# *Results of a Study of a Teaching-Credential Program's Impact on Recent Graduates: Report to the CSUN Department of Secondary Education and Teachers for a New Era*

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## OVERVIEW

During the 2006-07 school year, the TNE Evidence Committee conducted an evaluative study of the impact of a Secondary Education Department (SED) teaching-credential program to answer:

- To what degree do new credential-program graduates implement CSUN-emphasized teaching practices (henceforth, the Practices) in their classrooms?
- What factors facilitate or impede implementation of these Practices?

Ten 1st and 2nd-year fulltime secondary math teachers who earned CSUN Traditional Single-Subject Math credentials from fall 2004 to spring 2006 agreed to be observed teaching in their mathematics classrooms and to be interviewed.

In 2008-09, Julie Gainsburg, with assistance by Marian Pasternack, repeated the study, as follows:

**Research Questions**
- To what degree do new credential-program graduates implement CSUN-emphasized teaching Practices in their classrooms?
- What factors facilitate or impede implementation of these Practices?
- Is the program improving over the years in terms of this implementation?
- Do graduates implement the Practices differently in Years 3-4 from Years 1-2?

**Participants (*n* =19)**
- 11 first- and second-year fulltime secondary math teachers who earned CSUN Traditional Single-Subject Math credentials from fall 2006 to spring 2008
- 8 of the original participants from the 2006-07 study, now third- and fourth-year teachers

**Methods**
- Collaborative development (2006-07) with key SED personnel of a protocol for classroom observations to detect the presence/significance of research-based, program-emphasized Practices
- Collection of written background information from each participant prior to observation
- One period-long observation of each participant, during which we noted each incident of the Practices, rated the overall significance of each Practice to the lesson (Significant, Marginal, or None), and recorded the time spent in each of 11 teaching modes
- Audiotaped interview of each participant immediately after each observed lesson

**Data Analysis**
- Percentage of time spent per teaching mode total (i.e., breakdown of the average lesson)
- Significance of each effective practice in the lessons overall
- Qualitative analysis of interview data to identify factors facilitating and impeding the practices
- Comparative analysis of all data to detect differences among various cohorts

This document summarizes the results of this study for the purposes of SED discussions about possible programmatic improvements, modifications to assessment, and the design of future studies. It also serves as a final report to Teachers for a New Era.

# OBSERVATION RESULTS SUMMARY

**Who participated?**

- There were two pools of prospective participants: the 21 graduates who earned the traditional, single-subject math credential between fall 2006 and spring 2008 and the 10 participants of the 2006-07 study.
- From the first pool, we were able to find and communicate with 20 of the 21 graduates.
    - Of these 20, 15 were fulltime secondary math teachers at the time of the study.
    - Of these 15, 11 agreed to participate.
- We were able to find and communicate with 9 of the 10 participants from 2006-07.
    - Of these 9, 8 agreed to participate this year.
- In total, there were 19 participants: 11 Year 1-2 teachers and 8 Year 3-4 teachers. Each was observed for one period-long lesson and interviewed for 45 minutes afterwards.

**Where, what, and whom did they teach?**

- The 19 participants taught in 18 different schools in 8 districts (10 participants taught in LAUSD).
- 6 participants taught in middle schools and 13 in high schools.
- We observed 9 lessons in Algebra 1 classes, our target. Other classes observed were Prealgebra (5 lessons), Geometry (3), and Algebra 2 (2).
- 6 of the lessons observed were in classes that included designated English learners (ELs).
- 10 of the lessons observed were in classes that included pupils with special needs.
- 6 of the lessons observed were in classes that included pupils with poor mathematical backgrounds.
- 3 of the classes observed were honors courses.

**How was each teacher's level of Practice implementation determined?**

In the 2006-07 study, levels of implementation of the Practices were delineated to yield 3 roughly equal sized groups with natural breakpoints. Those were:

- *Low Implementer:* No Practices were rated as Significant to the observed lesson, 3 or fewer Practices were rated Marginally significant to the observed lesson, the observer noted a low level of pupil engagement with concepts, and the interview suggested that the Practices were generally not a significant part of most of the teacher's lessons.
- *Moderate Implementer:* One or no Practices were Significant to the observed lesson, more than 3 Practices were Marginally significant to the lesson OR more than 2 Practices were Marginally significant and groupwork was used, the observer noted a low level of pupil engagement with concepts, and the interview suggested that the Practices were occasionally a significant part of the teacher's lessons.
- *High Implementer:* One or more Practices were Significant to the observed lesson, the observer noted a high level of pupil engagement with concepts, and the interview suggested that some Practices were frequently a significant part of the teacher's lessons.

To enable comparison across the two study years, these same breakpoints were used in the 2008-09 study, even though they did not yield equal sized groups. In 2008-09, 8 participants were rated as High Implementers, 3 as Moderate Implementers, and 8 as Low Implementers.

**What does the "average" lesson of recent credential-program graduates look like in 2008-09?**

*Method*

We recorded the amount of time in each lesson that was devoted to each of 11 teaching modes:

| | |
|---|---|
| TI | teacher presentation of behavioral directives or task instructions |
| TM | teacher presentation of math content (minimal or no pupil input) |
| SD | pupil demonstration (more significant than verbal answer from seat) |
| WP | whole-class discussion to review/apply learned procedures (significant pupil input) |
| WC | whole-class discussion to co-construct new concepts or procedures |
| GP | pair or small-group work practice of learned procedures |
| GC | pair or small-group concept development (e.g., discovery activity/lab/project) |
| IP | individual practice of learned procedures |
| IC | individual concept development (e.g., discovery activity/lab/project) |
| T/Q | test/quiz |
| U | activity or discussion unrelated to math or implementation of the lesson |
| O | other |

We summed these times across all 19 lessons and found the percent of time each mode contributed to the total. Thus, we arrived at a breakdown of an "average" lesson of the 19 participants (Figure 1).

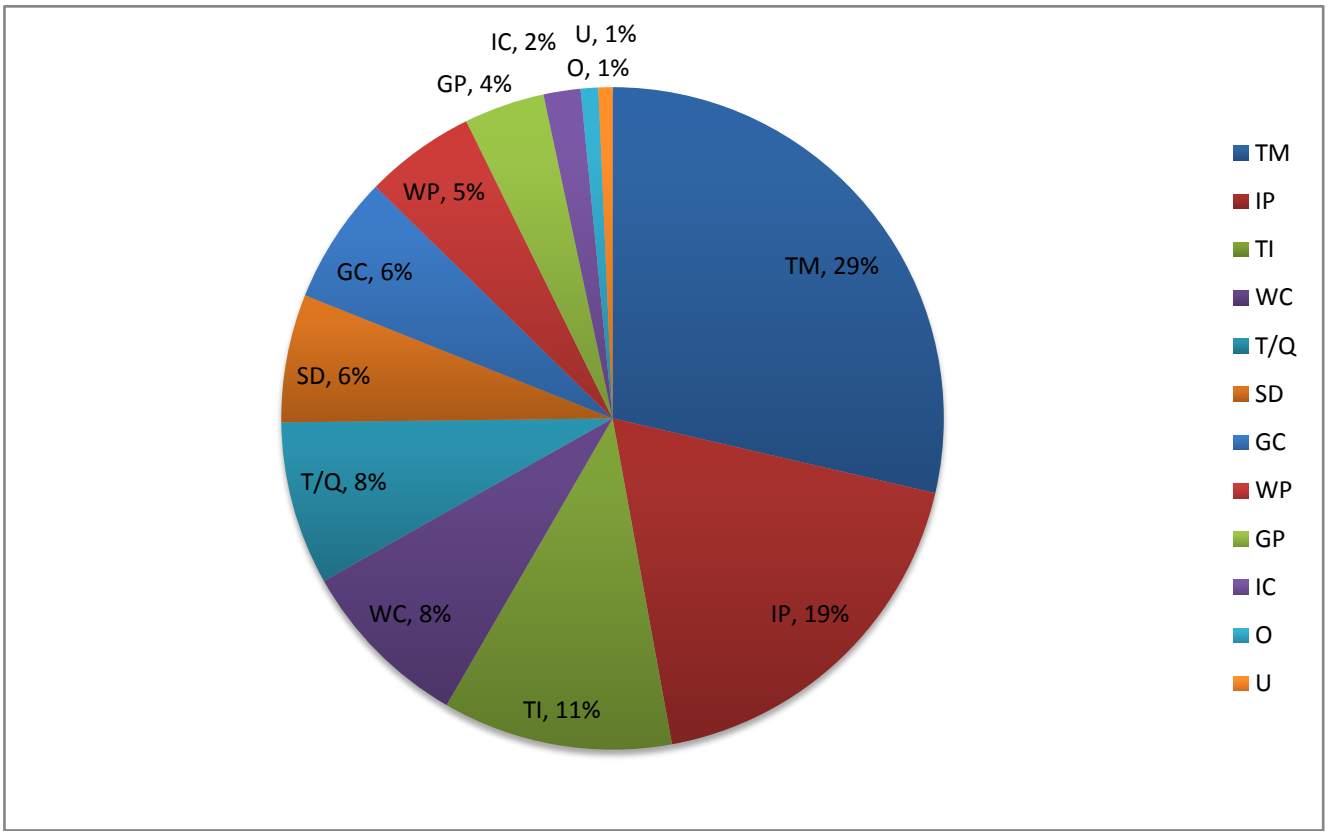
*Highlights*

- For 29% of the duration of the average math lesson taught by our graduates, the teacher presents math content, taking minimal or no input from pupils. This can take the form of lecture but more often includes teachers asking questions of pupils requiring short answers that recall taught content. (In 2006-07, this mode took 24% of the average lesson.)
- For 19% of the duration of the average math lesson, pupils individually practice already-learned procedures, i.e., do "seatwork." In this mode, teachers sometimes allow but do not explicitly encourage pupils to consult with peers. (In 2006-07, this mode took 32% of the lesson.)
- Other significant modes are the teacher giving behavioral directives or task instructions (11% of lesson time) and whole-class discussion with significant pupil input to review or apply learned procedures (8%). All other modes (except for testing and quizzing) represented 6% or less of the average lesson time.
- Groupwork was used little; group construction of concepts and group practice of learned content combined took 10% of the average lesson. (Group practice took 8% in 2006-07, when there was no group construction of concepts.)
- Pupil construction of concepts, whether done as a whole class, in a group, or individually, took 16% of the lesson. Pupil practice, whether done as a whole class, individually, or in groups, took 28% of the lesson. (In 2006-07, pupil construction was 4%, while practice was 48%.)

*Caveats*

- The 19 lessons ranged in duration from 42 to 110 minutes. We did not normalize these data; thus, a longer lesson (and its teacher) had greater influence on the average than a shorter one.
- Participants helped select the lesson to be observed. Thus, they possibly made greater than usual use of modes (e.g., groupwork) that they believed would impress CSUN observers.
- The time spent on tests or quizzes reported here is probably lower than normal, because we tried to avoid observing lessons that included tests or long quizzes.

Figure 1. Breakdown of the "Average" Lesson: Combined Observations




| | |
|---|---|
| TM | teacher presentation of math content (minimal or no pupil input) |
| IP | individual practice of learned procedures |
| TI | teacher presentation of behavioral directives or task instructions |
| WC | whole-class discussion to co-construct new concepts or procedures |
| T/Q | test/quiz |
| SD | pupil demonstration (more significant than verbal answer from seat) |
| GC | pair or small-group concept development (e.g., discovery activity/lab/project) |
| WP | whole-class discussion to review/apply learned procedures (significant pupil input) |
| GP | pair or small-group work practice of learned procedures |
| IC | individual concept development (e.g., discovery activity/lab/project) |
| O | other |

**To what degree do recent credential-program graduates implement CSUN-emphasized teaching Practices in their classrooms?**

*Method*

The 2006-07 research team, in conjunction with key SED personnel, developed a list of research-based "effective practices," here called the Practices, that are emphasized in our math credential program:

1) Teacher asks question or poses task with a **high level** of cognitive demand
2) Pupil given **authority to judge** the mathematical soundness of publicly presented solution or method
3) Teacher **connects** (or poses task that prompts pupil to connect) the featured math topic to **another math** topic
4) Teacher **connects** (or poses task that prompts pupil to connect) the featured math topic to **another academic** topic
5) Teacher **connects** (or poses task that prompts pupil to connect) the featured math topic to a **real-life** situation or object
6) Pupils allowed or encouraged to **choose** among solving **methods** or present alternative methods
7) Teacher or pupils use **technology, manipulatives**, body movement, or other nonverbal support for a math concept
8) Specific attention paid to **language**, i.e., writing, reading, or speaking skills
9) Teacher uses or encourages pupil to use multiple **forms of representation** for the same problem

During each observed lesson, we noted each incident of these Practices, then rated the overall significance of each Practice to the lesson (Significant, Marginal, or None). For each Practice, we counted the number of lessons at each significance level. Figure 2 shows, for each Practice, the percents of the total set of 19 lessons that displayed each significance level.

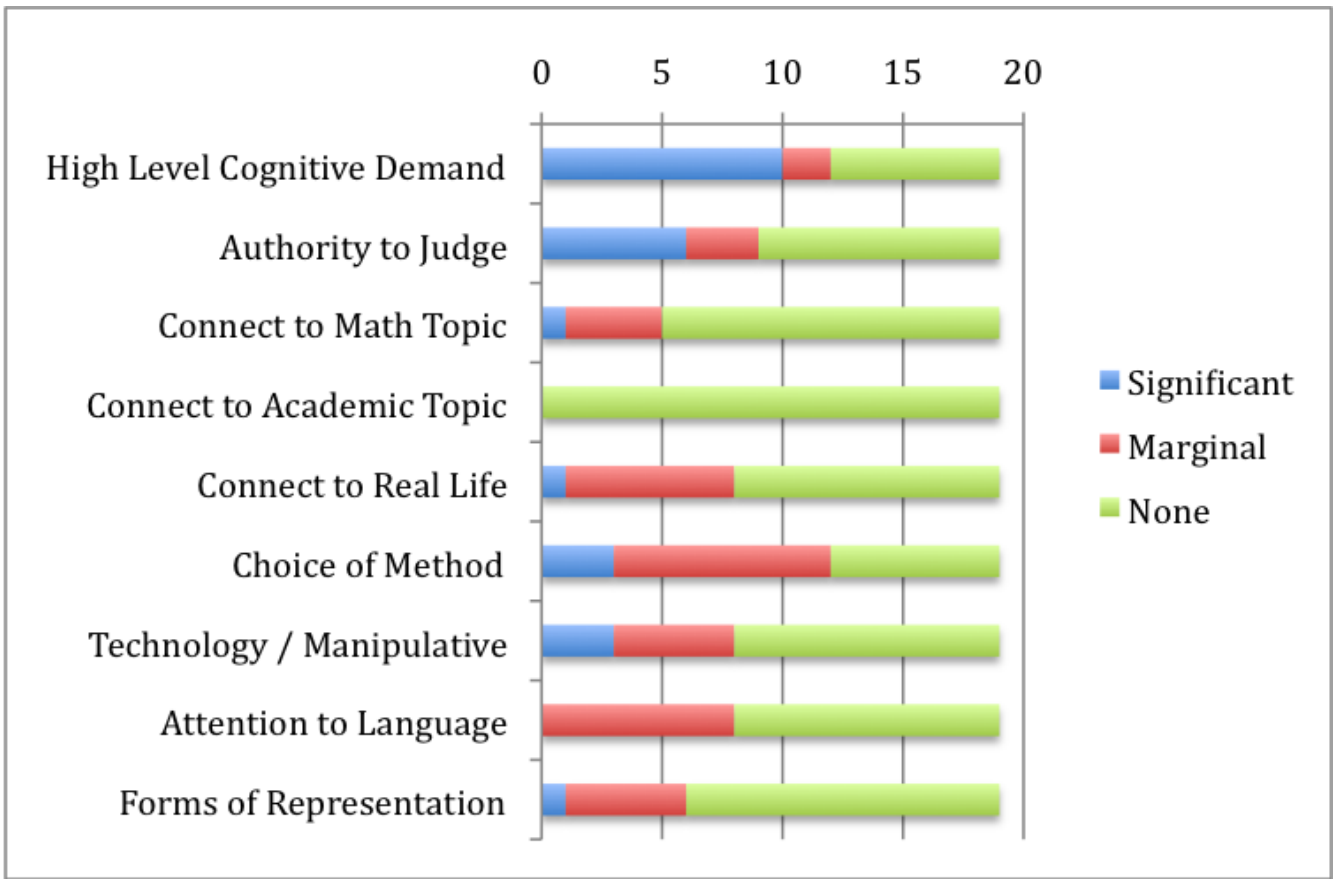
*Highlights*

- The Practice rated Significant in the greatest number of lessons was posing tasks with a **high level** of cognitive demand. Over half (10/19) of the lessons used this Significantly, with another two lessons using it Marginally. (In 2006-07, this Practice was Significant in 19% and Marginal in 31% of the lessons.)
- Giving pupils the **authority to judge** the mathematical soundness of a solution or method was the next most Significantly used Practice: 32% (6 lessons) used it Significantly, with another 13% (3 lessons) using it marginally. (In 2006-07, these figures were both 25%.)
- No other Practice was Significant in more than 3 lessons.
- Neither attention to **language development** nor connecting math to another **academic topic** was Significant in any lesson; the latter was not observed at all, even Marginally. (These were also the two least-observed Practices in 2006-07.)
- Giving pupils a **choice of method**, paying attention to **language development**, and connecting math to **real life** were used Marginally in 9 (47%), 8 (42%), and 7 (37%) lessons, respectively. (In 2006-07, these figures were 38%, 13%, and 31%, respectively.)

*Caveats:*

- Teachers helped select the lesson to be observed. Thus, they possibly made greater than usual use of practices they believed would impress CSUN observers.

Figure 2: CSUN-Emphasized Practices Observed (by number of lessons)



## COMPARATIVE ANALYSES OF TEACHING

**Do the Year 1-2 and Year 3-4 teachers in the 2008-09 study teach differently from each other (i.e., is there an experience influence across different teachers)?**

*Does the average lesson of the Year 3-4 teachers differ from that of the Year 1-2 teachers?*
In 2008-09, the main teaching modes (≥10% of the time) used in the average lesson of the 11 Year 1-2 teachers were:

- Teacher presentation of math content (minimal or no pupil input) (32%)
- Individual practice of already-learned procedures (16%)
- Teacher presentation of behavioral directives or task instructions (11%)
- Whole-class discussion to co-construct new concepts or procedures (10%)

Groupwork was used for 6% of the lesson and 15% of the lesson was devoted to construction of concepts.

The main teaching modes (≥10% of the time) used in the average lesson of the 8 Year 3-4 teachers were:

- Teacher presentation of math content (minimal or no pupil input) (23%)
- Individual practice of already-learned procedures (23%)
- Teacher presentation of behavioral directives or task instructions (11%)
- Pair or small-group concept development (e.g., discovery activity/lab/project) (11%)
- Pupil demonstration (more significant than verbal answer from seat) (10%)

Groupwork was used for 17% of the lesson and 19% of the lesson was devoted to construction of concepts.

It should be noted that whole-class and small-group construction of concepts were each only used by two Year 1-2 and two Year 3-4 teachers at all. The large amount of time two Year 1-2 teachers spent in whole-class construction of concepts and two Year 3-4 teachers spent in small-group construction of concepts are responsible for the high percents of these modes. With this caveat, the data show that in their average lesson, the Year 3-4 teachers in the 2008-09 study spent less time presenting math content and slightly less in whole-class concept construction (7%) than did the Year 1-2 teachers in this study, but gave more time to small-group concept construction, pupil demonstrations, and groupwork in general. This suggests a possible loosening of the reigns—that the more experienced teachers feel more comfortable moving away from the front of the room and allowing pupils to take more responsibility for learning the content.

*Do the Year 3-4 teachers implement the Practices differently than the Year 1-2 teachers?*
There was virtually no difference in Practice-implementation level between more and less experienced teachers in the 2008-09 study:

- The Year 1-2 teachers comprised 4 High implementers, 3 Moderates, and 4 Lows.
- The Year 3-4 teachers comprised 4 High implementers and 4 Lows.

There was also little difference in which Practices were implemented by these groups:

- The Year 1-2 teachers as a group Significantly implemented high-level tasks (6 participants), pupil authority (4), multiple methods (1), tech/manipulatives (2), and math connections (1).
- The Year 3-4 teachers as a group Significantly implemented high-level tasks (4 participants), pupil authority (2), multiple methods (2), tech/manipulatives (1), real-world connections (1), and multiple representations (1).

**Do the Year 3-4 teachers in the 2008-09 study teach differently from how they taught as Year 1-2 teachers two years ago in the 2006-07 study (i.e., did experience influence the same teachers)?**
Eight participants from the 2006-07 study returned to participate in the 2008-09 study. The 2006-07 data were recalculated to include only the first observed lesson (some had been observed twice) of these 8 teachers and compared to the 2008-09 data for the same 8 teachers, now with two additional years of experience.

*Has the average lesson of this cohort changed with an additional two years of experience?*
In 2006-07, the main teaching modes used in the average lesson of these 8 teachers were:

- Teacher presentation of math content (minimal or no pupil input) (31% of the duration of the lesson)
- Individual practice of already-learned procedures (27%)
- Whole-class discussion to review/apply learned procedures (significant pupil input) (12%)
- Teacher presentation of behavioral directives or task instructions (9%)

Groupwork was used by these teachers for 4% of the duration of the average lesson and 6% of the lesson was devoted to modes where pupils constructed math concepts.

In 2008-09, these same 8 teachers' average lesson mainly used:

- Teacher presentation of math content (minimal or no pupil input) (23%)
- Individual practice of already-learned procedures (23%)
- Pair or small-group concept development (e.g., discovery activity/lab/project) (11%)
- Pupil demonstration (more significant than verbal answer from seat) (10%)

Groupwork was used by these teachers for 17% of the lesson and 19% of the lesson was devoted to modes where pupils constructed math concepts.

As noted above, only two of these teachers used pair- or small-group construction of concepts at all; that one used it for 40 minutes of the observed lesson skewed the data in favor of this mode. With that caveat, the data show a slight trend away from teacher presentation and towards pupil talk, groupwork, and pupil concept development.

*Has this cohort's implementation of the Practices changed with an additional two years of experience?*
The cohort as a whole barely changed in terms of observed level of Practice implementation.

- In 2006-07, there were 4 High implementers, 2 Moderates, and 2 Lows.
- In 2008-09, there were 4 Highs and 4 Lows.

However, there was movement within these groups. Two Highs in 2006-07 dropped to Low in 2008-09, as did one Moderate. One Low and one Moderate in 2006-07 raised to High in 2008-09. Only three teachers stayed at the same level of implementation. There were also changes in which Practices were Significant to the lessons taught by the four teachers who were rated High in 2008-09:

| | |
|---|---|
| Teacher A | 2006-07—Tech/manipulatives |
| | 2008-09—High-level tasks, pupil authority, multiple methods |
| Teacher B | 2006-09—High-level tasks, real-world connections, tech/manip., multiple methods |
| | 2008-09—High-level tasks, tech/manip. |
| Teacher C | 2006-07—None |
| | 2008-09—High-level tasks, real-world connections, multiple representations |
| Teacher D | 2006-07—Tech/manip. |

This movement suggests either that the teachers changed over the years or that this is not a very stable categorization system. It may be that High implementers (and maybe all teachers) use different Practices on different days. These four teachers each demonstrated 3-4 Practices over the two years.

*What changes do these teachers perceive in their teaching over the two years?*
In the interview, these 8 teachers were asked how they felt their teaching had changed since our observation two years prior. They were not asked about changes in their use of the Practices explicitly. The four teachers rated as High implementers in 2008-09 reported:

| | |
|---|---|
| Teacher A | Doing more groupwork, now that he is more relaxed and less overwhelmed. |
| Teacher B | Having a better flow (sequence) of content; being stricter. |
| Teacher C | Using more projects and better questioning techniques, both due to site-based professional development (PD). |
| Teacher D | Using less small-group work in favor of pair work. |

Three of the four teachers rated Low implementers in 2008-09 reported:

| | |
|---|---|
| Teacher E | Making more real-world connections; asking more high-level questions due to PD. |
| Teacher F | Improved classroom management and logistics. |
| Teacher G | Having relinquished some control to the pupils; allowing more pupil-to-pupil talk. |

Therefore, despite the lack of movement over two years in the observed lessons of the cohort as a whole in terms of level of implementation, individual observations and interviews paint a brighter picture: Some teachers perceive personal improvements in the direction of increased use of the Practices and the data suggest that more Practices would be observed with additional observations.

*Did factors other than experience impact these teachers' implementation over the years?*
Some changes in implementation level might be explained by factors other than experience. The participants noted these changes in their personal situation that we inferred might have impacted implementation:

| | |
|---|---|
| Teacher C (Low → High) | Continued or increased involvement in internal PD. (This was the only participant to portray the observed day as atypical—that is, her High implementation was rare.) |
| Teacher D (Mod → High) | Started an education masters degree program at CSUN. |
| Teacher G (High → Low) | Has a new school administration (which she explicitly linked to reduced implementation of one Practice); is more pressed for time and health is suffering; taught in pain during the 2008-09 observation. |
| Teacher J (High → Low) | Transferred from a junior to senior high. |

**Does the original cohort of Year 1-2 teachers from the 2006-07 study teach differently from the current Year 1-2 cohort (possibly indicating program improvement)?**
The data from the 11 Year 1-2 teachers from the 2008-09 study were compared to the data for the 10 Year 1-2 teachers in the 2006-07 study, to see if the teaching of the newest graduates of our program has changed over the last two years.

*Has the average lesson of Year 1-2 teachers changed in the last two years?*
In 2006-07, the main teaching modes (≥10% of the duration of the lesson) used in the average lesson of the 10 Year 1-2 teachers were:

- Individual practice of already-learned procedures (32%)
- Teacher presentation of math content (minimal or no pupil input) (24%)
- Teacher presentation of behavioral directives or task instructions (12%)

Groupwork was used for 8% of the lesson and 4% of the lesson was devoted to modes where pupils constructed math concepts.

In 2008-09, the main teaching modes (≥10% of the time) used in the average lesson of the 11 Year 1-2 teachers were:

- Teacher presentation of math content (minimal or no pupil input) (32%)
- Individual practice of already-learned procedures (16%)
- Teacher presentation of behavioral directives or task instructions (11%)
- Whole-class discussion to co-construct new concepts or procedures (10%)

Groupwork was used for 6% of the lesson and 15% of the lesson was devoted to modes where pupils constructed math concepts.

As noted earlier, only two participants in 2008-09 used whole-class discussion to co-construct new concepts or procedures at all; that one used it for 56 minutes of the observed lesson skewed the data in favor of this mode. Also, because one participant gave an extended quiz on observation day, this mode took a high percent of the average lesson but was excluded from this comparison because we had tried to avoid observation days that involved extended quizzes or tests. With these caveats, the data show that Year 1-2 teachers today devote less time to pupils individually practicing learned procedures in favor of more teacher presentation of content and pupil construction of concepts as compared to Year 1-2 teachers in 2006-07.

*Has the implementation of the Practices by Year 1-2 teachers changed in the last two years?*
There was little difference in overall implementation levels of the two Year 1-2 cohorts.
In 2006-07, there were 4 High implementers, 2 Moderates, and 3 Lows.
In 2008-09, there were 4 High implementers, 3 Moderates, and 4 Lows.

In 2006-07, the four Year 1-2 Highs Significantly implemented high-level tasks (2 participants), pupil authority (2), tech/manipulatives (2), real-world connections (1), and multiple methods (1).
In 2008-09, the four Year 1-2 Highs Significantly implemented high-level tasks (4), pupil authority (4), tech/manipulatives (1), multiple methods (1), and math connections (1).

In 2006-07, each High implementer used from 1 to 4 Practices Significantly in a lesson; in 2008-09, each High used 2 to 3. All four Highs in 2008-09 used high-level tasks and pupil authority, while in 2006-07, each of these Practices was used by only two teachers.

## FACTORS INFLUENCING THE IMPLEMENTATION OF THE PRACTICES

From the post-observation interviews in the 2008-09 study, factors that the 19 participants reported or implied as influencing their use of the Practices (including groupwork) were extracted. Two categories of factors are distinguished:

1) Factors that participants directly cited as influencing their use of one or more Practices or that were interpreted as directly influential.
2) Factors that participants cited in a way that suggested they might influence the use of one or more Practices or that could be interpreted as influencing the practices.

Factors that participants explicitly tied only to non-Practices are not included in this analysis. Possible factors related to teachers, classes, or schools that could be determined from the teachers' background form and publically available school data were also examined.

### What factors do teachers perceive as *supporting* their implementation of the Practices?

*Overall:*

- The student-teaching experience (including the master teacher or CSUN supervisor) is the most-cited support for using the Practices today. CSUN courses are the second-most cited support, becoming first if indirectly cited supports are included. Most participants (14) mentioned student teaching and most (14) mentioned CSUN courses in the context of supporting the Practices.
- Mentioned less than half as often is internal professional development (PD), the next-most cited support. If internal and external PD are combined, 5 participants total cited them directly as supporting the Practices, and another 2 indirectly.
- All other supports were cited by 1-3 participants, with the exception of 4 cites for online resources.

*Differences by implementation level:*

- Teachers across implementation levels cited similar numbers of supports overall.
- No significant differences are seen in terms of which supports were cited by participants at different implementation levels.

*Differences by experience:*

- Year 1-2 teachers cited more supports overall than Years 3-4 teachers (3.3 per teacher vs. 2.5).
- 10/11 Year 1-2 teachers directly cited student teaching as a support for Practices, vs. 2/8 Year 3-4 teachers.

**What factors do teachers perceive as *constraining* their implementation of the Practices?**

*Overall:*

- Time was the most-cited area of constraint on the Practices, with most participants (11 directly and 1 indirectly) citing limited class time (perceiving that the Practices took more time than direct instruction) and most (9 directly and 2 indirectly) citing limited time to plan lessons that used the Practices, find Practice-related resources, or learn how to use these resources.
- 7 participants directly (and 1 indirectly) cited their own limited abilities or knowledge as constraints on the Practices.
- 7 participants directly (and 1 indirectly) cited constraints stemming from policies or structure of the school or requirements from administrative levels higher than the school.
- Other constraints each mentioned by about 1/3 of the participants were limited resources, insufficiency of CSUN preparation, and not knowing how to use the Practices effectively with certain pupils.

*Differences by implementation level:*

- Low implementers cited more constraints overall than did Highs.
- There were no apparent patterns in which constraints were cited by participants of different implementation levels, with the possible exception that Lows were likelier to cite limited resources.

*Differences by experience:*

- Year 1-2 teachers cited more constraints overall.
- There was no apparent pattern in which constraints were cited by Year 1-2 vs. Year 3-4 teachers.

**Do other factors affect implementation level?**

*School demographics:*

- *Size.* Only 2 of the 19 participants in the 2008-09 study taught in small schools (high schools with enrollment under 1,000) and both were High implementers. All other participants in the study taught in high schools with at least 1700 pupils or in middle schools with at least 850 pupils. Both of these small high schools were "special"—designed to be small and to promote reform practices; no other school was special in these ways.
- *Level*. School level had no apparent influence on implementation level. The 6 middle school teachers were evenly distributed across implementation levels: 2 were High implementers, 1 was a Moderate, and 3 were Lows.
- *Wealth*. The wealth of a school community, as measured by the percent of pupils receiving free or reduced lunch (FPRM%), had some relation to implementation of the Practices. High implementers taught in schools with higher rates of FPRM, i.e., poorer schools, than Moderates and Lows. The opposite pattern was found in 2006-07. Apparently, new teachers changed the pattern: 3 of the 4 Year 1-2 Highs taught in schools with FPRMs above the mean for Highs and 3 of 4 Year 1-2 Lows also taught in schools with FPRMs above the mean for Lows. So the Year 1-2 teachers in this study taught in poorer schools on average than the Year 3-4 teachers (57.5% vs. 29.6%). Because their implementation was unaffected by FPRM (actually higher in poorer schools), they shifted the pattern for Year 3-4 teachers, who had higher implementation in richer schools.
- *English Learners.* There was no difference in the schools' mean EL population across implementation levels. (Yet, as seen below, ELs were unevenly distributed across observed classes taught by teachers at different implementation levels.)

*Class characteristics:*

There was scant evidence of any relationships between the level or make-up of the course observed and implementation level.

- All 5 of the observed high school courses above the Algebra 1 level (Geometry, Algebra 2) were taught by Highs (3) or Moderates (2). But 3 Highs also were observed teaching high school Algebra 1, while 5 Lows were. In middle school, the five teachers observed teaching 7th-grade Prealgebra were evenly distributed across implementation levels: 2 were High implementers, 1 was a Moderate, and 2 were Lows. The sole 8th-grade Algebra 1 course was taught by a Low.
- 6 High implementers reported pupils with special needs in the class we observed; 3 Lows did.
- No Highs reported ELs in the class we observed, while 2 Moderates and 4 Lows did.
- 2 Highs reported pupils with poor math backgrounds in the class we observed, while 4 Lows did.

*Teacher characteristics:*

- There was no apparent relationship between level of Practice implementation and years of experience. Year 3-4 teachers represented half the High and half the Low implementers (but none of the 3 Moderates).
- Nor did the way in which the participant earned subject-matter competency (SMC) affect implementation. Highs and Lows were each evenly split between earning SMC via the CSET and via a baccalaureate degree. Eight of the 19 earned SMC via the CSET. Five earned SMC via a non-credential baccalaureate at CSUN, while 3 earned SMC via baccalaureates from other institutions. Three earned SMC via baccalaureates in CSUN's Four-Year Integrated program.

*Student-teaching experience at Northridge Academy:*

Northridge Academy (NAHS) is a priority placement site for CSUN student math teachers because the master teachers there are perceived by CSUN to be high implementers of the Practices. However, having one student-teaching experience at NAHS (all student teachers have two difference placements) had no apparent influence on the implementation level of graduates. Three of the 8 Highs had a student-teaching experience at NAHS, while 1 of the 3 Moderates and 3 of the 8 Lows did. This finding does not necessarily repudiate the notion that it is critical for credential candidates to see and experience the Practices during student teaching in order to implement them as fulltime teachers, because NAHS is not the only site of master teachers who implement the Practices. It was beyond the scope of this study, however, to rate all participants' master teachers in terms of Practice implementation. On the other hand, these data make clear that student teaching with a master teacher who implements certain Practices, e.g., at NAHS, does not guarantee that the student teacher will go on to regularly implement those Practices in his/her subsequent fulltime teaching.

## WHAT CAUSES HIGH IMPLEMENTATION?

An obvious goal of the credential program is to graduate high implementers of the Practices it promotes. Thus, key questions are what causes graduates to implement the Practices, and are aspects of the CSUN credential program part of the cause?

### What are "High" and Low" Implementers like?

After the decision rules for implementation level were applied, the 2008-09 participants were categorized as 8 High implementers, 3 Moderates, and 8 Lows. These groups were then further examined for other commonalities, i.e., features that distinguished Highs from Lows.

*High Implementers:*

While the observation of the Significant implementation of only one Practice was sufficient to earn a teacher a High rating, all 8 Highs in 2008-09 made Significant use of 2 or 3 Practices in the observed lesson. In addition, they made Marginal use of 3 to 8 Practices in the lesson. All 8 Highs claim to use collaborative work regularly, if only for part of a lesson. Most were observed to encourage pupil talk and pupil presentation of methods and most talked about these being routine features of their teaching.

*Low Implementers:*

By definition, the Lows did not use any of the Practices Significantly in the observed lesson. Each of the 8 Lows used 1 to 3 Practices Marginally. Most of the Lows claim to use collaborative work (some allow pupil-to-pupil to talk, some use pupil presentation). Some claim to use occasional projects or to make attempts to ask high-level questions.

Overall, then, there is not a large difference between participants designated High and Low implementers. No Highs made Significant use of more than 3 of the 9 Practices in a single observed lesson, suggesting that no individual graduate routinely implements most of the Practices emphasized at CSUN. On the other hand, almost all participating teachers claim to use some of the Practices. Thus, it appears that most graduates do learn about the Practices while at CSUN; on some level, they "know" the CSUN perspective on good teaching. This is corroborated by the finding that most participants, regardless of implementation level, reported learning about the Practices in CSUN courses. As seen in the previous section, there are no significant differences in the factors that influence Practice implementation for High vs. Low implementers. The only apparent difference between Highs and Lows is in implementation itself, at least during the observed lesson. A reasonable conclusion is that our recent graduates may be more homogenous in terms of Practice implementation than a High-Low categorization system implies, and that looking for general influential factors (for all participants) would be more fruitful than trying to isolate qualities of the group designated as High.

### Which Practices do our graduates implement?

All 8 High implementers and 2 out of the 3 Moderates (who used only 1 Practice Significantly) make Significant use of high-level tasks or questions. Six of the 8 Highs made Significant use of pupil autonomy. No other Practices were used Significantly by as many participants. It may be that high-level tasks and questions are the most consistently stressed Practice across CSUN courses and in professional development—there is good reason to believe this is true—and pupil autonomy may be a natural partner Practice, since pupils must be given some independence to solve high-level problems in order for those problems to actually require high-level thinking. It may also be that these two Practices are the easiest to adopt because they require no extra resources or training (unlike, for example, using

technology) and might be implemented with limited planning (unlike, for example, real-world connections or special attention to language). Experience made only one minor difference in the Practices used: The only two Highs that did not make significant use of pupil authority were both Year 3-4 teachers.

**What do our graduates believe they need(ed) in order to implement the Practices?**
A quantitative summary of the factors these teachers found influential on their use of the Practices has been provided in a prior section. Here, a more qualitative, interpretive summary of the interview data is given to help explain what the participants (across levels) feel they needed in order to implement the Practices or would need or have needed in order to implement them more frequently.

The most consistently cited support for using the Practices in teaching was learning about them at CSUN, in coursework and/or in student teaching. This is an encouraging finding for CSUN: The participants' comments suggest that graduates leave CSUN with a strong foundational knowledge of the Practices, a belief that they represent good teaching, and a desire to use at least some of them. Virtually no teacher could cite aspects of the CSUN program that were useless or inappropriate for their current teaching. It seems that the CSUN credential program is providing the necessary background for implementing the Practices. However, the low level of Practice implementation overall by these recent graduates suggests that CSUN training alone is insufficient to promote implementation in the classroom by most graduates.

These new teachers learn from seeing and doing, with an emphasis on the latter. Their interviews reveal that they are strikingly literal: They are likeliest to implement a practice or an activity when they have first at least seen and ideally tried in a classroom the specific instantiation of the Practice that they would implement. They find it difficult and uncomfortable to take a general idea from coursework or professional development (e.g., collaborative learning, academic language development) and translate it into a usable idea for a specific lesson plan. Even seeing a mentor or exemplary teacher use a method might not be sufficient; some participants feel the need to have tried it themselves in a guided setting before using it their "real" classroom. And even this might not be sufficient in the next setting: If the current classroom has more pupils or a different furniture configuration or pupils who are harder to manage, or the adopted curriculum doesn't have the Practices built in—a stumbling block for participants who student taught at NAHS with a reform curriculum, some participants struggle to translate the Practice from student teaching or from a prior year of teaching into the current setting.

Several participants commented that an additional methods course at CSUN or more student teaching would have been helpful (no one advocated for less of these), and some felt the methods course should have been taught in conjunction with student teaching. The implication is that more time in methods courses would equip teachers with more activities that could be directly imported into their classes—that the "value added" would not be the learning of additional methods as much as to see a greater variety of specific instantiations of the methods they had already learned to increase the odds that the instantiations would match the context of their eventual teaching situation. And the additional "hands-on" teaching practice that extended or course-connected student teaching would offer would make our graduates more confident about using the Practices in their current classrooms.

Related to this literalness, comments by a few participants paint a picture of development that starts with the literal imitation of the Practices or routines they had seen their master teacher use (one participant referred to this early implementation as "robotic"). With experience, they felt themselves becoming more fluid and comfortable with these Practices and developed their own style of

implementation.

Also related, participants complained about their inability to generate activity or lesson ideas to implement Practices they know they should use and want to use in their current teaching position. If professional development or a curriculum provides them with a ready-to-use lesson that incorporates a Practice, they will use it. General professional development (to promote a practice not specific to math) was considered unhelpful, hard to translate to the participants' own settings. The "inability" to generate Practice-based lessons may be a matter of limited creativity or knowledge, but two other cited factors probably contribute to this inability: fear of the lesson not going well and time to design lessons. No participant described anything sounding like experimentation. Our graduates feel pressure (whether self or administration imposed is unclear) to have lessons "work" the first time, where "work" means the material gets covered and learned and the class remains in control. Time is the omnipresent constraint, and our graduates' jobs and lives seem to leave no room for lesson planning. This may help explain why asking high-level questions and giving pupils autonomy were the most used Practices; they do not require much advance planning and can be incorporated fairly easily into a direct-instruction lesson lifted from a textbook. Other Practices (using technology, connecting to the real world, developing academic language) and groupwork may require more planning, sometimes research, and sometimes the teacher learning a new technique or technology—activities that take time our graduates simply may not have or are of low priority if no one at school is encouraging their use.

Many participants commented on a high level of collegial support, if not for the Practices per se then in general. This contrasts with research portraying teaching as isolated and teachers as unwilling to make their teaching public or share ideas. Many of the participants relied on colleagues for informal teaching ideas and advice and many were involved in formal learning communities or had notably collaborative departments. In the more collaborative settings, a "When in Rome…" rule seems to apply: Our graduates teach to fit the culture. This suggests that school culture matters: A school or department where colleagues use the Practices and where formal collaborative arrangements and professional development support the Practices does indeed encourage the use of the Practices by a new teacher—in other words, makes it likelier that a teacher who has learned about the Practices at CSUN and wants to implement them actually will.

## EVALUATION OF THE CSUN CREDENTIAL PROGRAM

The post-observation interview contained specific questions about the participants' experience in the CSUN credential program. It also offered opportunities for participants to mention CSUN experiences spontaneously as factors influencing their teaching. In this section, participants' comments about the CSUN credential program, whether directly related to the Practices or not, are summarized.

### CSUN Courses

Participants were asked which features of the CSUN credential program had the most impact on their teaching today. Only two of the 19 made no positive comment about coursework; the overall sentiment was that the courses were very helpful, and when asked about inappropriate or unhelpful aspects of coursework, most participants struggled to come up with one. Most cited the methods course, SED 525MA/MAL, as having a very positive impact. Several said this course had shown them a new way of teaching math and mentioned broad approaches they had learned, including discovery learning, collaborative learning, constructivism, analyzing mathematical concepts from a teaching/learning perspective, hands-on methods, and questioning for understanding. Several also described having acquired "tools" for teaching in the methods course and even cited specific lessons or activities presented or developed during the course that they use today. Three participants said they would have benefitted from another semester or year of methods. Other courses described as helpful were SED 511 (by 3 participants, for classroom setup, routines, and management), SED 554/5 (by 3 participants, for practical ideas, analyzing teaching, and asking pupils to explain their thinking), SPED 401C (by 2 participants, for practical management skills and methods that work with all pupils), SED 521 (by 2 participants, one for learning about pair work and one for giving her useful strategies for all of her pupils), EPC 420 (by one participant, for sharing ideas in a seminar format), and SED 514 (by 1 participant, for helping him create his current Website).

There were few criticisms of CSUN credential courses, and some might not have been raised if the interviewer had not expressly solicited criticism. A few participants felt that course content focused on ELs and pupils with special needs was irrelevant to their current teaching situation but granted that these topics were important to cover for other teachers. (Indeed, one participant said he wished he had paid *more* attention to these topics, now realizing he needs them, and, as mentioned above, two participants recognized the appropriateness of SDAIE and special-education strategies for all their pupils.) Regarding the SED 525MA/MAL, two participants wished it had provided more help with planning: One wanted more training for incorporating the CA Content Standards; the other would have preferred more whole-lesson planning over deep analysis of specific math concepts. The latter also felt there had been too much emphasis on discovery activities that required high-level reading comprehension and costly materials; she wanted more ideas for teaching basic skills and engaging pupils with short attention spans quickly and inexpensively. Two participants found SED 521 insufficiently relevant to mathematics teaching; another felt this course had focused on reading to the exclusion of writing, which she now uses in her teaching. One participant had felt unprepared for school politics but was unsure how CSUN coursework could address this. Finally, one teacher commented on her CSUN undergraduate mathematics courses, saying these were helpful but did not teach her how to explain simple concepts to pupils.

An important criticism of the methods and other courses—the difficulty the participants had relating the ideas to practice—has been discussed in the prior section.

Other comments related to CSUN coursework in general. Six participants reported that all program courses had been useful and/or that they felt well prepared by the program overall. One credited the

program for his current support group of friends. Two participants now recognized the relevance of course material in ways that had not been apparent to them during the program. One realized that the program must have been comprehensive because BTSA now seems redundant. Two praised the helpful, supportive, accessible instructors. Three participants would have liked more coursework in classroom management. One would have liked more discussion of his legal responsibilities concerning pupils designated with special needs; another wished to have been trained to work with paraprofessionals in his classroom (as well as with parents). One reported learning a lot of techniques at CSUN that she does not use today and projects that do not relate to her specific classes.

**CSUN Student Teaching**

Student teaching was also viewed quite positively, with 5 participants spontaneously citing it as the most important part of the program. Many had positive comments about their master teachers. Several described particular things they learned from a master teacher: Nine participants mentioned learning classroom management or routines, 5 participants learned to use groupwork, 3 participants learned about establishing rapport with pupils, one learned how to teach a specific concept, one learned to explain concepts simply, one learned lesson pacing, and one learned about algebra tiles. One participant appreciated that her master teachers had different styles from each other. In addition, two participants praised the feedback of the CSUN supervisor, and another mentioned that her supervisor stressed discovery and inquiry learning, but that she struggled with these.

Few teachers offered criticisms of their master teachers. The most common criticism was that the master teacher did not use a variety of activities (2 participants) and/or was traditional (4 participants), though the latter did not always mean that the participant was dissatisfied with the experience or thought the master teacher was a poor teacher. One participant found her master teacher's style disagreeable (too aggressive) and another complained that hers was not transparent about planning. Other participants noted shortcomings in the structure of fieldwork: 3 participants wanted more time in student teaching (one specified that this extra time should be less controlled by the master teacher; another wanted more gradation between teaching 1 and 3 classes), 2 participants would have preferred to begin independently teaching at the start of SED 554, one wanted student teaching to be concurrent with coursework, and one wanted more field observations, while another felt the CSUN early fieldwork course (presumably MA 391) should be mandatory for every candidate. The inability of some participants to translate what they had learned in student teaching to their current situations has been discussed in the prior section.

At the time of the study, four participants were employed at one of the schools where they had student taught. Only one described this as a liability, because she is still seen as the master teacher's student teacher. It was not clear whether the problem is not being seen as a full-fledged teacher or being politically associated with the master teacher.

**Teacher Performance Assessment (TPA)**

As required by the state, all 19 participants completed some form of TPA at the end of their credential program. Seventeen did the CSUN-designed Professional Teaching Portfolio (PTP), while two piloted the Performance Assessment for California Teachers (PACT) Teaching Event, which has gradually replaced the PTP at CSUN since 2007. (Both participants who did PACT were High implementers, but assignment to PACT during the pilot phase was non-random and these numbers are too small to draw conclusions about the impact of PACT on Practice implementation.)

The 11 Year 1-2 teachers were asked which TPA they had completed and whether it had had any impact on their current teaching; two of the Year 3-4 teachers spontaneously mentioned the TPA as

well. Of the 13 participants who commented on the TPA, 6 felt that writing the reflections had been helpful and supported their reflecting today (two of these had done PACT, and one added that PACT had helped him learn to restructure a lesson). Three felt that having completed some of the particular artifacts for the PTP had been helpful (e.g., a lesson plan they still use). Three commented that having done the PTP gave them confidence when facing another major work, namely the BTSA or CSUN masters portfolio. Only 2 of the 13 had found the TPA completely unhelpful (both had done the PTP), but another 4 felt the PTP had been only partly helpful (one had found much of it "busy work" and one admitted to having "made some of it up").

## CONCLUSION AND IMPLICATIONS FOR CSUN

To a large degree, the results of the 2008-09 Study of a Teaching-Credential Program's Impact on Recent Graduates echo those from the 2006-07 version of the same study: Recent graduates of our traditional single-subject mathematics credential program have not generally made central to their teaching the research-based Practices that were emphasized in their CSUN credential coursework. This overarching finding comes with several important caveats:

1) In the mathematics-education research community, there is no established "best" level of implementation of any of these Practices. Research has demonstrated the effectiveness with pupils of implementing the Practices when compared with no implementation. But research does not yet tell us how much of a lesson or unit should be devoted to any of the Practices, whether small doses can be effective, and what would even constitute a small dose. Our graduates were observed to make some use of the Practices, and we have no way to judge how far that level falls short of desirable.

2) Large-scale studies (Daley& Valdés, 2006; Jacobs, Hiebert, Givvin, Hollingsworth, Garnier, & Wearne, 2006) have demonstrated that veteran secondary mathematics teachers at all levels of experience have not made these Practices central to their teaching. So our graduates, as first- through fourth-year teachers, appear typical of U.S. teachers across the board. This should not be reason to "rest on our laurels." Though there is no established "best" level of implementation, international comparisons (Stigler & Hiebert, 2004) show that countries in which some of these Practices are implemented with greater frequency than in the U.S. outperform U.S. pupils on mathematics assessments.

3) Roughly half of the CSUN graduates who received the single-subject mathematics credential during the target dates for both the 2006-07 and 2008-09 studies were not included. These were University Interns, who have fulltime teaching jobs during the credential program. Interns do not have a traditional student-teaching experience: They have no "master teacher" to guide them daily; instead, CSUN supervisors and a mentor colleague occasionally observe their classroom. Therefore, they were considered too different from Traditional credential students to appropriately combine them as a study sample. Their exclusion may have impacted the results in either direction: It is plausible that they implement the Practices less frequently or significantly than the participants in these studies because they did not have a student-teaching experience with a CSUN-selected master teacher, who could have demonstrated and encouraged the Practices. Conversely, it is also plausible that they implement the Practices more frequently or significantly because they may be a stronger group of teachers; they were able to convince a school to hire them without a credential and were confident enough to take on fulltime teaching without the benefit of having completed (or even having begun) teacher training.

4) Given our limited resources, these studies traded off in-depth investigations of individual teachers for the largest possible sample. Thus, we cannot expect to have portrayed any individual teacher's use of the Practices accurately, and characterizations of individuals as high and low implementers are suspect. However, the aggregate picture of our math-credential graduates' teaching based on 19 observations is presumed to be far more accurate.

With these caveats, this study paints a picture of the typical CSUN math-credential holder in the first few years of teaching as employing fairly traditional modes—presenting math content, behavioral directives, and task instructions, and having pupils practice already-learned procedures. Of the nine Practices emphasized in CSUN coursework, two were seen more frequently than the others: The teacher asks a question or poses a task with a high level of cognitive demand, and the teacher gives

pupils the authority to judge the mathematical soundness of publicly presented solution or method. It may be that these Practices are the easiest to implement within traditional teaching modes and/or with minimal planning time; it may also be that these are the most consistently stressed in CSUN courses and/or student teaching.

One purpose of this study was to compare cohorts of teachers to detect any impact of experience or of program improvement over the two years since the prior study. These comparisons yielded little. There were few apparent differences between the more and less experienced teachers in the 2008-09 study. Practice implementation was similar, although there was some evidence that the more experienced teachers had relinquished some control and given pupils more responsibility to construct and co-construct the content. This trend held when the Year 3-4 teachers in the 2008-09 study were compared to themselves, as Year 1-2 teachers in the 2006-07 study. However, this finding has the major caveat that it was skewed by two Year 3-4 teachers, who were the only ones to use pupil concept development in any form. Although there was no change over time in overall implementation level of the cohort of teachers who participated in both the 2006-07 and 2008-09 studies, some individuals within this cohort changed in terms of level and which Practices they implemented. Several teachers in this cohort described changes that they perceived in their teaching over the two years between the studies, generally in the direction of greater implementation and less traditional teaching. These self-perceptions may have more validity than the one-shot observations in this study.

There were also few differences noted between Year-1-2 graduates in 2006-07 and 2008-09. There was no perceptible difference in the overall implementation level between these cohorts. The current set of Year 1-2 teachers devotes less time to pupils individually practicing learned procedures in favor of more teacher presentation of content and pupil construction of concepts. Again, however, the caveat must be noted that pupil concept development in 2008-09 was implemented solely by two participants. In general, these data give little reason to believe that the program prepares teachers more or less effectively today than it did two years ago.

If experience and when CSUN was attended make little difference in whether recent graduates implement the Practices, what does? It seems safe to say that CSUN provided the main supports for implementing the Practices, in the forms of coursework and student teaching. That far fewer Year 3-4 teachers than Year 1-2 teachers cited student teaching as a support for the Practices may mean that their master teachers did not coach the implementation of the Practices to as high a degree or that the student-teaching experience has become less salient over time as newer mentors and resources have taken over the role of shaping their teaching. Indeed, the only other supporting factor cited with some frequency was professional development—a resource that Year 3-4 teachers would have had more time to experience. Time to plan and teach with the Practices, limited teacher knowledge, and school policies or structures were seen by participants as the main constraints on the use of the Practices, all of which suggest the potential efficacy of site-based professional development. No clear patterns emerged in terms of the impact of school or classroom demographics on implementation, but the two schools that were deliberately small and dedicated to reform both employed High implementers, and no Highs were observed teaching classes with designated ELs.

A few of the results of this study contrast with those of the 2006-07 study. Then, a cluster of constraints centered on the participants' perception that the Practices were inappropriate or difficult to implement with low-performing or poorly behaved pupils or in classes with a range of ability levels. These constraints were raised in the 2008-09 study but were not central. However, they may be a subset of the general constraint cited in the 2008-09 study that teachers need to see and practice specific methods with specific groups before they are comfortable using them. Also, in contrast to the

2008-09 study, classroom management seemed to be less of a preoccupation of the participants; this may be the result of adding more experienced teachers to the sample. Another contrast relates to methodology: In the 2006-07 study, the second observations and interviews yielded little new information about the participants and the ranking as High, Moderate, or Low implementers seemed relatively stable; thus, in the 2008-09 study, it was decided to observe and interview each participant once, enabling us to use a larger sample. Yet the instability of the return participants in terms of level of implementation, which Practices used, and self-reported teaching styles gives a new impression: that ratings based on a single observation are suspect, that the group of teachers may be more homogeneous than the one-day snapshot would imply, and that the data are most safely interpreted as representative of the group as a whole and not for individuals.

What is CSUN's contribution to implementation? Could it be more? The results of this study suggest that CSUN may be doing what it can: building a strong foundation. Graduates have clearly learned about the Practices in CSUN courses and they seem to leave CSUN with the belief that these are valuable methods and a desire to use them. To encourage implementation of the Practices, particular existing program strategies appear effective and others might be recommended:

- Student-teaching and microteaching experiences in courses are critical; graduates need to have practiced a method before they will use it in their classrooms.
- An additional methods course might be warranted, especially if it aims to give additional and concrete experiences with the Practices already learned in prior courses and runs concurrent with a student-teaching experience, where the Practices can be tried and studied.
- The findings illustrate the importance of finding master teachers who implement the Practices and guide their student teachers to use them in multiple contexts.
- The findings imply an endorsement of the TNE-sponsored Master Teacher Professional Development program, which supports master teachers' coaching of certain Practices.
- The findings of this study and the requirements of PACT may warrant a more systematic effort by the SED to guarantee that every student teacher has opportunities to use specific Practices in the classroom.
- CSUN instructors could also encourage the eventual implementation of the Practices by graduates by making sure that the general ideas and approaches discussed in courses are regularly translated into specific lessons and activities for specific types of classes, whether that translation is done by instructors or by the students.

As a group, our graduates seem to be telling us that when it comes to implementing the Practices, their CSUN training was necessary but not sufficient. Nor is experience alone necessarily sufficient to increase Practice use, although some participants feel that it is. Thus, strategies beyond the credential program are also indicated:

- A school context that encourages the Practices and related professional development seem to be crucial. Site-based professional development that is extensive, ongoing, collegial, and focused on the Practices appears to promote their use and to be welcomed by these teachers. Thus, if CSUN faculty were to become involved in PD for secondary teachers, it may be best done in programs like SITTE, where the interventions occur at the school site, involve a cadre of teachers from the same school, and align with (or change) school policy rather than working counter to or around it.
- The CA Commission on Teacher Credentialing has determined that universities may again offer Clear Credential Programs. This is a return to practice prior to 2002 and a change from the 2001 Clear Credential Program Standards calling for school districts (or district-university partners) to offer clear credential programs. As a result, CSUN will develop a Clear Credential Program in the near future. This will offer a key opportunity for a structured, thoughtful "revisiting" of the

Practices by new teachers in conjunction with their everyday teaching—the kind of "hands-on," context-specific experiences that our graduates seem to be asking for—with the potential to be more effective because the enrolled teachers would no longer be brand-new and overwhelmed by management and organizational issues.

- For similar reasons, our current mathematics-education masters program should effectively promote the Practices (and anecdotal evidence shows that it does). Scholarships allowing former credential students to return for this masters program would be one strategy for amplifying our initial investment in them and their investment in the initial credential program. However, this study confirms the efficacy of our original intent to enroll teachers with at least a couple of years of experience.

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