

Algebra Connections Teacher Participant Evaluation

The University of Chicago Survey Lab
<http://surveylab.uchicago.edu/>

May 2007

Introduction

In the 2004-2005 and 2005-2006 academic years Dr. Barbara Radner led a project called “Algebra Connections” that was designed to improve algebra instruction among Chicago Public Schools (CPS) teachers. Two cohorts of teachers took part in the program, one in 2004-2005 and one in 2005-2006. The program sought to enroll sets of teachers from selected schools to create natural support groups within the schools for the participating teachers. Teachers enrolled in the program attended three algebra courses and a single course on formative evaluation during after-school or weekend hours over the September to June school year. In addition, a facilitator from the program visited participating teachers in their classrooms to observe the implementation of the techniques they were learning in the classroom and to provide coaching and assistance as needed. The courses were offered tuition-free; participating teachers earned math endorsement credit for completing the courses.

As part of a larger evaluation of the program, Dr. Radner contracted with the University of Chicago Survey Lab to interview teachers about their experiences with the program. We pursued interviews with 38 teachers, 31 of whom had completed at least one course and 7 of whom had withdrawn from the program prior to the end of the first course. We were able to obtain feedback from 30 of the teachers, 6 of the 7 early leavers (86%) and 24 of the 31 course completers (77%). The overall response to the course was strongly positive; there were also some complaints and suggestions for ways in which the program could be improved.

This report details the data collection process and summarizes the results of the evaluation. Additional information is contained in the following appendices:

- Appendix A Pre-test Version of the Questionnaire (with debriefing prompts)
- Appendix B Initial Recruitment Letter Text
- Appendix C Questionnaire for Year 1 Program Completers
- Appendix D Questionnaire for Year 1 Program Early Leavers
- Appendix E Questionnaire for Year 2 Program Completers
- Appendix F Questionnaire for Year 2 Program Early Leavers
- Appendix G Interview Guide for Semi-Structured Interviews
- Appendix H Frequencies for Survey Response
- Appendix I Summary of Coding for Open-Ended Questions in Main Survey
- Appendix J Summary of Points from Open-Ended Interviews

I. Methods

Questionnaire Design

The Survey Lab developed an initial evaluation questionnaire in consultation with Barbara Radner and Justin Speer. The questionnaire was designed for self-administration and we supplied multiple modes for completion: mail, web, or FAX. Research has consistently shown that self-administered questionnaires produce more honest response than interviewer-administered questionnaires when the subject may

be either socially desirable (things people would like others to believe they think or do) or socially undesirable (things people would prefer others not know what they think or do). Because this was an evaluation, we wanted to maximize the opportunity for teachers to give their true opinions, uninfluenced by the tendency to want to seem positive to an interviewer.

We pretested this instrument with two of the teachers who had taken the course. The small universe of teachers meant that we were reluctant to lose any cases, therefore we secured permission from pre-test teachers in advance to fill out the actual survey once final revisions were made. We offered pre-test teachers a separate incentive for their participation in the pretest (\$20) and for their participation in the final survey (\$15).

We sent email links to each of the pre-test respondents and asked that they not follow the link until the time we called for the interview. The point was to get the pre-test respondent's immediate reactions to the questions as would be true in an actual survey situation. When we called, we had each respondent move through the questions one at a time, reading the question (but not giving us an answer), then responding to our queries about the questions. We asked such things as "Is the question clear?" "Can you rephrase the question in your own words?" or "Are there response choices missing that you would like to see?". At the end of each pretest, we asked the respondent if there were questions they had expected us to ask that we had not. A copy of the pretest questionnaire and the prompts for each question appear as Appendix A. Based on feedback from these pretest cases we revised the original questionnaire for final use.

We adapted the close-coded questionnaire that we developed for four types of case: those from year 1 who completed the program; those from year 1 who left the program before completion; those from year 2 who completed the program and those from year 2 who left prior to completion. The differences between the four versions consisted of the number of evaluation questions for the algebra instructors and the inclusion or exclusion of a question about reasons for withdrawing from the program before it was over. The instructors for the math and evaluation courses that were part of the program were different in each of the two years. Year 1 had two different algebra instructors while Year 2 had a single instructor. Table I.1 below summarizes the differences between the questionnaires.

Table I.1 Summary of Differences between Four Questionnaire Versions for Thirty-two Teachers Completing at least One Course

| Questionnaire Version | Target Group | Unique Questions | Questionnaire Location |
|--|--|---|------------------------|
| Main – Year 1 (N=13, 11 completed) | Completers from 2004-2005 cohort | Evaluation of 2 Algebra instructors | Appendix C |
| Early leaver – Year 1 (N=1, no completes) | Early leavers from 2004-2005 cohort | Reasons for withdrawing Evaluation of 2 Algebra instructors | Appendix D |

| | | | |
|---|--|---|------------|
| Main – Year 2 (N=15, 11 completed) | Completers from 2005-2006 cohort | Evaluation of 1 Algebra instructor | Appendix E |
| Early leaver – Year 2 (N=2, 1 completed) | Early leavers from 2005-2006 cohort | Evaluation of 1 Algebra instructors | Appendix F |

Seven of the teachers dropped out of the program very early, prior to completing even one of the four courses. We decided to pursue these early drop-out cases as open-ended interviews. It was not clear that the general evaluation questionnaire offered relevant questions for those who withdrew very shortly after initial enrollment. Further, we expected that those who had left the program after only a few classes might have more difficulty remembering their initial reasons for enrollment and how the program struck them at the time. Because in-person, open-ended interviews allow for follow-up probes and lengthy explanations, this approach seemed more appropriate as a method for learning why these teachers left the program so quickly. The interview guide used for these cases appears as Appendix G.

Since early leavers had spent very little time in the overall program, and in some cases this period was three and a half years in the past, the interview guide was intended to orient the respondents by asking them to recall how they first heard about the program, what initially attracted them to it, what they remembered about the logistics of its functioning and so forth prior to asking why they left early. Semi-structured interviews allow for conversational follow-up and so do not require pre-testing of language in the manner of fixed choice questionnaires. Experienced interviewers use the cues of the interview situation to encourage the respondent to expand on and explain their answers fully.

Respondent Recruitment

The initial list of participants included e-mail and street addresses for most of the teachers. In cases where such information was not available, we were able to locate some of these pieces of information with web searches and/or calls to various schools. Some of the original numbers provided proved to be disconnected and some of the email addresses were defunct; sometimes we were able to locate a new phone or email address and sometimes we were not. Ultimately, three teachers lacked email addresses, but had street addresses; one teacher lacked a street address, but had an email address; one teacher lacked any current locating information.

The period during which we recruited participants lasted from May 2 to May 23, 2007. We initially mailed an invitational letter (see Appendix B), a paper copy of the survey and a postage-paid return envelope to all respondents with surface mail addresses. We followed this with an email that contained a link to the web version of the survey. We also sent an email version of the letter to those for whom we had an email but no surface mail address. We followed up by phone where possible to make sure respondents had received our materials and to encourage participation.

One person declined to participate. We sent this person a final “Please reconsider” request by mail, but got no response. The others (with phones) all said they would fill out a questionnaire, but many did not. In cases for which we got no response and had no contact with the target person, we visited the teacher’s current school to make a personal recruitment attempt or leave a letter in the teacher’s school mailbox. We sent email reminders and a second paper questionnaire to non-responders. Later in the field period, we sent those who had still not responded a new email request with an attached copy of the questionnaire. The email text requested that the teacher print the form, complete it and FAX it back to the Survey Lab or, alternately, use the previously sent paper version or follow the link to the web version.

Table I.2 summarizes the contact information that was supplied or was eventually found for each case as well as the mean and total number of recruitment attempts by each mode.

Table I.2 Recruitment Attempts by Mode

| Recruitment Mode | N of Respondents with a ... | Mean attempts/case | Total recruitment attempts |
|------------------|--|--------------------|----------------------------|
| Phone | Phone Number: 35 | 3.2 | 122 |
| Email | Email address: 34 | 2.3 | 88 |
| Surface mail | Mailing address: 36 | 1.3 | 51 |
| In-person visit | Known school address if otherwise a non-responder: 7 | 0.1 | 5 |

Open-Ended Interviews

For the seven cases in which teachers withdrew from the program prior to the end of the first course, we endeavored to carry out in-person, open-ended (semi-structured) interviews. In two cases, however, these interviews were conducted instead by phone. One teacher had relocated to another state. Another initially declined to participate, but later reconsidered and agreed to speak with us if she could do it by phone. We sent a “thank you” of \$25 to teachers who participated in this interview.

Completed Interviews

Table I.3 below summarizes the completion rates and survey modes from among the 31 teachers asked to complete a mail or web survey.

Table I.3 Completion Rates and Mode by Cohort and Duration in Program

| Survey Target Group | Total N in group | Completed on Paper | Completed Online | Total Completed | Response Rate |
|-------------------------------------|------------------|--------------------|------------------|-----------------|---------------|
| Completers from 2004-2005 cohort | 13 | 4 | 7 | 11 | 85% |
| Early leavers from 2004-2005 cohort | 1 | 0 | 0 | 0 | 0% |
| Completers from 2005-2006 cohort | 15 | 6 | 6 | 12 | 80% |

| | | | | | |
|-------------------------------------|----|----|----|----|-----|
| Early leavers from 2005-2006 cohort | 2 | 0 | 1 | 1 | 50% |
| Total | 31 | 10 | 14 | 24 | 77% |

A number of the respondents omitted answers to one or two questions in the survey. We did not attempt to retrieve these data as these embedded skips appeared to be deliberate. One survey was submitted partially completed and it appeared the respondent may have mistakenly missed the final page turn. We made an attempt to retrieve the missing data for this case, but had no response.

Table I.4 below shows completion and mode information for the 7 cases of teachers who left the program prior to the end of the first course. We were able to obtain cooperation from all but one of these teachers.

Table I.4 Completion Rate and Mode for Open-Ended Interviews

| Personal Interview Target Group | Total N in group | Completed In person | Completed by phone | Total Completed | Response Rate |
|---------------------------------------|------------------|---------------------|--------------------|-----------------|---------------|
| Withdrew prior to end of first course | 7 | 4 | 2 | 6 | 86% |

Coding

The close-coded surveys each included three open-ended response questions:

1. What are the most important things the program did for you?
2. How, if at all, is the program continuing to have an impact on your teaching today?
3. Is there anything else you wanted to say about the program?

Not all the teachers remained within the boundaries of the first two questions, and elements of each of the questions were addressed in the final open-end by a few respondents. Because of the overlap in content, we coded all the open-ended text as a unit rather than individually.

We first read through the answers and came up with a list of categories that seemed to cover the content of the answers. We identified fourteen such categories which are defined in more detail in Appendix I. Next, we assigned two coders to read through the text and apply the codes independently. The two were 86% coincident in their application of the codes, a sufficiently high level of reliability for confidence in the results. The two coders then discussed the 14% of discrepant coding decisions and arrived at a consensus decision. The final codes were appended to the SPSS datafile along with a number of demographic variables regarding participants' years of teaching experience, education and recent training that were supplied by the Principal Investigator.

Open-ended Interviews

Five of the six open-ended interviews were conducted in pairs with one person leading the interview and the other taking notes. We have found this to be a useful way to collect very complete notes without the use of a tape recorder. In our experience, recording an interview results in less candid response and may also provoke higher

rates of refusal in the initial recruitment phase. The refusal conversion phone interview was conducted solo due to the need to get it done at the time the respondent called in rather than at a pre-scheduled appointment.

After completing the interviews, the note-taker wrote up an initial set of notes and the interview leader then read through and added any additional notes. Research staff read through the complete set of notes and pulled out a non-redundant list of all the points made by the participants. This list, dis-identified to preserve confidentiality, appears as Appendix J.

II. Findings

Reasons for Enrolling

The first question in the survey asked respondents why they initially enrolled in the program. The questionnaire included a close-coded list of nine potential reasons based on discussions with the principal investigator and pretests. Six participants selected “Other” reasons, but only two of these specified what those reasons were. One wrote “general knowledge” and the other said that teaching algebra in 8th grade was a goal for their school.

The distribution of responses to the reasons for enrollment are listed in order of popularity in Table II.1. All but one of the teachers (96%) selected “to improve your math knowledge” as a main reason for having joined the program and three-quarters of the teachers cited “long-term career progress” as a main reason. Roughly two-thirds (65%) were looking for immediate application to their teaching work and a similar proportion (63%) liked the idea of being in a program with colleagues from their school. Slightly less common, but still almost three-fifths of the teachers said that free tuition and math endorsement credit were main reasons to enroll. Finally, A fifth or fewer teachers cited urging by fellow teachers, the desire to meet teachers from other schools or the principal’s urging as reasons for having signed on.

Table II.1 Distribution of Reasons for Enrolling in the Program

| | Main Reason | Secondary Reason | Not a Reason |
|--|----------------|------------------|---------------|
| To improve math knowledge | 96% (N=23) | 0% (N=0) | 4% (N=1) |
| For long-term career progress | 75% (N=18) | 21% (N=5) | 4% (N=1) |
| For immediate application to teaching work | 65%* (N=15) | 22%* (N=5) | 13%* (N=3) |
| Liked the idea of being in a program with colleagues from school | 63% (N=15) | 17% (N=4) | 21% (N=5) |
| Free tuition | 58% (N=14) | 21% (N=5) | 21% (N=5) |
| For math endorsement credit | 58% (N=14) | 17% (N=4) | 25% (N=6) |

| | | | |
|---|--------------|---------------|---------------|
| Other teachers at school who were enrolling urged joining | 21% (N=5) | 33% (N=8) | 46% (N=11) |
| To meet teachers from other schools | 17% (N=4) | 42% (N=10) | 42% (N=10) |
| Principal urged enrollment | 8% (N=2) | 29% (N=7) | 63% (N=15) |
| Other | 21% (N=5) | 4% (N=1) | 75% (N=18) |

* One respondent left this question blank

A different way to consider reasons for enrolling in the program is to see how the various reasons, both primary and secondary, hang together among the participants. Factor analysis is a statistical procedure that looks for common variation among a set of variables to test whether or not co-variation suggests some underlying “factors” that might account for the observed pattern of results. It is a data reduction technique. The idea is that many observed behaviors, opinions or experiences may flow from a limited set of underlying predispositions (say “conservatism” vs. “liberalism”) or states. Here, we are interested in whether or not the constellation of reasons selected by respondents for enrolling in the program suggests a reduced set of underlying motivational types.

First, we recoded reasons as zero if not selected, one if selected as a secondary reason and two if selected as a main reason. Next we ran a factor analysis to see how, if at all, the responses cluster. Using a varimax rotation and substituting the mean for the one missing value, we show the rotated component scores in Table II.2 below. We have shaded high loadings – those that exceed .50. When questions have a high score on a factor (the range is from 0 to 1), this means they all share variation with an unnamed variable that must be construed by looking at the content of the items that load together. A factor analysis program looks for the maximum shared variance between items, then takes this “explained” variance away and iterates through again to see if there is a second factor. When there is little residual variation left to be explained (the standard cutpoint, used here, is an eigenvalue of less than 1.0), the program ceases to identify factors. An unrotated factor analysis assumes the factors are orthogonal to each other – that they share no variance. This is a very strict and often unrealistic assumption. Rotation allows some correlation between factors, a relaxed assumption that is often a more accurate reflection of characteristics in the real social world.

Table II.2 Factor Analysis Output for Reasons First Enrolled

| | Rotated Components | | |
|--|--------------------|-------------|-------|
| | 1 | 2 | 3 |
| Liked the idea of being in a program with colleagues from school | .826 | .192 | .054 |
| Other teachers at school who were enrolling urged joining | .807 | .041 | .075 |
| Free tuition | .775 | .223 | -.025 |
| Principal urged enrollment | .553 | .171 | -.237 |
| Wanted to improve math knowledge | .206 | .851 | .016 |

| | | | |
|--|-------|-------------|-------------|
| For long-term career progress | .220 | .815 | .116 |
| For immediate application to teaching work | .081 | .726 | -.042 |
| To meet teachers from other schools | .176 | .179 | .826 |
| For math endorsement credit | -.213 | -.093 | .777 |

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

We identified three clear factors. The first factor loads on the appeal of being part of a program with colleagues from one's school, the encouragement of fellow teachers to enroll, free tuition, and the encouragement of the principal to enroll. We might consider this a "school support" factor: colleagues are doing it and encouraging it; the principal is encouraging it; the program is being funded.

The second factor loads on the drive to improve oneself and become better at one's job: a desire to increase math knowledge, for long-term career progress and for immediate application in the classroom. This seems to be a "job investment – program content" factor.

Finally, the third factor loads on meeting teachers from other schools and math endorsement credit. It is quite interesting that the math endorsement credit loads with a more general social motivation (non-content, non-work group – loadings on those items are negative or close to zero) and not with a "job investment" factor. This casts the meaning of the math endorsement motivation for enrollment as more of a credential than an interest in the substance of the training. We could label this the "fun credential" factor.

Next, we looked to see if these three motivational orientations were correlated with the respondent's evaluations of the program. In a question toward the end of the survey, we asked respondents to rate the value of different program elements: the graduate courses in algebra, the assessment course, the student activity guides, the teaching guides, the formative evaluation guides and the project facilitator visits.

When we ran correlations between the three motivation factors and the value that teachers place on program features, we found no significant differences except in the case of teaching guides. Those who rated high on the "job investment – program content" factor were significantly more likely than those who rated high on either of the other motivational factors to highly value the teaching guides as one element of the program.

A correlation of the factors with responses to an open-ended prompt for what the respondent believed were the most important things the program did for him or her showed significant associations between the "school support" factor and mention of the program as a good source of useful materials and as a way to connect with experts outside the school.

When we ran correlations between these three factors and teacher training and education characteristics (whether or not the respondent has a master's degree, whether the degrees are in a field of education or something else, years at the current

school, years teaching, years in the Chicago Public School system, professional development during the past year, whether or not the teacher's students receive additional math instruction during or after school, whether or not the teacher operates in a self-contained classroom and the number of hours spent teaching math), the only significant association is between the "fun credential" factor and a teacher having a degree outside the field of education. Teachers with post-secondary degrees in communications, business, marketing and criminal justice are more likely to have a high rating on the "fun credential" motivation factor than teachers whose post-secondary degrees are all in education or education-related fields such as reading specialist or curriculum development.

When we ran correlations between these three factors and a code for whether or not the respondent volunteered any global positive assessment of the program in the open-ended questions, we see a significant and negative association with the "fun credential" factor. Teachers with a "fun credential" motivation for enrolling in the program are significantly less likely than other teachers to offer an unprompted global positive comment about the program such as "it is an excellent program" or "it was a great opportunity!" or "I would and have definitely recommended this program to others who have been offered the chance." At the same time, although teachers in all three groups have similar proportions of negative and positive ratings overall in the questionnaire, those who rate high on the "fun credential" enrollment motivation are significantly more likely than the others to give the top positive score when selecting a positive response.

As a second measure of motivation for taking part in the program, we asked respondents whether or not they would enroll again if they had it to do over. One respondent left this question blank, but the remainder all answer "yes". Table II.3 summarizes the reasons the participants supply for why they would enroll again.

Table II.3 Reasons Why Participants Would Enroll Again Given the Chance to Do it Over

| | Main Reason | Secondary Reason | Not a Reason |
|--|--------------------|-------------------------|---------------------|
| Increased own knowledge, skill | 95% (N =20) | 5% (N =1) | 0% (N =0) |
| Practical value in the classroom | 91% (N =21) | 4% (N =1) | 4% (N =1) |
| A chance to communicate and share ideas with teachers outside your school | 56% (N =13) | 35% (N =8) | 9% (N =2) |
| A group-building, bonding experience with teachers inside your school | 52% (N =12) | 44% (N =10) | 4% (N =1) |
| Credential for advancement | 82% (N =18) | 18% (N =4) | 0% (N =0) |
| Something Else | 9% (N =2) | 0% (N =0) | 91% (N =21) |

*Total N's vary as some respondents left items blank

There is a strong and significant correlation between selecting "practical value in the classroom" and the "job investment – program content" factor as a reason for actual

enrollment. None of the other reasons for the hypothetical choice of doing it again showed a significant relationship with the initial motivation factors.

Table II.4 Factor Analysis Output for Reasons Would Enroll Again if Had it to Do Over

| | Rotated Components | |
|---|--------------------|-------------|
| | 1 | 2 |
| A chance to communicate and share ideas with teachers outside your school | .874 | .038 |
| A group-building, bonding experience with teachers inside your school | .740 | .367 |
| Credentials for advancement | .671 | -.325 |
| Practical value in the classroom | -.055 | .842 |
| Increased own knowledge, skill | .084 | .804 |

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

If we run a second factor analysis of reasons for retrospectively making the decision to enroll, two clear factors emerge (see Table II.4), one that loads on knowledge, skill and applied value and the other that loads on social concerns, networking and credentials. The “knowledge, skill, applied value” factor correlates significantly with the “job investment – program content” factor from the first set of questions. The “fun credential” factor and the social concerns, networking and credential factor are modestly correlated, but this does not rise to the level of statistical significance.

The small total number of cases limits the degree to which we can make strong statements about these results. Nonetheless, the data suggest that for this set of participants there seem to have been two primary orientations for enrollment. One is focused on social and more narrow credential-based job considerations and the other is more fundamentally associated with a desire for increased knowledge, skill and practical value in the classroom.

Overall Satisfaction with the Program

Overall, participating teachers were very positive about the program. Tables II.5 and II.6 show the distribution of top scores and negative scores across the eighteen rating variables that were included in the survey. We see that about a quarter of the teachers assigned the top positive score for about 90% of the rating items and over half assigned the top positive score for about three-quarters of the rating items. Two-thirds of the teachers gave no negative score for any of the 18 possible places they might have assigned one and an additional 17% gave only one negative score. Thus, 84% of participants assigned zero or one negative score.

Table II.5 Proportion of Eighteen Rating Variables Given the Top Positive Score

| Proportion of 18 Rating Variables Given the Highest Positive Score | Frequency | Percent | Cumulative Percent |
|--|-----------|---------|--------------------|
| | | | |

| | | | |
|-------|----|------|------|
| 100 % | 1 | 4% | 4% |
| 94 % | 2 | 8% | 13% |
| 89 % | 3 | 13% | 25% |
| 83 % | 2 | 8% | 33% |
| 78 % | 1 | 4% | 38% |
| 72 % | 4 | 17% | 54% |
| 67 % | 5 | 21% | 75% |
| 61 % | 3 | 13% | 88% |
| 56 % | 1 | 4% | 92% |
| 50 % | 1 | 4% | 96% |
| 39 % | 1 | 4% | 100% |
| Total | 24 | 100% | |

Table II.6 Proportion of Eighteen Rating Variables Given Any Negative Score

| Proportion of 18 Rating Variables Given Any Negative Score | Frequency | Percent | Cumulative Percent |
|--|-----------|---------|--------------------|
| 33% | 1 | 4% | 4% |
| 28% | 1 | 4% | 8% |
| 22% | 1 | 4% | 13% |
| 17% | 1 | 4% | 17% |
| 6% | 4 | 17% | 33% |
| 0% | 16 | 67% | 100% |
| Total | 24 | 100% | |

The open-ended comments reinforce this overall positive evaluation. Among those who gave any response in any of the three open response fields, almost two-thirds (64%) volunteered that it was a “great program” or “an excellent program” or provided some other enthusiastic positive global assessment (the entire range of responses to the open-ended questions can be found in Appendix H with the rest of the survey response frequencies; Appendix I details how this code was assigned).

Teachers who left the program early, before the end of the first course, included those who were not positive about the program as well as those who were enthusiastic despite having withdrawn so early. Four of the six early leavers we interviewed left the program due to reasons outside the program itself – health/accident and logistical problems that arose after enrollment or a lack of time due to competing demands of the National Boards that several faced at the same time. Three of the four who left for unexpected reasons having to do with factors outside the program were still quite positive about the program, two especially so. One of the four gave the program more of a mixed review.

Two of the early leavers left because of the program itself. In one case the respondent did not believe the program met her needs because the materials were beyond the capabilities of her particular student population (particularly in assumptions about basic reading and writing skills). In the other case, the teacher felt the material was over her head and she felt lost.

Teachers who answered the close-coded survey were asked one open-ended question about the most important things they took away from the program. We coded these answers into a series of categories. Table II.7 summarizes the numbers of respondents with the various elements listed. More detailed definitions of the codes can be found in Appendix I.

Table II.7 Most Important Program Benefits Mentioned in Open-ended Response

| Open-ended response mentioned ... | N of Cases* | Percent of Cases |
|---|-------------|------------------|
| Supplying new ideas and strategies for math teaching | 18 | 82% |
| Improving teaching skills | 12 | 55% |
| Supplying useful materials | 11 | 50% |
| Improving math skills | 7 | 30% |
| Motivating the teacher to take on higher teaching goals, get more education, and/or enjoy teaching math | 5 | 23% |
| Helping the teacher see the relevance of math to specific grade levels and/or to other subjects | 4 | 18% |
| Connecting the teacher to peer math teachers | 4 | 18% |
| Boosting the teacher's confidence in understanding / teaching math | 3 | 14% |
| Lowering student anxiety about math through teacher strategies | 3 | 14% |
| Connecting the teacher to experts and resources outside the school | 3 | 14% |
| Helping the teacher plan a teaching program | 1 | 4% |

*22 of the 24 respondents supplied an open-ended response.

The most frequently mentioned gains from the program were new ideas and strategies for math teaching and/or improving the respondent's teaching. Half the teachers also made reference to the useful materials with which the program supplied them. Varying proportions of teachers (but less than half) mentioned a number of other program benefits including improved math skill, higher levels of motivation, higher levels of comfort with math and math teaching, and connections with teaching peers and outside experts.

Evaluation of the Instructors and Facilitator

One feature of the program was improving the algebra skills and knowledge of the teachers in three algebra courses. These courses were taught by two different instructors in the first cohort and by a single instructor in the second cohort. In addition, there was a fourth class in assessment taught by a single instructor. Table II.8 below provides summary information for the ratings respondents gave each instructor.

The ratings were quite high overall. On a scale of 1-5, with 1 as poor and 5 as excellent (3 is the neutral midpoint) the mean scores were all above 4; two were above 4.5 and one was a perfect 5. None of these instructors received any score on the "poor" side of the scale. The algebra instructor in year two was especially popular.

Table II.8 Ratings for Course Instructors

| Algebra Instructors | Assessment |
|---------------------|------------|
|---------------------|------------|

| Rating | Year 1 LN | | Year 1 JL | | Year 2 | | Instructor | |
|--------------------|--------------|---------|--------------|---------|--------|---------|------------|---------|
| | N | Percent | N | Percent | N | Percent | N* | Percent |
| 1 Poor | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% |
| 2 | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% |
| 3 | 2 | 18% | 1 | 9% | 0 | 0% | 1 | 4% |
| 4 | 4 | 36% | 1 | 9% | 0 | 0% | 5 | 23% |
| 5 Excellent | 5 | 46% | 9 | 82% | 13 | 100% | 17 | 73% |
| Mean Score | 4.3 | | 4.7 | | 5.0 | | 4.7 | |

* One respondent left this blank

As a different part of the program, a facilitator visited the classrooms of the teachers enrolled in the courses to observe and coach as teachers used program materials and implemented the approaches they were learning. Table II.9 summarizes the ratings of the facilitator.

Table II.9 Rating the In-class Facilitator

| Got as Much of Facilitator's Time as Needed | Rate Facilitator's Helpfulness | | Effect of Facilitator on Value of Courses & Materials | | | |
|---|--------------------------------|---------|---|-----------------------|---------|-----|
| | N* | Percent | | N | Percent | |
| Yes 92% (N = 22) | 1 Poor | 1 | 5% | Increased quite a bit | 11 | 50% |
| | 2 | 1 | 5% | Increased somewhat | 8 | 36% |
| | 3 | 2 | 9% | No added value | 3 | 14% |
| | 4 | 5 | 23% | | | |
| | 5 Excellent | 13 | 59% | | | |
| | Overall Rating | | 4.3‡ | | | |
| No 8% (N = 2) | 1 Poor | | | Increased quite a bit | 1 | 50% |
| | 2 | 1 | 50% | Increased some | | |
| | 3 | | | No added value | 1 | 50% |
| | 4 | | | | | |
| | 5 Excellent | | | | | |
| No interaction | 1 | 50% | | | | |

* One respondent left this blank

‡ If the "2" score from the respondent who did not get as much of the facilitator's time as needed is incorporated into the overall rating, it falls to 4.2

Twenty-two of twenty-four respondents (92%) reported that they got enough of the facilitator's time while two (8%) did not. One of the latter two reported never having interacted with the facilitator. Across all teachers who did interact with the facilitator, the mean rating on a 1-5 scale from "poor" to "excellent" was 4.2. Among those who got enough of the facilitator's time, the mean rating was 4.3. It appears however, that the overall rating of the facilitator by the teacher who reported not getting enough of that program person's time (a rating of "2" – between average and poor) was a commentary primarily on this fact since the same teacher said the facilitator increased the value of the courses and materials quite a bit.

Four of all the teachers (17%) reported that the facilitator added no value to the courses and materials; eight (33%) reported that the facilitator increased the value of the courses and materials somewhat; 12 (50%) reported that the facilitator increased the value of the courses and materials quite a bit.

In order to create natural local support groups, the Algebra Connections program was designed to recruit multiple teachers from each participating school. Teachers were asked not only to evaluate the value of the coordinator as a program feature that might enhance the value of the courses and materials, but also to evaluate what effect the facilitator had on the level of cooperation among teachers at the school. Results appear in Table II.10.

Table II.10 Effect of Facilitator on Cooperation Among Teachers at each School

| | Effect of Facilitator on Teacher cooperation | | | | Effect persists? | | |
|---|--|---------|---------|---------|------------------|----------------|---------------|
| | N | Percent | N | Percent | Yes | No | |
| Created or boosted team spirit | 17 | 71% | Created | 8 | 47% | 86% (N=12)* | 14% (N=2)* |
| | | | Boosted | 8 | 47% | | |
| | | | Both | 1 | 6% | | |
| Reinforced existing divisions or hierarchy | 2 | 8% | | | 100% (N=1)* | 0% (N=0)* | |
| No effect | 5 | 21% | | | | | |

* Some could not answer because they no longer teach at the same school where they taught during the program.

Seventy percent of the participants reported that the facilitator either created or helped to boost the teacher’s team spirit or both. Just under 10% believed the facilitator instead reinforced existing divisions or hierarchies among teachers; none believed the facilitator created new divisions or hierarchies. A fifth of the participating teachers believed there was no effect of the facilitator on the level of cooperation among teachers at the school.

Many of the teachers were no longer at the schools where they had originally enrolled in the program, so could not rate whether or not the facilitator’s effect on cooperation had persisted over time. Of those who remained at their schools, 86% believed the positive effect persisted, compared with 14% who believed it had not. The one teacher who said the facilitator had reinforced existing divisions that remained at the same school also said this negative effect had persisted over time.

Course Ratings

Overall ratings of the algebra and assessment courses are shown in Table II.11. Teachers gave the algebra courses high ratings for providing teaching strategies and useful teaching resources. Three-quarters of the teachers also gave these classes the highest rating for helping them to learn their subject matter better. The algebra courses were, however, rated less highly overall for linking participants to a support group of teachers.

Table II.11 Rating the Benefits of the Algebra and Assessment Courses

| | Not at all | A little | Moderatel | Very much | Total |
|--|-------------|--------------|--------------|---------------|-----------------|
| Algebra Courses: | | | | | |
| Helped to learn subject matter better | 0% (N=0) | 0% (N=0) | 25% (N=6) | 75% (N=18) | 100% (N=24) |
| Provided teaching strategies | 0% (N=0) | 0% (N=0) | 8% (N=2) | 92% (N=22) | 100% (N=24) |
| Linked to support group of teachers | 4% (N=1) | 13% (N=3) | 29% (N=7) | 54% (N=13) | 100% (N=24) |
| Provided useful teaching resources | 0% (N=0) | 0% (N=0) | 4% (N=1) | 96% (N=23) | 100% (N=24) |
| Assessment Course: | | | | | |
| Provided useful classroom strategies | 0% (N=0) | 5% (N=1) | 23% (N=5) | 73% (N=16) | 100% (N=22)* |
| Linked to support group of teachers | 9% (N=2) | 5% (N=1) | 36% (N=8) | 50% (N=11) | 100% (N=22)* |
| Increased teaching effectiveness | 0% (N=0) | 10% (N=2) | 19% (N=4) | 71% (N=15) | 100% (N=21)* |

* Some respondents left these blank

This echoes what we heard in the open-ended interviews. In those discussions, teachers reported that participants generally interacted within their own school groups in the algebra courses rather than linking with teachers from other schools. Still, about half the participants found the algebra courses to be excellent in this respect as well.

Although ratings of the assessment course were still high – 70% of participants gave the class top marks for increasing their teaching effectiveness and also providing useful classroom strategies, there were also several low rankings on these measures, which was not true for the substance ratings of the algebra courses. As was true for the algebra courses, this class got lower marks for linking participants to a support group of teachers than for the course content, with only about half choosing the top category for this measure.

We looked at the question asking whether other teachers from the respondent’s school remained in the program throughout, or whether the respondent was left as a singleton in the program due to others dropping out, to see if this could explain the two cases who felt the program did not at all link them to a support group of peers. It did not. There were two teachers among the completed cases who were left as singletons and both of these scored the courses as moderately helpful in linking them to a support group of other teachers.

We also looked at the potential association between the course ratings and the effort teachers put in. The results are summarized in Tables II.12 and II.13.

Table II.12 Mean Rating Scores by Teacher Effort on Homework*

| | Did All Assigned Homework | | Turned in All Assignments on Time | |
|---------------------------------------|---------------------------|----------|-----------------------------------|----------|
| | Yes (N= 18) | No (N=6) | Yes (N=15) | No (N=9) |
| Algebra Courses: | | | | |
| Helped to learn subject matter better | 3.7 | 4.0 | 3.7 | 3.9 |
| Provided teaching strategies | 3.9 | 4.0 | 3.9 | 3.9 |
| Linked to support group of teachers | 3.2 | 3.7 | 3.3 | 3.4 |
| Provided useful teaching resources | 3.9 | 4.0 | 4.0 | 3.9 |
| Assessment Course: | | | | |
| Provided useful classroom strategies | 3.6 | 4.0 | 3.7 | 3.6 |
| Linked to support group of teachers | 3.1 | 3.8 | 3.2 | 3.4 |
| Increased teaching effectiveness | 3.5 | 4.0 | 3.6 | 3.6 |

* The ratings are on a 1-5 point scale from 1=Not at all to 5=Very much.

Table II.13 Mean Rating Scores by Class Attendance*

| | Missed Any Classes | |
|---------------------------------------|--------------------|-----------|
| | Yes (N= 10) | No (N=14) |
| Algebra Courses: | | |
| Helped to learn subject matter better | 3.8 | 3.7 |
| Provided teaching strategies | 3.9 | 3.9 |
| Linked to support group of teachers | 3.1 | 3.5 |
| Provided useful teaching resources | 4.0 | 3.9 |
| Assessment Course: | | |
| Provided useful classroom strategies | 4.0 | 3.8 |
| Linked to support group of teachers | 3.4 | 3.5 |
| Increased teaching effectiveness | 3.0 | 3.8 |

* The ratings are on a 1-5 point scale from 1=Not at all to 5=Very much.

Teachers were asked how much of the assigned homework they completed, how much homework they turned in on time, and how many class sessions they missed. Those who reported completing all assigned homework and turning all homework in on time had predominantly *lower* ratings for the courses than those who reported either not completing some assignments or turning them in late. Conversely, those who reported missing any class sessions had more mixed results with some running in each direction.

The numbers are too small for any statistical significance, but lack of (self-reported) effort is clearly *not* systematically associated with lower ratings in this group of participants.

Continuing Effect on Teaching Strategies

We asked program participants to respond to an open-ended question about what ways, if at all, they continued to make use of anything from the program. About three quarters of the teachers who wrote in an answer volunteered that they continued to make use of teaching strategies they learned, and about three fifths that they continued to use materials (manipulatives and games) that had been disseminated to program participants (see Table II.14).

Table II.14 Respondent Report* of Continued Use of Strategies Learned in Program or Materials Disseminated by Program

| | Yes | No | Total* |
|-----------------------------|---------------|--------------|----------------|
| Continued Use of Strategies | 73% (N=16) | 27% (N=6) | 100% (N=22) |
| Continued Use of Materials | 59% (N=13) | 41% (N=9) | 100% (N=22) |

* Two respondents left this open-ended field blank

In addition to this open ended question, the survey presented participants with a close-coded set of prompts to rate teachers' current relative use of specific techniques as a result of the program. Respondents were asked if, due to having enrolled in the program, they now used each technique more, less, or the same as in the past. The results are found in Table II.15.

Table II.15 Relative Use of Teaching Techniques Since Enrollment as a Result of Program Participation

| What was the effect of this program on your use of the following techniques? | A lot more | A little more | No effect | A little less | A lot less |
|--|---------------|---------------|--------------|---------------|-------------|
| Peer interaction teaching methods | 63% (N=15) | 33% (N=8) | 0% (N=0) | 4% (N=1) | 0% (N=0) |
| Student initiated cognitive and meta-cognitive techniques | 75% (N=18) | 21% (N=5) | 0% (N=0) | 4% (N=1) | 0% (N=0) |
| Practice | 75% (N=18) | 21% (N=5) | 0% (N=0) | 4% (N=1) | 0% (N=0) |
| Teacher-initiated instruction* | 52% (N=12) | 35% (N=8) | 4% (N=1) | 4% (N=1) | 4% (N=1) |
| Teaching to multiple learning styles | 67% (N=16) | 29% (N=7) | 4% (N=1) | 0% (N=0) | 0% (N=0) |
| Reframing techniques | 58% (N=14) | 29% (N=7) | 4% (N=1) | 4% (N=1) | 4% (N=1) |
| Applications and practical examples | 67% (N=16) | 33% (N=8) | 0% (N=0) | 0% (N=0) | 0% (N=0) |
| Affective domain | 50% (N=12) | 33% (N=8) | 13% (N=3) | 4% (N=1) | 0% (N=0) |

| | | | | | |
|----------------------------------|---------------|--------------|--------------|-------------|-------------|
| Assessment* | 50% (N=12) | 33% (N=8) | 13% (N=3) | 0% (N=0) | 0% (N=0) |
| Teacher instruction of cognition | 58% (N=14) | 38% (N=9) | 4% (N=1) | 0% (N=0) | 0% (N=0) |

* One respondent left this question blank.

Overall there were few reports of less use of listed techniques and many reports of more use of listed techniques due to program participation. The biggest self-reported effects were on use of student-initiated cognitive and meta-cognitive techniques (have students keep math journals, write out steps, draw pictures/diagrams of problem-solving process, create their own problems, etc.) and having students do more practice applying their skills to new problems. The second largest effects were on teaching to multiple modalities (manipulatives, models, visuals, technology) and using real-world applications and practical examples. Other techniques showed less of a bump in use.

Although there was little reporting of declines in the use of the listed techniques, those with the most reports (just two cases) of less use were teacher-initiated instruction (one-on-one teaching, modeling problems for students, small group instruction) and reframing techniques (breaking problems into smaller parts, fewer or simpler problems, re-stating the problem, re-teaching lessons with different approaches). The most “no effect” reports (3 cases) are associated with techniques in the affective domain (positive reinforcement, verbal encouragement and patience).

Relative Value of Program Components

We asked the program participants to rate the value of different program components.

Table II.16 Comparative Program Component Ratings

| On a scale of 1 to 5, where 1 is the least valuable and 5 the most valuable, ratings of the following program components: | Mean Score | N of Cases* |
|--|-------------------|--------------------|
| Graduate Courses in Algebra | 4.8 | 22 |
| Student Activity Guides | 4.7 | 23 |
| Teaching Guides | 4.5 | 24 |
| Course in Assessment | 4.4 | 23 |
| Formative Evaluation Guides | 4.3 | 24 |
| Project Facilitator Visits | 3.6 | 23 |

* Several respondents left some of these blank

The algebra courses received the highest average rating with fully two-thirds of the participants rating it as “most valuable”. Table II.16 lists the mean ratings for the various program elements in descending order of scores. The project facilitator visits were rated as the least valuable aspect of the program overall.

III. Early Leaver Results

We conducted six open-ended interviews with early leavers – those who withdrew from the program prior to completing the first course. By definition these respondents

had limited experience with the program. However, because they were able to answer at more length and elaborate their answers in response to our probes, their answers provide some evaluative dimensions that are absent from the close-coded surveys.

We began our interviews by asking these respondents how they first heard about the program and what initially attracted them to enroll. All had learned about the program at their schools and most were attracted by the work “connections.” Apparently there had been a previous “connectors” program that was popular among teachers and the term “connections” sounded as if this program might be a continuation of that earlier one. At least one teacher felt pressured into enrolling by the school’s principal and resented this. Another thought the program was going to supply “fun ways to teach math.” Finally, several respondents felt they needed the program to get up to speed in their math skills. One of these felt weak in math so was unsure about teaching it without further training; the other was looking to update an outdated math teaching approach.

An interesting pattern that emerged from the answers we got is that Chicago Public School teachers are moved around from one grade level to another and from one subject to another and only learn about their assignments for one year at the end of another. Although no respondent raised this explicitly as an issue, it became clear through our discussions that this fact reduces the value of investing in teaching skills devoted to a single subject or grade level and also renders the timing of enrollment in courses problematic. One valuable aspect of the Algebra Connections program was the immediate applicability of lessons in the courses one day to classroom teaching the next. One reason for early dropout of a teacher was the mismatch between the curricular timing of algebra in her classroom and the program.

Discussions of why and how the respondents enrolled also revealed that recruiting groups of teachers from the same school appears to be a valuable program characteristic for some. This program feature provides teachers with a ready-made support group and a set of colleagues with whom to compare notes concerning how the program strategies translate for various age groups and teaching styles. The summary notes below illustrate this (in all notes “R” stands for “respondent”):

Four other teachers from R’s school attended, of whom she was closer to two. The participation of those two made R more enthusiastic about program, but R did not know until attending who would be in program for sure. R liked knowing others beforehand for the group work portions of course. About five teachers from R’s school participated. R really liked being part of a group and would have been somewhat scared going alone. R implies participation was linked to other teachers. This R said she really liked the immediate feedback she could get from co-participants in the course about how different approaches were working in their classrooms. The course was easier and better because of the others at the same school participating. R became closer to the other participants, and they got to know one another better from the program.

However, it also became clear that the success of group participation was contingent on pre-existing dynamics among staff inside the schools. Consider the following summary note from one interview:

R enrolled completely independently but found out after dropping out that another teacher from R's school had enrolled. Had R known of other teacher's presence, R might have stayed longer. The other teacher later said R should have stayed and that he could have helped R with the challenging course materials. The other teacher said the course did eventually teach different ways of teaching math in the classroom and said he would have helped R had R remained in the program.

When we asked for the reasons that respondents withdrew so early from the program, few mentioned the difficulty level of the courses. However, one respondent felt the material was over her head and she believed she was alone in feeling this way. Another mentioned that when teachers at the school who were *not* enrolled asked about it, they most commonly wanted to know how much homework there was and how difficult the homework was. A third respondent reported that non-participants from her school were surprised at the level of the course materials even though she herself thought it was typical for 8th grade. These responses along with several open-ended comments from the main survey imply that expectations among math teachers at some schools may fall below grade-level learning.

The role of the facilitator in the program was not clear to all participants, at least not those who withdrew very early. While some extolled the value of this program feature both because it forced teachers to implement strategies right away and because it provided coaching with doing so, others believed the facilitator was meant as an observer to judge the teacher. Those that withdrew most quickly were the most likely to hold this latter perception.

Most of those who remained in the program long enough to obtain materials were quite pleased with these. Most also seemed to like program instructors quite a bit.

The respondents who withdrew from the program early supplied some criticisms of the program as well as some suggestions for improvement. Problems they raised can be categorized as having to do with overall workloads, logistics, and program fit.

Overall workloads

- Several of the teachers who dropped out early were undertaking their National Boards, which are extremely time-consuming. As a matter of policy it might be prudent not to recruit teachers whose Boards will overlap with the program.
- One teacher was covering after-school programs and pointed out that taking evening courses makes for a very long and stressful day.
- One of the teachers emphasized the very high work load that is normal at her school due to very large class sizes, under-prepared students and lack of parent involvement. This teacher noted being exhausted by the end of a regular school day and thus finding it difficult to muster the energy for evening coursework and homework of her own.

- Another teacher found the program added enough stress to her life that she needed to withdraw for health reasons. One teacher suggested that the program should be shorter and less demanding.

Logistical issues

- Several of the early leavers pointed out that the programs were held at the DePaul campus which was difficult to get to at the time of day that classes were held – around rush hour. Although parking was provided, it was still hard to make it to class on time. One suggestion was to organize groups of nearby schools and teach the program in rotation among them so that none had to travel very far.
- One respondent said that the class voted on days and times to meet for class and that others agreed on Saturday. This was not a time this respondent was willing to consider. Scheduling a class time for a set of teachers whose regular days end at varying times and who have varying commitments outside of work is quite a challenge.

Program fit

- A number of teachers had complaints about particular features of the program that did not fit well with their classrooms. One pointed out that students at her school have extremely limited reading and writing ability (far below grade level), thus rendering many of the math program strategies impossible. This, however, contrasts with the remarks of others who felt the program helped them to organize math teaching for various abilities and grade levels.
- Another disliked the surveys that students had to complete, citing the fact that these took an hour or so out of the day and were, she felt, likely to be unreliable in any case because the students quickly tired of them and wrote anything just to finish. This teacher suggested that, in her classroom, a group discussion of the survey issues would have been more efficient and productive. This complaint is in contradistinction to another participant who believed the surveys helped her to identify where students were going wrong in their work.
- Several of the teachers were particularly pleased with the group-oriented style of the courses and program more generally. However, one participant did not favor group work as a personal learning style and wished the program had also made more room for independent learning. Several of the teachers who left the program early suggested that more complete information about the syllabus and program set-up should be distributed prior to enrollment.
- One teacher believed the program material was simply too hard for her and that her ability level could not be accommodated within the courses.

Summary

The overall tone of the feedback from teachers enrolled in the Algebra Connections program was strongly positive. This was particularly true of teachers who remained in the program to its conclusion, but even those who dropped out of the program, some quite early, had some very good things to say about the program. Several of the early leavers seemed to have taken away useful strategies that they continue to employ in their teaching work based on even limited time in the program.

Analysis of the reasons respondents provided for enrolling in the program indicate that there were, at least for this group, two different orientations among program participants. One group was focused on social interaction and credentials. A second group was focused on acquiring new knowledge, skills and putting these directly into practice. It would be interesting to be able to measure whether these teacher orientations were in any way associated with student learning outcomes.

Based on informal conversations with respondents during our phone recruitment efforts and the personal interviews we conducted with the early leavers, a strong teaching staff is an important aspect of this overall high level of satisfaction. This impression is reinforced by high marks given to those who taught the different courses that were part of the program. Some of the algebra instructors were more popular than others, but all got consistently positive scores. Maintaining strong teaching staff is likely to remain the backbone of a successful program in the future.

The facilitator was less popular among some of the teachers, but also had a strong positive rating overall. One of the personal interview respondents pointed out that the facilitator “forced” teachers to implement the new methods they were learning – not with force, actually, but by making it awkward for teachers to postpone familiarizing themselves with the materials and trying them out with their students. Since they knew the facilitator was coming, the teachers took the time to get ready and put the techniques into practice. She said it was probably one of the greater strengths of the program to have this sort of “enforcement” in place because otherwise busy teachers would simply put off implementation indefinitely. It could be that teachers were more varied in their assessment of the facilitator because of the implicit policing aspect to her role.

The main downside of the program that teachers identified was the unavoidable fact that it added work and hours to jobs that may already be stressful and time-consuming. The greatest burden falls on the most dedicated teachers who spend time with students or in programs before and after school as well as during the regular school day. However, these data are consistent with the conclusion that teachers who were motivated by a real interest in learning the material and applying their knowledge immediately to the classroom were also those who found the program most rewarding.