

**An Evaluation of Project RENEW:  
*Leadership for Excellence and Renewal in Mathematics  
Education***

**Year V Findings**

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## Section A: Summary of Project Findings to Date

1. RENEW helps to retain Preceptees (beginning teachers within their first five years of teaching) in the profession (97% of teachers who participated in at least 15 hours of RENEW professional development for two or more years during the 2001/2002-2004/2005 academic years)
2. RENEW continues to meet the self-reported needs of the Preceptees as they try to implement standards-based mathematics in their classrooms.
3. Evidence from a wealth of sources indicated that Project RENEW continually met the needs of Preceptees in terms of their desire for increased pedagogical content knowledge and their desire to avoid isolation by building collegial relationships in a safe and trusting community.
  - a. Data from institutes and MEPS indicated that the project activities had a significant impact on both beginning and experienced teacher content knowledge both in terms of the amount that they know and the way that the knowledge is structured. Analyses of Preceptee open-ended writings triangulated these findings.
  - b. Multiple Analysis of Variance showed significant differences in Preceptees' beliefs about teaching mathematics after one or more years participation in RENEW.
  - c. ANOVAS showed that after one or more years participation in RENEW Preceptees felt significantly more confident in their ability to:
    - i. Lead a class using investigative strategies in mathematics.
    - ii. Manage a class of students engaged in hands-on work.
    - iii. Help students take responsibility for their own learning.
    - iv. Encourage student interest in mathematics.
  - d. Further, after one or more years participation in RENEW, Preceptees felt significantly more confident in their ability to:
    - i. Recognize and respond to student diversity.
    - ii. Use strategies that specifically encourage minorities and females in mathematics.

4. New analyses conducted this year indicated that the above results were not mediated by length of time teaching. Teachers in their first two years of teaching made statistically similar gains to those in their third through fifth years of teaching, indicating the need for programs that support teachers through their first five years.
5. Longitudinal questionnaire data indicated that RENEW developed the leadership capacity of the Preceptors; in particular, their role in mentoring the beginning teachers with whom they work. In addition focus group and informal interviews showed that Preceptors continued to take additional leadership roles in mathematics in their schools and districts after leaving the project.
6. Data gathered over the five years indicated that the Preceptors not only continue to develop their own pedagogical content knowledge as they increase their understandings of important mathematics content, of the diverse needs of the students that they teach, and deeper understandings of effective mathematics pedagogy, but are more able to implement this knowledge in their own classrooms despite the statewide focus on language arts.
  - Preceptors self reported gains in key areas of mathematics growth including: deeper understanding of math concepts through RENEW activities; greater understanding of how students learn by being placed in the position of a learner; a greater confidence in themselves as a “doer” of mathematics.
  - ANOVA showed significant change in *Beliefs About Teaching Mathematics*.
  - Preceptors are better able to implement their own vision of mathematics into their classrooms.

## **Section B: Findings Details**

1. Retention Rates. Results indicated that 97% (114 of the 118) of teachers who participated in at least 15 hours of RENEW professional development for two or more years during the 2001/2002-2004/2005 academic years remain in the profession. Of the 147 beginning teachers who participated in at least two years of RENEW for at least 10 hours 138 are still teaching giving a retention rate of 94%. Furthermore between 86 and 95% of teachers that participated for one or more year in the project remained in the profession. Some of the RENEW teacher that participated within the first two years of the project have left their state or state and we are unable at this time to track whether they are still teaching. The lower bound of 86% is calculated assuming that non of these teachers are still teaching. The upper bound of 95% assumes that all of them are still teaching.

2. Meeting the Needs of Beginning Teachers. During years 2 to 3 of the project pre-year questionnaires asked Preceptees what support they needed from the project. Analysis of the 173 responses to this question indicated the top self-reported needs categories of Preceptees are: (1) activities and strategies for classroom activities, (2) help with differentiating instruction, (3) opportunities to build working relationships with colleagues, (4) ideas for connecting mathematics to real world contexts and across disciplines, (5) a better understanding of the

mathematics they must teach, (6) ways to connect standards to conceptual learning. In years 3 – 4 Preceptees were asked on post-questionnaires the extent to which the project fulfilled these needs. The 183 responses to these questions were overwhelmingly positive. The graph below illustrate the results.

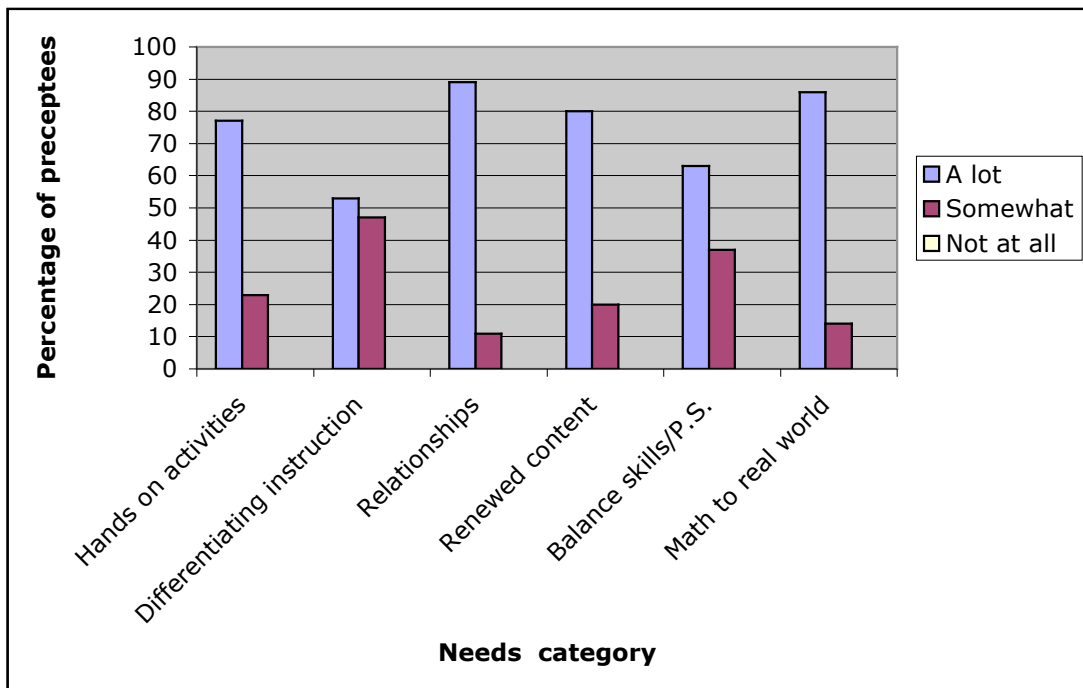


Figure 1. Responses of needs questions 2003-2004

3. Results of pre/post concept map data analysis from week-long summer institutes showed that project activities had a significant impact on beginning and experienced teacher content knowledge both in terms of the amount that they know and the way that the knowledge is structured (Hough, et al, 2005a, 2005b). Analyses of participant's reflective writings from the institutes triangulate these results.

*I have come away with a greater understanding of math concepts for myself which has enriched my teaching. I have absolutely loved being involved. What a wonderful opportunity to explore and discuss math with other teachers. (Preceptee, end of year questionnaire)*

*Before RENEW I never felt confident in solving math problems. I rarely understood the WHY behind problems. The project offers a place that I can freely ask and feel comfortable exploring (Preceptee, end of year reflection)*

*I have learned how to become confident in my mathematical thinking (Preceptee, Summer Institute)*

*Every time I attend a math institute I become confident and empowered in math and feel like a better teacher every second I am present in the institute. I never knew statistics could be this fun I've already planned most of my 1<sup>st</sup> month unit in statistics. (Preceptee, Summer Institute)*

*RENEW has provided an opportunity for me to learn that I enjoy a challenging math problem and the process one goes through starting with no clue how to approach the problem to finding strategies that lead them towards a solution. (Preceptor at Summer Institute)*

According to Wang and Odell, (2002), in their extensive review of the literature on beginning teacher mentoring, in addition to a deep and flexible knowledge of subject matter beginning teachers need a relevant disposition towards *standards*-based reform that includes a teacher's beliefs about teaching and beliefs about mathematical knowledge. Each year we administer several "beliefs" scales to Preceptees (*Beliefs about Standards-based Mathematics, Beliefs about Mathematics, and Beliefs about Teaching Mathematics*)

Analysis of responses to these scales have consistently showed significant changes in both Preceptees' *Beliefs about Teaching Mathematics* and *Beliefs about Standards-based Mathematics* after one

or more years participation in RENEW (see year III and year IV report for details). Analyses of teachers' responses to open ended questionnaire data consistently triangulate these findings. 62% of responses asking if Preceptees thought their beliefs had changed stated positively yes, that their beliefs had changed; 16% stated that they had changed somewhat; 18% stated that their beliefs remained consistent but had been strengthened by the project or that they were better able to act upon their beliefs as a result of participation, and 4% stated that no their beliefs had not changed.

*My beliefs have changed due to RENEW. I now know that everyone has to be given the opportunity to explore and realize that the answer to a problem can come about by different method. (Preceptee, end of year questionnaire)*

*Absolutely-I have applied many of the ideas and concepts presented in this project. It has radically (I think) changed my mind about the approach to teaching math. (Preceptee, end of year reflection)*

*I had always thought that some people were good at math and others were not. Now, as a result of RENEW, I feel that everyone is capable of learning math. (Preceptee, end of year questionnaire)*

*I think I always believed in these concepts but Project RENEW has given me the tools to make investigative learning possible in my classroom. (Preceptee, end of year questionnaire)*

Linking pre-service teacher content knowledge to their classroom practice is a difficult task (Widen, Mayer-Smith, & Moon, 1998), however efficacy to teach may considered a link in the process since efficacy has been shown to effect teaching practices. For instance it has been shown that teachers who exhibit a high sense of efficacy in a given area of

teaching will have a greater level of planning, organization and enthusiasm for and spend more time teaching in that area than teachers with lower efficacy (Tschannen-Moran & Woolfolk 2001, Coladarchi, 1992). Each year we administer an efficacy for teaching mathematics scale (based on Standards Based Reform) to test how efficacious beginning teachers feel about implementing certain practices in their classroom. Analyses of the data consistently show that one or more in RENEW significantly increase Preceptees' efficacy in implementing these reform practices in their classrooms. In particular they feel better able to (1) encourage student interest in mathematics; (2) lead a class using investigative strategies in mathematics; (3) manage a class of students engaged in hands-on work; (4) help students take responsibility for their own learning; (5) recognize and respond to student diversity; (6) use strategies that specifically encourage minorities and females in mathematics. These results were again triangulated using Preceptee reflective writings from institutes and MEPS.

*I feel much more comfortable about discussing math with my students and realize that there are many ways for them to solve problems. (Preceptee, reflection)*

*By collaborating with other math teachers, I have learned better teaching practices, as well as strategies to help my students be more successful in math.*

*Reflecting back on this year, I feel that Project RENEW has broadened my mind and enabled me to be even more confident in the way I teach mathematics in my classroom. I feel that I have seen better test scores this year as a result of my hands-on way of thinking. (Preceptee, reflection)*

*(Preceptee, reflection)*

This year we conducted additional analysis to explore the effects of years in the teaching profession as a mediating factor on change in the beliefs and efficacy constructs. Multi-variate analysis of variance showed no interaction effects between years in the profession and these constructs. This strongly suggests that these findings showing increases in beliefs and efficacy were not mediated by length of time teaching. That is, the beliefs about teaching and efficacy to teach were no different in teachers in their first two years of teaching were not significantly different to those in their third to fifth years of teaching.

### **Development of Leadership Capacity**

*How does Preceptors' Leadership Develop Over Time?*

Longitudinal data pertaining to Preceptors' mentoring role was collected over a three year period. Specifically, an open ended questionnaire was administered each year, in which Preceptors answered questions such as: *How do you see your role as preceptor? Compare this response to last year's response. In what way has it changed? How do you see your role in promoting equity in your educational setting?*

Results show that RENEW effects the leadership capacity of the Preceptors (O'Rode, 2005). Analysis of data indicated that Preceptors developed (in three stages) in their mentoring role, from being a "resource" and giver of information" to a "relationship builder" and on to

“a change agent for equity”. From their experiences in RENEW, Preceptors began to first understand better the importance of building lasting relationships with the beginning teachers that they mentored and then to see the importance of discussing issues of equity in their MEPS, their classroom practice and in their districts.

*I have developed a good relationship with my Preceptees built on trust and mutual respect. This is something I really didn't think of originally. (Preceptor, Stage II)*

*Teachers need to find ways to teach concepts that will help all students be successful .I am challenged about the equity of our school program. I consistently see the advanced math classes with fewer minority students than our population dictates. I more minority students scoring below proficient on the state standards. I must address these issues personally and share with our MEPS. I must continue to bring up all types of inequity, sometimes gently nudging others to examine their practice. Other times I must not be so gentle! (Preceptor, Stage III)*

Focus groups were conducted with Cohort I Preceptors (those who participated in RENEW during years I – III). Preceptors were asked to reflect on their changes in leadership over time and the roles that they now played in their schools and districts. Results showed that Preceptors continued to take leadership roles in their schools and classrooms including: organizing and conducting Family Math Nights, offering district-wide, mathematics professional development opportunities, advising on district curriculum and playing an informal support role to Cohort II Preceptors and their Preceptees.

### **Section C: Plans for Summative Study Year V**

There are four case studies underway as part of the RENEW Evaluation. During years I and II of the Project two districts were selected for case study, Rio and Oxnard Elementary. Stories of implementation in these two districts will be submitted as part of the final report. During years III and IV, two additional districts were added to study, Goleta and Simi Valley. Data collected across these project years is being analyzed by district. Write-ups of these analyses across differing district contexts will be submitted as part of the final report.

During this final year of the project, a Teacher Burnout study will be conducted to address summative effects of the project on participating teachers. From each of the four case study districts 15 Preceptees who participated in RENEW for two or more years, 15 beginning teachers who participated in one year of RENEW only and 15 teachers (in their first five years of teaching) who participated in no RENEW activities will be randomly selected. These 180 beginning teachers will be asked to complete the *Maslach Teacher Burnout Scale* (Maslach, 1996) along with some reflective prompts. Data from the scales will be scored and variables created according to the guidelines set out by the author of the scale. These variables will then be tested for differences between participatory groups in the project. (i.e. 1. participation in RENEW for two or more years in RENEW, 2. Participation in RENEW, 3. No participation in RENEW)

## **Section D: Key Accomplishments of the project**

This year Project RENEW has:

- Impacted 171 teachers and 19 administrators across ten school districts in Southern California on a year round basis
- Impacted an additional 30 beginning teachers during summer institutes.
- Offered additional professional development to 21 substitute teachers.
- Created partnerships between the leadership team and the district teams that are responsive to the needs of the particular district site.
- Continued to focus on issues pertinent to English Learners, learners who populate the classrooms of the teachers in the project.
- Stimulated new initiatives at district sites (family math nights, math professional development workshops)
- Partnered with the NSF-funded *Leadership Curriculum for Mathematics Professional Development* (LCMPD) project to allow Preceptors further opportunities for professional development.

## **Section E: The Future of RENEW Work**

We are requesting a no-cost extension for an additional year to conduct the following activities.

- Plan and conduct a mathematics education leadership institute for teachers who have participated in Project RENEW as a Preceptee during any of the past five years and who are recommended as a potential new mathematics teacher leader by their district;
- Plan and conduct a three-day institute for experienced teachers who will continue to serve as Preceptors during the 2006-07 school year;
- Support the Project RENEW academic year program in districts to the extent that funding will allow;
- Work with our partner districts to develop a program that will continue to support and retain beginning teachers in mathematics after funding by this project ends;
- Continue our work on and complete a Resource Manual for educators to use in a program that supports beginning teachers in teaching mathematics and develops the leadership of experienced teachers.
- Disseminate findings from the research component of this project in national conferences, publications and through our website.
- Continue our research through further analysis of data collected during the five years of this project.

## Section F: References

- Coladarci, T. (1992). Teachers' sense of efficacy and commitment to teaching. *Journal of Experimental Education*, 60, 323-337.
- Hough, S; O'Rode, N; Terman, N; Weissglass, J (2005). A Respectful Approach to Assessing Teachers' Growth in Mathematical Understanding: Concept Maps. In Revision. *Journal of Mathematics Teacher Education*.
- Hough, S., Weissglass, J. (2005). Beginning Teachers' Knowledge Networks in Statistics: How They Develop During an Intensive Summer Institute. To appear. *The International Journal of Learning, Volume 12*.
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- Wang, J. and Odell, S., J. (2002). Mentored Learning to Teach According to Standards-Based Reform: A Critical Review. *Review of Educational Research*, 72(3), 00 481-546.

## **Section G: Updated List of Articles and Conference Presentations**

### *Articles*

Hough, S; O'Rode, N; Terman, N; Weissglass, J (2005). A Respectful Approach to Assessing Teachers' Growth in Mathematical Understanding: Concept Maps. In Revision. *Journal of Mathematics Teacher Education*.

Hough, S., Weissglass, J. (2005). Beginning Teachers' Knowledge Networks in Statistics: How They Develop During an Intensive Summer Institute. To appear. *The International Journal of Learning, Volume 12*.

### *Conference Proceedings and Presentations to Date:*

Hough, S; Sandoval, N; Terman, N. (2005). Measuring Change: Experienced Teachers Develop Pedagogical Content Knowledge by Linking Content and Pedagogy. Paper to be presented at the American Educational Research Association, San Francisco, April, 2006.

O'Rode, N; Terman, N. (2005). *Mathematics and Equity: Developing Leadership of Experienced Teachers*. Paper presented at the Annual Meeting of the American Educational Research Association, Montreal, Canada. April, 2005.

Terman, N; Guzman, M. (2004). *Mathematics and Equity: Developing the Leadership of Experienced Teachers to Work With Beginning Teachers*. Paper presented at the National Council of Supervisors of Mathematics (NCSM) April 19-21, 2004 Philadelphia, PA

Hough, S; Erbes, S; O'Rode, N. (2004). *Understanding and Addressing Beginning Teacher Needs and Concerns: The Effects of Project RENEW, A Retention and Renewal Project in Mathematics*. Paper presented at the American Educational Research Association, San Diego, CA. April, 2004.

Hough, S; Erbes, S. (2004). *Understanding and Addressing Beginning Teachers' Needs, Concerns and Difficulties: A Description of a Retention and Renewal Project in Mathematics Education*. Paper presented at the Association of Teacher Educators 84th Annual Meeting Dallas, TX, February 15 - 19, 2004

Terman, N; O'Rode, N. (2004). *Project RENEW: Developing The Leadership of Experienced Teachers to Work With Beginning Teachers*. Paper

presented at the New Teacher Center Symposium, San Jose, CA.  
February, 2004.

Terman, N; Guzman, M. (2003). *Learning from Each Other: Experienced and Beginning Teachers Explore Mathematics and Equity*. Paper presented at the California Mathematics Council-Southern Section (CMC-SS). Palm Springs, CA. November 7-8, 2003

Hough, S; O'Rode, N. (2003). *Revisiting the Needs of Beginning Teachers in the Context of a Professional development Project*. Paper Presented at the Facing Futures Conference, February 2003, Santa Barbara, California.

Weissglass, J; Terman, T; Hough, S. (2002). *Project RENEW: Leadership for Excellence and Renewal in Mathematics Education*. An Emergent Model for Supporting Beginning Teachers. Paper presented at the California Council of Teacher Educators

### **Other Manuscripts**

Hough, S; Sandoval, N; (2005) *An Ongoing Evaluation of Project RENEW: Summary of Main Findings*. Executive Summary for Administrators. December 2005.

Hough, S; Sandoval, N; (2005). *Executive Summary for Administrators*, January, 2005

Hough, S; O'Rode, N. (2004). *Executive Summary for Administrators*, January 2004.

Papers, when available, can be downloaded directly from <http://renew.education.ucsb.edu/research.htm> as they become available

Or by clicking on the research menu option of RENEW's new website: <http://renew.education.ucsb.edu>