

## Examining Teacher Quality and Student Achievement: A TQE Research Grant

**Overview:** The Assessment Work Team of the Teacher Quality Enhancement (TQE) grant is offering faculty an opportunity to research the relationship of teacher quality to improved student learning. The TQE grant is a collaborative initiative involving ISU, Chicago Public Schools, Golden Apple, Little Village Community Development Corporation, Truman City College of Chicago, Daley City College of Chicago, National Board's Resource Center, and State Farm. Awards will be **\$3,500 plus benefits**, including supplemental resources for research materials up to \$2,500, and travel allocation to present subsequent research at a professional conference.

The Assessment Work Team is also offering non-applicant faculty the opportunity to serve as Readers of these grant proposals for a modest honorarium of \$100.

**Rationale:** The need for high quality urban teachers is almost universally known and more recently the causal relationship between teacher quality and student achievement has been supported in the research literature. As a recognized leader in teacher preparation, Illinois State University is currently taking steps to research this relationship so that it may better prepare our urban teacher candidates, and ultimately the children in classrooms across the United States.

One of these steps involves creating courses that are specifically designed to prepare teachers for the realities of urban and high need settings (another TQE grant initiative offered through the Upper Division Recruitment and Program Development Work Team). Designing and offering such courses provide a foundation for building an effective urban teacher education program. For the Assessment Work Team, understanding how our current program prepares preservice teachers, and the relationship between teacher effectiveness and student achievement is vital. Based on this enhanced understanding, we can make sound recommendations to the College of Education about ways in which it might redesign teacher education and teacher induction activities at the university level. To that end, data-driven research based on empirical models that test relationships among variables relevant to teacher effectiveness and student achievement are necessary.

This vision of urban teacher preparation must recognize the important role of assessment, particularly given our current standardized-test-driven context. Teacher educators need to model authentic assessment to improve instruction and employ multiple ways of assessing student learning. Through using authentic learning activities, schooling becomes relevant and engages students in meaning-making and in knowledge construction and critique. Experiencing such student-centered activities helps teacher candidates to understand the pedagogical importance of “seeing the student” (Ayers, 2001)—the notion that good teaching always begins with seeing each child as a multi-dimensional being, an individual with a unique history and equally unique hopes and dreams. In other words, preservice teachers learn to see the necessity of valuing students’

cultures and lived experiences—and making space for them in the classroom—while simultaneously espousing the crucial importance of subject-area content.

In short, this urban teacher education program intends to act as a critical enterprise for focusing on urban schools, but with interest in collaborating with others who attend to the related needs of rural, small town, and suburban schools. Its principles are ones of universal design that benefit all students but without which some students are unable to succeed.

Anyon, J. (2005). *Radical possibilities: Public policy, urban education, and a new social movement*. New York: Routledge.

Ayers, W. (2001). *To teach: The journey of a teacher* (2nd ed.). New York: Teachers College Press.

### Research Grant Application Details

**Eligibility:** All tenured and tenure-line faculty, and AP staff at ISU are eligible. However, the TQE team that designed this grant is targeting those faculty/AP involved in teacher education and those who teach classes related to urban issues or work in such administrative contexts. Applicants may apply as individuals or teams. Teams may comprise faculty housed in the same or different disciplines, Departments, or Colleges. An individual may be listed on only one application. All tenured and tenure-line faculty who are not applying for the grant are invited to submit their names, credentials, and availability to serve as a proposal Reader.

**Amount of Awards:** Awards will be \$3,500 plus benefits, supplemental resources for research materials up to \$2,500, and travel allocation to present subsequent research at one professional conference or at the discretion of the TQE Director. Grantees will receive payment in two installments based on the following schedule:

- 1<sup>st</sup> installment - \$1,500 at the start of research project
- 2<sup>th</sup> installment - \$2,000 after the research report has been completed and a full, publication quality report is submitted on/before August 15th, 2007.

In between these two benchmarks, grantees will be expected to periodically report their progress toward research completion. Additionally, a tentative budget plan for the allocated research expenses (\$2,500) should be included in the grant proposal.

Teams that are accepted into the research grant will split the \$3,500 (payment schedule above applies) and receive individual benefits plus the allocated amount for supplemental resources.

Proposal Readers will receive an honorarium of \$100 for their services on a team of Readers.

## Application Materials and Procedures for Grant Proposals

1. **Cover Page** – The cover page should include the title of the grant program (Examining Teacher Quality and Student Achievement: A TQE Research Grant); the proposed title of the research study; name(s), rank(s), department(s), campus & email address(es), phone numbers, and signature(s) of applicant(s); signature of department chairperson(s) of applicant(s).
2. **Research Proposal** – The TQE Assessment Work Team's over-arching priority is research that contributes to improved academic achievement for all students in Chicago Public Schools, particularly those who attend Little Village schools and whose education prospects are hindered by inadequate education services and conditions associated with poverty, race/ethnicity, limited English proficiency, disability, immigration, and family circumstance. For more specific guidelines, please refer to the *Guidelines for Research Grant Proposals* section below.
3. **Proposed Budget:** Applicants should also submit a detailed budget plan explaining how the allocated research funds (\$2,500) will be utilized throughout the research.
4. **Deadline**—5:00 PM, Tuesday, October 31, 2006. Send your application materials electronically to Andre Couto at [alcouto@ilstu.edu](mailto:alcouto@ilstu.edu) , AND send three hard copies to: Dr. Robert Lee, Chicago Teacher Education Pipeline Programs & Partnerships, 150 N. Michigan Ave. Suite 1590, Chicago, IL 60601. We intend to notify applicants of results by Friday, November 10, 2006.

## Guidelines for Research Grant Proposals

### Proposal Focus

With academic achievement as the major priority, the Assessment Work Team focuses on outcomes that differ by periods of education. In kindergarten through 12th grade, the core academic outcomes of reading and writing (including reading and writing in the disciplines), mathematics, and science are emphasized, as well as the behaviors and social skills that support learning in school and successful transitions to post-secondary education.

At the post-secondary level, the focus is on enrollment in and completion of programs that prepare students for successful careers, especially in teacher education.

The Assessment Work Team will fund research targeting to improve teacher quality and/or investigate the relationship between teacher quality and student achievement, such as:

- **Intervention Development and Evaluation:** Applicants may conduct efficacy trials targeting to determine whether or not developed interventions – programs, practices, policies – are effective under specified conditions (e.g., large urban high school with large class sizes and high turnover rate among teachers) and with specific types of students (e.g., low income or high proportion of English language learners). A well designed efficacy trial provides evidence on whether an intervention *can* work, but not whether it would work if deployed widely. Applicants may propose an efficacy trial to determine if an intervention will work under specific conditions or a replication trial to determine if an intervention shown to produce a net positive impact in one setting will produce a net positive impact in a different setting or with a different population of students.
- **Intervention Model Comparison:** Applicants may develop proposals to compare the impact of two interventions that are based on different theoretical models. In such cases, the purpose might be to compare the efficacy of two well-developed approaches to improving student learning. One advantage to this approach is that, relative to designs in which the comparison group experiences whatever the school or district currently provides, the investigator should have better knowledge of the critical components of each intervention and can attempt to create two conditions in which, for example, students receive instruction that differs on a number of critical instructional components.
- **Assessment Development and Validation:** Applicants are invited to develop and/or validate assessments that measure teacher subject matter and pedagogical knowledge in core academic content areas (e.g., reading, writing, social studies, history, mathematics and science). Assessments may

be designed for teachers at any grade level (Kindergarten through high school). Applicants must propose to validate these measures against standardized measures of student learning and achievement (i.e., do teachers' scores on measures of content and pedagogical knowledge predict the achievement of their students?). Alternatively, applicants may propose to validate *existing* measures of teacher content and pedagogical knowledge against standardized measures of student achievement.

### Guidelines for Proposed Interventions

Applicants must provide a compelling rationale for the use of the intervention that includes (1) a strong theoretical foundation and (2) empirical evidence of the association between exposure to the intervention and better student outcomes. As part of the description of the theoretical basis for the intervention, the applicant should detail how the components of the intervention operationalize the tenets of the theory. A strong theoretical rationale will make clear which features of the intervention are the critical features that need to be well-implemented in order to obtain improvement in student outcomes.

Applicants should clearly detail the empirical evidence in support of the intervention. For example, empirical evidence to justify an evaluation of the intervention could consist of data based on a single-group, pre-test/post-test study showing an increase in scores on a standardized measure for which there are existing data on typical gains in scores over a comparable period of time. As part of the justification for considering the proposed intervention, the applicant might show that the pre-intervention to post-interventions gains on the standardized measure are comparable to, if not better than, gains that have been observed in other studies. Alternatively, empirical justification could be data obtained from a small quasi-experimental study. Such a study would likely be under-powered for most interventions and outcomes, so it is the effect size rather than statistical significance of the difference that would be most informative. Furthermore, information on effect sizes is more useful to reviewers when sufficient context for interpreting the effect sizes is provided. For example, how does the size of the obtained effect compare to the amount of growth one would expect over an academic year for students at that grade-level and in that domain?

*Intervention Description.* Applicants should clearly describe the components of the intervention and how they relate to each other both temporally (or operationally) and theoretically (e.g., why does A lead to B). When applicants clearly describe the model that guides the intervention and the specific components making up the intervention, reviewers are better able to evaluate the relation between the theoretical and empirical foundation for the intervention and the intervention itself (e.g., is the proposed intervention a reasonable operationalization of the theory?). Reviewers are also better able to evaluate the relation between the intervention and the outcome measures (e.g., do the proposed measures tap the constructs that the intervention is intended to address?).

*Fidelity of implementation of the intervention.* Researchers should attend to questions of implementation and how best to train and support teachers in the use of these interventions. The applicant should specify how the implementation of the intervention will be documented and measured. In strong applications, investigators will make clear how the fidelity measures capture the critical features of the intervention. The proposal should either indicate how the intervention will be maintained consistently across multiple groups (e.g., classrooms and schools) over time or describe the parameters under which variations in the implementation may occur. Investigators should propose research designs that permit the identification and assessment of factors impacting the fidelity of implementation.

*Comparison group, where applicable.* Comparisons of interventions against other conditions are only meaningful to the extent that one can tell what students in the comparison settings receive or experience. Applicants should include procedures for describing practices in the comparison groups. Applicants should be able to compare intervention and comparison groups on the implementation of critical features of the intervention so that, for example, if there is no observed difference in student performance between intervention and comparison students, they can determine if key elements of the intervention were also practiced and implemented in the comparison groups.

In evaluations of education interventions, students in the comparison group typically receive some kind of treatment; rarely is the comparison group a "no-treatment" control. Students in the comparison group are still in school experiencing the school's curriculum and instruction. For some evaluations, the primary question is whether the treatment is more effective than a particular alternative treatment. In such instances, the comparison group receives a well-defined treatment that is usually an important comparison to the target intervention for theoretical or pragmatic reasons.

In other cases, the primary question is whether the treatment is more effective than what is generally available and utilized in schools. In such cases, the comparison group might receive what is sometimes called "business-as-usual." That is, the comparison group receives whatever the school or district is currently using or doing in a particular area. Business-as-usual generally refers to situations in which the standard or frequent practice across the nation is a relatively undefined education treatment. However, business-as-usual may also refer to situations in which a branded intervention (e.g., a published curriculum) is implemented with no more support from the developers of the program than would be available under normal conditions. In either case, *using a business-as-usual comparison group is acceptable.*

When business-as-usual is one or another branded intervention, applicants should specify the treatment or treatments received in the comparison group. In all cases, applicants should account for the ways in which what happens in the comparison group are important to understanding the net impact of the experimental treatment. The purpose here is to obtain information useful for *post hoc* explanations of why the

experimental treatment does or does not improve student learning relative to the comparison treatment. Finally, the applicant should describe strategies they intend to use to avoid contamination between treatment and comparison groups.

*Sample.* The applicant should define, as completely as possible, the sample to be selected and sampling procedures to be employed for the proposed study. Additionally, the applicant should describe strategies to insure that participants will remain in the study over the course of the evaluation.

*Design.* The applicant must provide a detailed research design. Applicants should describe how potential threats to internal and external validity will be addressed. Studies using randomized assignment to treatment and comparison conditions are strongly preferred. When a randomized trial is used, the applicant should clearly state the unit of randomization (e.g., students, classroom, teacher, or school). Choice of randomizing unit or units should be grounded in a theoretical framework. Applicants should explain the procedures for assignment of groups (e.g., schools, classrooms) or participants to treatment and comparison conditions.

*Only in circumstances in which a randomized trial is not possible* may alternatives that substantially minimize selection bias or allow it to be modeled be employed. Applicants proposing to use a design other than a randomized design must make a compelling case that randomization is not possible. Acceptable alternatives include appropriately structured regression-discontinuity designs or other well-designed quasi-experimental designs that come close to true experiments in minimizing the effects of selection bias on estimates of effect size.

A well-designed quasi-experiment is one that reduces substantially the potential influence of selection bias on membership in the intervention or comparison group. This involves demonstrating equivalence between the intervention and comparison groups at program entry on the variables that are to be measured as program outcomes (e.g., reading achievement test scores), or obtaining such equivalence through statistical procedures such as propensity score balancing or regression. It also involves demonstrating equivalence or removing statistically the effects of other variables on which the groups may differ and that may affect intended outcomes of the program being evaluated (e.g., demographic variables, experience and level of training of teachers, motivation of parents or students). Finally, it involves a design for the initial selection of the intervention and comparison groups that minimizes selection bias or allows it to be modeled.

For example, a very weak quasi-experimental design that would *not* be acceptable as evidence of program efficacy would populate the intervention condition with students who volunteered for the program to be evaluated, and would select comparison students who had the opportunity to volunteer but did not. In contrast, an acceptable design would select students in one particular geographical area of a city to be in the intervention; whereas students in another geographical area, known to be demographically similar, would be selected to be in the comparison condition. In the

former case, self-selection into the intervention is very likely to reflect motivation and other factors that will affect outcomes of interest and that will be impossible to equate across the two groups. In the latter case, the geographical differences between the participants in the two groups would ideally be unrelated to outcomes of interest, and in any case, could be measured and controlled for statistically.

*Measures.* Investigators should include relevant standardized measures of student achievement (e.g., standardized measures of mathematics achievement or reading achievement) in addition to other measures of student learning and achievement (e.g., researcher-developed measures). For Teacher Quality applications, applicants must also include measures of teacher practices. The Assessment Work Team recognizes that applicants under Teacher Quality and Education Leadership who are proposing to develop and assess interventions that are administered as part of *preservice* training for future teachers or education leaders may not have sufficient time within the constraints of the award period to follow the preservice teachers and leaders into their first positions and obtain data on their students. In such instances, applicants should include measures of teacher/education leader behaviors that have been associated with student outcomes and provide sufficient justification to assert that demonstrating change on these proximal measures is likely to be associated with change in student outcomes. The applicant should provide information on the reliability, validity, and appropriateness of proposed measures. In strong applications, investigators will make clear that the skills or content the intervention is designed to address are captured in the various measures that are proposed.

*Data analysis:* The applicant must include detailed descriptions of data analysis procedures. Because predictor variables relevant to education outcomes (e.g., student characteristics, teacher characteristics, school and district characteristics) often covary, the Assessment Work Team expects investigators to utilize the most appropriate statistical techniques to isolate the possible effects of variables of interest. Strong applications will include an explicit discussion of how exclusion from testing, or missing data, will be handled within the statistical analyses.

For quantitative data, specific statistical procedures should be described. The relation between hypotheses, measures, independent and dependent variables should be clear. For qualitative data, the specific methods used to index, summarize, and interpret data should be delineated.

Most evaluations of education interventions involve clustering of students in classes and schools and require the effects of such clustering to be accounted for in the analyses, even when individuals are randomly assigned to each condition. Such circumstances generally require specialized multilevel statistical analyses using computer programs designed for such purposes. Strong applications will provide sufficient detail for reviewers to judge the appropriateness of the data analysis strategy. For random assignment studies, applicants need to be aware that typically the primary unit of analysis is the unit of random assignment.

Efficacy projects that involve random assignment at the school-level are likely to be quite costly. When schools are the unit of assignment, it is acceptable for applicants to increase the power of their design and reduce the requisite number of schools by conducting an analysis that treats schools as a fixed effect. Applicants should first describe their design, detail their analysis plan, and indicate what the power would be if schools were treated as a random effect. Applicants should then describe an analysis plan that treats schools as fixed effects and indicate what the power would be under these conditions even though treating schools as fixed effects limits the generalizability of the findings.

- *Power.* Applicants should clearly address the power of the evaluation design to detect a reasonably expected and minimally important effect. When applicants justify what constitutes a reasonably expected effect, applicants should indicate clearly (e.g., including the statistical formula) how the effect size was calculated. Many evaluations of education interventions are designed so that clusters or groups of students, rather than individual students, are randomly assigned to treatment and comparison conditions. In such cases, the power of the design depends in part on the degree to which the observations of individuals within groups are correlated with each other on the outcomes of interest. For determining the sample size, applicants need to consider the number of clusters, the number of individuals within clusters, the potential adjustment from covariates, the desired effect, the intraclass correlation (i.e., the variance between clusters relative to the total variance between and within clusters), and the desired power of the design (note, other factors may also affect the determination of sample size, such as using one-tailed vs two-tailed tests, repeated observations, attrition of participants, etc.; see Donner & Klar, 2000; Murray, 1998; W.T. Grant Foundation & University of Michigan, [http://sitemaker.umich.edu/group-based/optimal\\_design\\_software](http://sitemaker.umich.edu/group-based/optimal_design_software)).

Strong applications will include empirical justification for the intraclass correlation and anticipated effect size used in the power analysis. When calculating the power of the design, applicants should anticipate the degree to which the magnitude of the expected effect may vary across the primary outcomes of interest (e.g., across a set of language, vocabulary, and reading measures, one might anticipate larger effects on some measures relative to other measures).

- *Mediating and moderating variables.* Observational, survey, or qualitative methodologies are encouraged as a complement to experimental methodologies to assist in the identification of factors that may explain the effectiveness or ineffectiveness of the intervention. Mediating and moderating variables that are measured in the intervention condition that are also likely to affect outcomes in the comparison condition should be measured in the comparison condition (e.g., student time-on-task, teacher experience/time in position).

The evaluation should be designed to account for sources of variation in outcomes across settings (i.e., to account for what might otherwise be part of the error variance). Applicants should provide a theoretical rationale to justify the inclusion (or exclusion) of factors/variables in the design of the evaluation that have been found to affect the success of education programs (e.g., teacher experience, fidelity of implementation, characteristics of the student population). The research should demonstrate the conditions and critical variables that affect the success of a given intervention. The most scalable interventions are those that can produce the desired effects across a range of education contexts.

### Guidelines for Assessment Development and Validation

Applicants must provide a compelling rationale to support the development of the proposed assessment. Reviewers will consider the strength of the theoretical foundation for the proposed assessment, the existing empirical evidence supporting the proposed assessment, and whether the proposed assessment duplicates existing assessments of teacher subject matter knowledge and pedagogical knowledge. Applicants should clearly describe the components of the assessment (e.g., specific knowledge and skills that the instrument is designed to tap) in sufficient detail to allow reviewers to evaluate relations between the theoretical and empirical foundations for the assessment and the assessment itself (e.g., does the proposed assessment capture critical skills?), and whether the proposed assessment will meet the needs for which it is intended. Applicants should consider the pragmatic constraints, such as ease of administration and cost, that states or districts will use to determine whether the instrument is a reasonable option for general use. In short, applicants must clearly and concisely articulate why the proposed assessment, as opposed to some other assessment, should be developed and/or validated.

*Methodological requirements.* Applicants should detail the proposed procedures for developing the assessment instrument (e.g., procedures for determining which subject matter content and pedagogical knowledge are being "tapped" by the instrument (i.e., construct validity), procedures for selecting items to be used in the assessment, assessing difficulty of selected items, obtaining representative responses to questions). Applicants must clearly describe the research plans for assessing the validity and reliability of the instrument. Applicants should describe the characteristics and size of samples to be used in each study, procedures for collecting data, measures to be used, and data analytic strategies. Particularly for proposals using existing datasets (e.g., state or local student achievement databases), applicants should explicitly address how exclusion from testing, or missing data, will be handled within the statistical analysis. As an example, investigators might conduct "value-added" analyses to compare student achievement across teachers scoring at different levels on the proposed teacher assessment.

Value-added analyses use statistically adjusted gain scores for individual students to estimate, for example, the effect of a particular teacher on his or her students' learning relative to the effects of other teachers on their students' learning. Value-added analyses can often strengthen the conclusions drawn from traditional multivariate analyses. Value-added analyses use gain scores for individual students to control for student characteristics when estimating the effects of other variables. For example, the analysis of the relationship between teacher professional development and reading outcomes described previously would be more persuasive if individual student outcomes in a particular year were adjusted for student scores on the same or a similar assessment at the end of the previous school year.

The strongest approaches to statistical modeling of multivariate data involve testing two or more models of relationships using the same data. Because multivariate analyses cannot fully adjust for selection biases and the effects of variables that were not measured or were not measured well, they are seldom if ever sufficient to support strong causal conclusions about what works. However, when two or more models of relationships among variables are tested with the same data, it may be possible to determine that one is more plausible than another, thus providing information relevant to understanding what does not work, as well as what does work. That, in turn, can direct future efforts in avenues that are more likely to be productive.

## Application Materials and Procedures for Research Grant Proposal Readers

Email the following information by 5:00 PM, Monday, October 23, 2006 to Andre Couto at [alcouto@ilstu.edu](mailto:alcouto@ilstu.edu)

1. Your name, title, and years at ISU.
2. Your college and department.
3. Your availability November 1-8 for reviewing grant proposals.
4. A statement explaining your interest and describing your credentials to serve as a Reviewer of research proposals for this project.

### Evaluation Criteria

A three or more member subcommittee of the Assessment Work Team of the TQE Grant will evaluate all submitted research grant proposals. Recipients will be selected competitively, based on:

1. The clarity and comprehensiveness of the proposal;
2. The relevance of the research proposal in regard to the Proposal Section;
3. The feasibility that the research will be completed by the project deadline; and
4. How well the proposal fits with and furthers ISU's urban teacher preparation initiatives

### Anticipated Outcomes of Participating in this Research Grant

Grantees should provide the TQE Assessment Work Team with:

1. A progress report submitted by February 16<sup>th</sup> indicating research project accomplishments as related to the timeline submitted in the original research grant proposal;
2. An annotated bibliography of self-selected texts, articles, and additional resources. This annotation should be done in whatever way best facilitates and serves the grantee's work.
3. Reference list including but not limited to items in the annotated bibliography.
4. Presentation to the group of grant recipients, Assessment Work Team members, College of Education deans and department chairs at a research symposium to be scheduled September 2007.
5. Articulation as to whether and, if so, how the grantee wants to continue to participate in work related to the TQE grant and ISU's Urban Teacher Preparation initiatives.

Please address any questions to the TQE Assessment Work Team members:

Andre Couto, Chicago Teacher Education Pipeline Programs & Partnerships, (312) 251-3506; [alcouto@ilstu.edu](mailto:alcouto@ilstu.edu); Robert Lee, Chicago Teacher Education Pipeline Programs & Partnerships, (312) 251-3509; [rllee2@ilstu.edu](mailto:rllee2@ilstu.edu); or Darrell Kruger, COE, (309) 438-2357; [dprkruger@ilstu.edu](mailto:dprkruger@ilstu.edu);