.
- Oral preliminary exams provide an opportunity to assess core knowledge.

QME-SLO 2. Advanced knowledge of theory, methods, and applications in one area of measurement, evaluation, statistics, or statistics education.

- Successful completion of at least four advanced methodology courses.
- Thesis defenses, oral preliminary exams, and dissertation defenses provide opportunities to explore and assess advanced knowledge.

QME-SLO 3. Contribution to the body of knowledge in one area of QME.

- The successful thesis or dissertation makes a clear meaningful contribution to the body of knowledge in quantitative methods in education.
- Papers written for conference presentation or publication may also provide excellent evidence of contributions to the body of knowledge.*

QME-SLO 4. Advanced knowledge of research design, data management, and the research process (as defined by the core research methods courses).

- Successful completion of the core research methods courses.
- The PhD capstone course, EPSY 8215 (Advanced Research Methods) includes several projects allowing students the opportunity to demonstrate ability to design, implement, and critique complex research designs.*
- The MA Plan-B paper or PhD pre-dissertation research project are opportunities for students to demonstrate research skills.
- The dissertation is a comprehensive demonstration of research expertise.
- Papers written for conference presentation or publication provide excellent evidence of research expertise.*
QME-SLO 5. Membership, participation in, and contribution to a research methodology professional community.

- Membership in the National Council on Measurement in Education, the American Educational Research Association, the American Evaluation Association, the American Statistical Association, or related organizations.*
- Papers written for conference presentation or publication demonstrate participation and contribution to a professional community.*

**Communication – Evidence Sources**

QME-SLO 6. Advanced written skills and ability to write technical material consistent with *APA Style* to technical and non-technical audiences.

- The MA Plan-B paper or PhD pre-dissertation written papers are opportunities for students to demonstrate communication skills.*
- The dissertation is a comprehensive demonstration of communication and research expertise.*
- Papers written for conference presentation or publication provide excellent opportunities to demonstrate writing expertise.*

QME-SLO 7. Advanced speaking and presentation skills and ability to present and speak about technical material to technical and non-technical audiences.

- Papers presented at local, national, or international research conferences provide opportunities to demonstrate speaking and presentation expertise.*
- Presentations to colleagues and research teams provide evidence of speaking/presentation skills.*

QME-SLO 8. Ability to teach and engage in instruction through multiple modes in formal and informal educational, training, or consulting settings.

- Students working in the Office of Research Consultation & Services have regular opportunities to consult with other graduate students and faculty and staff on research projects. Their performance is evaluated (currently informally) by the ORCS coordinator.*
- TAs are evaluated formally through the Student Evaluation of Teaching forms. These are reviewed by the faculty in charge of the particular course and by the QME coordinator.
Leadership and Collaborative Skills – Evidence Sources

QME-SLO 9. Ability to lead a team of researchers, evaluators, or measurement practitioners.

- Many students hold RA positions at some point, but not all are given the opportunity to take a leadership role in those positions. In the event these opportunities arise, they could be evaluated.*
- Recipients of the student leadership award, initiating student-led workshops or seminars, contributions to the QME student organization.

QME-SLO 10. Ability to contribute to a team effort, providing technical expertise at a level consistent and appropriate to the project and other team members.

- Students hold RA positions, internships, or participate in research projects out of interest. All of these positions provide opportunities to observe contributions to research efforts.*
- Peer support of peer research activities including cross-validation, reliability coding and scoring, research implementation support, practice sessions for conference presentations or job talks, and informal critique of peer writing.

Professional Responsibility – Evidence Sources

QME-SLO 11. Ability to design and conduct research in an ethical and responsible manner.

- MA students write a Plan-B paper or thesis for degree completion. That paper must be quantitative in nature. This may include data collection through original study design, the use of existing data, or simulation. It may lend itself to evaluating responsible research conduct.*
- PhD students have several opportunities to demonstrate responsible research conduct, including the pre-dissertation research project, preliminary written exam paper, dissertation, and research design assignments in EPSY8215 – Advanced Research Methods.*
- Some students have the opportunity to engage in research design and all aspects of research conduct through RA positions.*
Personal and Professional Management Skills – Evidence Sources

QME-SLO 12. Ability to persist in achieving long-term goals, yet do so in a timely manner rather than perseverate.

- Students must meet continued enrollment and time limits for degree completion. In part, persistence is measured as a function of time to degree.*
- In some cases, dissertation work involves lengthy procedures (data collection, simulation repetition), requiring perseverance.*

QME-SLO 13. Ability to plan and manage projects with uncertain outcomes or unanticipated challenges.

- Completion of degree milestones including Plan-B paper or thesis (MA); pre-dissertation research project, preliminary written exam paper, dissertation (PhD), generally have uncertain outcomes with unanticipated challenges. These provide opportunities for evaluation of project management ability.*
- In particular, the PhD prospectus meeting, where candidates present their dissertation methods, provides a strong opportunity to evaluate the ability to plan a project with uncertain outcomes.*
- RA positions often provide opportunities to manage projects with uncertain outcomes and manage unanticipated challenges.*