Project RENEW Report: Findings
Year IV: June 1, 2004 – May 31, 2005

Findings

Findings Appendices

Section A: Summary of Key Findings

1. RENEW continues to retain more Preceptees (beginning teachers in their first 5 years of teaching) and recruit more Preceptees per Preceptor in the project each year.

2. Evidence from a wealth of sources indicate that Project RENEW is meeting the needs of these 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.

    - Pre/post data from a week-long summer institute shows that project activities have a significant impact on beginning teacher content knowledge both in terms of the amount that they know and the way that the knowledge is structured.
    - Preceptees reported that RENEW has had an impact on their conceptions of mathematics and its teaching.
    - Multiple Analysis of Variance showed significant differences in Preceptees' beliefs about teaching mathematics after one or more years participation in RENEW.
    - ANOVAS showed that after one or more years participation in RENEW Preceptees felt significantly more confident in their ability to:

        - Lead a class using investigative strategies in mathematics.
        - Manage a class of students engaged in hands-on work.
        - Help students take responsibility for their own learning.
        - Encourage student interest in mathematics.

    - Further, after one or more years participation in RENEW, Preceptees felt significantly more confident in their ability to:
        - Recognize and respond to student diversity.
        - Use strategies that specifically encourage minorities and females in mathematics.

3. RENEW continues to be successful in developing the leadership capacity of the Preceptors; in particular, their role in mentoring the beginning teachers with whom they work, and in general, their ability and desire to take additional leadership roles in mathematics in their schools and districts.

4. Our data further indicate that the experienced teachers (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.

5. Retention data indicate that between 88 and 96% of beginning teachers participating in RENEW are retained in the profession. Retention figures of participants involved in the first, second and third years of RENEW appear to be slightly higher than other new teacher support programs in the local area. Further, 98% of experienced RENEW teacher participants are retained in the profession.

Sections B: Results

1. Comments on Implementation

This year the Cohort II Preceptor Cadre took over full responsibility for mentoring the Preceptees in their schools and districts from Cohort I. Despite this decrease in Preceptors, retention of Preceptees in the project continues to increase each year. In Year II of RENEW only 22 Preceptees were retained in the project after their Year I participation. In Year III, 55 of the 107 Year II Preceptees signed up for continued participation. This year in Year IV, 79 of the 155 Year III Preceptees signed up again for the project. Indeed, a concern of the leadership team and of districts was that the Cohort II Preceptors would not be able to accommodate all of those Preceptees wishing to return, however, six months into the project year we find that Cohort II Preceptors are comfortable with taking on more mentoring responsibilities. This year there are 154 Preceptees participating and 33 Preceptors:

a ratio of about 5 Preceptees per Preceptor compared to a ratio 3 Preceptees per Preceptor last year. In general, each year Cohort I Preceptor teams become more adept at recruitment as their teams established the RENEW model in their individual district and school contexts. This year Cohort II Preceptors were able to capitalize on the experience they gained from their year of leadership mentoring from the Cohort I Preceptors and recruited an additional 75 new Preceptees.

Leadership of Cohort II.

Two Preceptor activities this year had a direct impact on building the leadership capacity of Cohort II and preparing them for their transition: the 3-day residential retreat and their planning and conducting of the Beginning Teacher (BT) Institutes in their districts. These activities are described in more detail in the previous section of this report. Feedback from the retreat indicate that the institute prepared them and gave them the confidence to plan and conduct the Beginning Teacher Institutes without reliance on their more experienced Cohort I colleagues. Further, written reflections indicated that after conducting their institute many Preceptors gained additional insights into their own leadership styles.

> *These activities made me realize what kind of a leader I will strive to be (motivator, equitable, "cheerleader" and "coach")*

In addition to what components make for a successful session

> *Through conducting this institute we realized that: modeling a positive, fun-loving attitude is crucial to the climate of the workshop; creating a safe and comfortable environment enables people to share and take-risks; and allowing time for collaboration is very productive.*

What happened to Cohort I?

Although the idea of creating a fourth year program for the Cohort I Preceptors was seriously considered, the decision was made to continue according to the original program design and focus this year on the leadership development of the Cohort II Preceptors. Although the Cohort II Preceptors valued the experience and collegiality that the Cohort I Preceptors brought during their year (Year 3) of working together, Cohort II Preceptors felt they were ready to assume the preceptoring role in their district on their own and in their own way. Cohort I Preceptors were involved in the fourth year of Project RENEW in the following ways.

- Attending the December 9, 2004 *Administrator and Reunion Day* where they participated in district-based discussions with their administrators and the Cohort II Preceptors regarding the challenges of teaching mathematics for understanding given the current context and pressures in their own district.
- Attending a Reunion Day for the Cohort I Preceptors on February 25, 2005 that focused on their leadership. In addition to doing mathematics and reconnecting with each other, they learned more about and further contributed to the portion of the project evaluation that documents their leadership growth.
- Supporting the Cohort II Preceptors in their district. Two Cohort I preceptors from one of the districts were invited by the Cohort II preceptors to work with them to plan and conduct their MEPS and they continue to participate in this way. Another Cohort I Preceptor (in a different district) presents at the Cohort II MEPS and takes responsibility for some of the classroom observations. In two districts, a Cohort I Preceptor who became part of the leadership team for

Cohort II continue their role as a preceptor and are part of their district's Cohort II Preceptor team.

We are in the process of collecting data regarding the ways in which the Cohort I preceptors are taking leadership in their schools and districts, independent of a formal Preceptor role. Informal interviews indicate that the relationships built with the Preceptees with whom they worked continue in ways that provide collegial and instructional support to those beginning teachers.

2. *Project RENEW is meeting the needs of Preceptees in terms of facilitating increased pedagogical content knowledge and to avoid isolation by building collegial relationships in a safe and trusting community.*

Data from pre/post-year questionnaires, knowledge measures, reflective writings, interviews and site visits were analyzed in order to look at the effects of project activities on participants. The table of progressive evaluation questions is included in the Appendix (page i) and a more detailed description of the methods of analysis employed was reported in Year II and can be found on pages 20-28 of that report. What follows here is a detailed description of findings (listed in the summary above) from analyses conducted during the latter part of Year III and the first half of Year IV.

a. *Pre/post data from week-long summer institute shows that project activities have a significant impact on beginning teacher content knowledge both in terms of the amount that they know and the way that the knowledge is structured.*

One of the major objectives of the project is to develop participants' understandings of important mathematics content knowledge*.* To gain more systematic evidence of this Preceptee learning, a study using concept maps was

conducted in the context of the week-long Beginning Teacher Institute that was held at UCSB from June 26th – June 30th, 2004. Pre and post Institute concept map measures and reflective prompts were administered to the 26 participating beginning teachers. Data were analyzed using structural/numerical (Novak & Gowind, 1984) and content approaches (Morine-Dershimer, 1993). Statistically significant differences between pre and post structural variables were found in the breadth and depth as well as the connectedness of participants' knowledge of Statistics concepts. Table 1 below displays these results.

Table 1. *Pre and Post Mean Scores on Structural Variables*

	Mean		Range	
	Pre	Post	Pre	Post
#Concepts	24	35*	7-39	13-58
Width+Depth	15	21*	8-29	12-37
#Chunks	4	6*	0-10	0-18
#Links	0	1*	0-1	0-5

* significance difference between pre and post mean at alpha= .05 level

The number of concepts on a map and the width+depth variables indicate the amount of knowledge about a topic that is displayed on a map, whereas the number of chunks and links on a map depicts the connectedness of the knowledge. For instance, row three indicates that the number of concepts on the average participant map increased to 35 after the institute from 24 at the beginning of the institute. This difference (as were all differences) was found to be statistically significant.

Table 2 below indicates the subject matter content that was on participant's maps and demonstrates that many more beginning teachers had a better and more connected understanding post-Institute of the some of the fundamental concepts of statistics (such as measures of central tendency, graphing and displaying data, sampling (and bias) and statistical data analyses).

Table 2. *Subject Matter Nodes Appearing on Participant Maps*

	Appeared on Map as Concept		Appeared on Map as Chunk	
	Pre	Post	Pre	Post
Measures of CT	50%	73%	5%	43%
Graphing	68%	100%	33%	81%
Sampling	0%	50%	0%	38%
Probability	59%	77%	19%	33%
Bias	10%	68%	10%	29%
Data Collection	45%	64%	15%	31%
Data Analysis and Interpretation	27%	50%	0%	38%

b. Multiple Analysis of Variance showed significant differences in Preceptees' beliefs about teaching mathematics after one or more years participation in RENEW.

In addition to learning more mathematics content, project activities focus on participants learning important aspects of *doing* mathematics. The vision of mathematics portrayed by the project leadership, in-line with the mathematics in the *Principals and Standards for School Mathematics,* (NCTM, 2000), is one that is exciting and beautiful as well as important, and they hold, that every person should experience the authentic doing of mathematics in order for them to have its power as a tool and for their own enjoyment. This view of mathematics lends equal importance to subject matter knowledge and on the processes of mathematics, on reasoning, hypothesizing, conjecturing and the creation of mathematical ideas. Often teachers have not had opportunities themselves to experience mathematics in this way and

so have incomplete understandings of what mathematics is about. Many focus on the procedural aspects of the subject matter, and believe that mathematics is mainly memorization, has only one right answer and is only to be fully undertaken by someone with “mathematical talent”. It is hypothesized that participating in authentic mathematics activities will help the Preceptees change their views about mathematics and that this will lead them to re-think the way in which mathematics is taught.

RENEW promotes a view of teaching mathematics that is in line with National Standards (Principals and Standards for School Mathematics, (NCTM, 2000). RENEW Preceptors are afforded extensive opportunities to learn how to implement National as well as State standards for school mathematics by participating in authentic mathematics activities themselves that are led by leadership team modeling the principles and by participating in activities in which they read and reflect on relevant research and theory connected to mathematics learning. By giving participants these kinds of experiences it is hypothesized that they will develop their view of teaching mathematics so that it is more in line with that promoted by NCTM. To examine changes in Preceptees’ beliefs pre/post beliefs scales are collected from participants each project year. From the questionnaire items on the *Beliefs About Teaching Mathematics* Scale (r= .73) a *non-telling* variable is created. A participant scoring highly on this variable would tend to disagree with statement such as: ”The best way for students to learn mathematics is to do many similar types of problems until they get the procedure down“, and agree with statements such as: ” To learn math students should be given plenty of

opportunities to engage in inquiry oriented activities. " A Non-telling variable was created for Year III responses and an ANOVA was ran in SPSS using non-telling as the dependent and group (new RENEW participants versus those that had been in the project 1 or more year) as independent factor. Table 3 below depicts the means, standard deviations and F stat for these groups.

Table 3. *Differences in Beliefs About Teaching Mathematics Between New RENEW Participants and Those that Have Been With the Project for One or More Years.*

	Mean		Std. Deviation		F
	Pre (N=61)	Post (N=144)	Pre (N=61)	Post (N=144)	
Non Telling	3.5	3.7	.43	.52	6.5**

These results indicate that Preceptees who have been in RENEW one or more years have *Beliefs About Teaching Mathematics* that are significantly different than those first entering the project ($F(204)=6.5$, $p<.01$).

c. *Preceptees reported that RENEW had had an impact on their beliefs about mathematics and its teaching.*

At the end of Year III, to triangulate these results we added a reflective prompt to the End-of-year Preceptee Questionnaire which asked participants whether they thought beliefs about doing and teaching mathematics had changed as a result of participating in the project. Seventy-one percent of the total respondents answered this prompt. Of these participants, 62% stated positively yes that RENEW participation had changed their beliefs, whereas 16% stated that they had changed somewhat

> *Yes, they have. I no longer believe that math is just something that involves memorizing facts and procedures, it is something that entails a wide variety of procedures. Students cannot only learn through teacher oriented activities but*

they can also learn through flexible groupings, making investigations and exploring.

Somewhat. The same principles of teaching math were discussed in my credential program so I don't feel like Project RENEW has changed my responses-just validated them.

Eighteen percent of these participants 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.

> *I think I always believed in these concepts but Project RENEW has given me the tools to make investigative learning actually possible in my classroom.*

Only three of the participants stated that no, their beliefs had not changed at all as a result of being in the project. Figure 1 below displays these results.

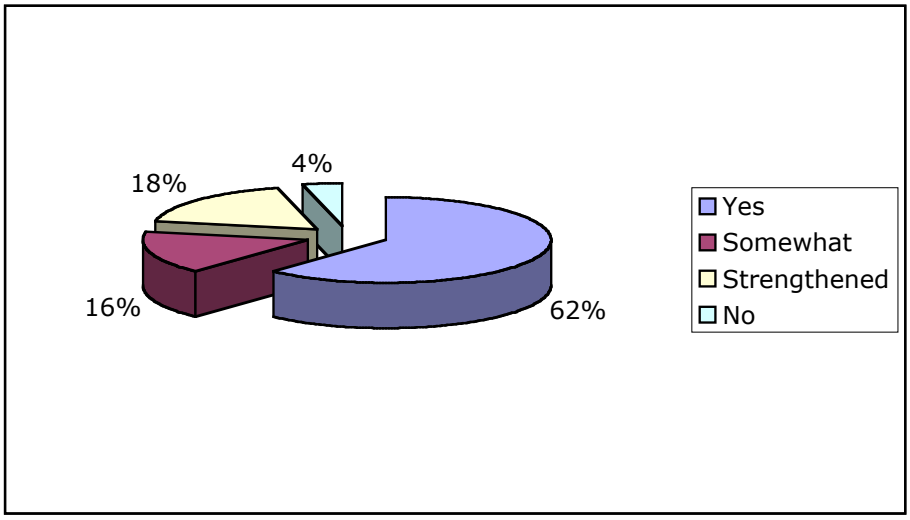

Figure 1. Changed Beliefs as a Result of Participation in RENEW

d. ANOVAS showed that after one or more years participation in RENEW Preceptees felt significantly more confident in their ability to:

- Lead a class using investigative strategies in mathematics.
- Manage a class of students engaged in hands-on work.
- Help students take responsibility for their own learning.
- Encourage student interest in mathematics.

e. After one or more years participation in RENEW Preceptees felt significantly more confident in their ability to:
   - Recognize and respond to student diversity
   - To use strategies that specifically minorities and females in mathematics.

To understand better the likelihood that Preceptees implement the changes described above in their classrooms, the RENEW *Beginning Teacher Questionnaire* asks participants to rate how well prepared they feel to: (1) lead a class of students using investigative strategies; (2) manage a class of students engaged in hands-on/project based work; (3) help students take responsibility for their own learning. These items are rated on a scale of 1-4 where 1=”not adequately prepared”; 2=”somewhat prepared”’ 3=”quite prepared” and 4=”very well prepared”. Only participant responses that had both pre and post results during Year III were analyzed, both by pre/post project year, and as a function of number of years in the project.

Similarly, we examined the extent to which Preceptees felt prepared to implement equitable mathematics practices in their classrooms. Again participant responses were analyzed both for pre and post project year change and as a function of the number of years they had participated in the project.

Table 4. *Pre and Post Year Results Depicting Change in Participant Preparedness.*

Question	Mean	
	Pre	*Post*
Lead a class of students using investigative mathematics.	2.5	2.8*
Manage a class of students engaged in hands-on project work.	2.9	3.2*
Help students take responsibility for their own learning.	2.7	3.0*
Recognize and respond to diversity.	2.8	3.2*
Encourage students’ interest in mathematics.	2.8	3.3*
Use strategies that specifically encourage participation of minorities and females in mathematics.	2.4	3.0*

* significant pre/post mean difference at p<.01

A Multivariate Analysis of Variance was conducted using the efficacy variables as dependent variables and the pre/post year group as the fixed factor. There was a statistically significant overall multivariate result: $F(18, 296)=4.7$, $p<.001$. Subsequent univariate statistics show significant differences on all of the efficacy variables ($F(3, 296)=10.4$; $F(3, 296)=7.3$; $F(3, 296)=7.5$; $F(3, 296)=10.4$; $F(3, 296)=14.8$; $F(3, 296)=20.3$, respectively, $p<.001$) for each of these results indicating that Year III Preceptees, regardless of number of years in the project, felt better prepared on all of these indicators at the end of the year than at the beginning.

In addition, we conducted a MANOVA with these indicator variables as dependent variables and the number of years participation in the project as the independent variable to see if this preparedness varied as a function of years of participation. Table 5 below gives these results.

Table 5. *Preceptee Preparedness by Number of Years Participation in the Project*

	Year 0 N=63	Year I N=96	Year II N=38	Year III N=12
Lead a class of students using investigative mathematics.	2.2	2.8*	2.9*	3.2*
Manage a class of students engaged in hands-on project work.	2.6	3.1*	3.1	3.3
Help students take responsibility for their own learning.	2.5	3.0*	3.0	3.2
Encourage students' interest in mathematics.	2.6	3.2*	3.3*	3.5*
Recognize and respond to diversity.	2.6	3.2*	3.2	3.3
Use strategies that specifically encourage participation of minorities and females in mathematics.	2.0	2.9*	3.0*	3.0

* Indicates a statistically significant difference from the previous year at a significance level <.01

3. Developing the Leadership Capacity of Preceptors

During years three and four we continued to monitor the development of leadership in both cohorts of Preceptors. In Project RENEW, Leadership is defined as *taking responsibility for what matters to you.* Teachers often exclude themselves and are excluded by others from the traditional view of leadership. RENEW works with teachers to develop their confidence so that they are willing to move beyond their classroom responsibilities and take additional leadership for improving mathematics education. For RENEW Preceptors, it means taking an important role in shaping the future of the profession by supporting beginning teachers. To examine changes in how Preceptors view this important leadership role we analyzed responses to open-ended questionnaire items collected yearly from them. The items asked Preceptors to reflect on their role as a Preceptor and what it entailed. In addition they were asked to write about their understandings of equity and how it relates to mathematics education, in particular at their school and district sites. Continuing data analysis used the categories of *leadership development* that emerged during the analysis of the first two years of this data (reported in Year III Report and in O'Rode, et al. (2003)) and which indicated that Preceptors tended to pass through stages of leadership development. The majority of Preceptors in Cohort I initially viewed their role as one of *Resource and Provider* to beginning teachers. As they progressed through one or more years in the project, most expanded their vision of their role to include that of a *Relationship Builder*. A final stage of Leadership in the project emerged as one in which the Preceptor started to take on the role as *Change Agent* in their school and districts; that is, they took

responsibility not only for the beginning teacher whom they were mentoring but for mathematics education in general. In most of these cases, statements were made about heightened attention to equity issues around mathematics education. These stages and examples of each are summarized in Figure 2 below.

Beginning of First Year (Summer 2001)

I hope to help teachers improve their own mathematics abilities and perhaps look at solving computational problems differently… Preceptor as Resource

End of First Year (Summer 2002)

Now I also see a need to work on developing trusting relationships so that the Preceptees feel safe and ready to take risks… Preceptor as Builder of Trusting Relationships

End of Second Year (Summer 2003)

I see my role as Preceptor as multi-faceted. Teachers need to find ways to teach concepts that will help all students be successful.… I am particularly challenged personally about the equity of our school program. I consistently see the advanced math classes with fewer minority students than our population dictates. I see more minority students scoring below proficient on the state standards. I need to address these issues personally and share them in our Math Professional Seminars. Preceptor as Change Agent

Figure 2. *Three-Year Progression of Leadership Development for One Preceptor (Experienced Teacher) in Project RENEW*