

***Results of a Study of a Teaching-
Credential Program's Impact on Recent
Graduates:***

**SUB-REPORT 2, ANTHROPOLOGICAL
TRIANGULATION OF INTERVIEW, SURVEY
AND FIELDNOTE DATA**

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This report, the second of two sub-reports , uses anthropological triangulation of interview, survey and fieldnote data to make sense of the behavioral observations described in Sub-Report 1 of the study.

(Sub-Report 1 presents the study's behavioral observation data and situates this data against the backdrop of national trendlines.)

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ABSTRACT

Sub-Report 2 builds on the behavioral observation findings of Sub-Report 1 of the TNE Evidence Team by bringing to bear anthropological triangulation methods on interview, survey and fieldnote data. Sub-Report 1 argues that although the observed teachers implemented practices taught them at CSUN to a low degree, there is significant variation among these teachers. Some are “low implementers” with a low awareness of their practice and the practices that were taught at CSUN. Others are low implementers with “procedural” knowledge of effective practice (i.e. view practices as “techniques” rather than possessing a coherent conceptual understanding of effective teaching). Yet others are low implementers whose ability to operationalize their conceptual knowledge of effective practice is partially compromised by the logistics of teaching among many other issues.

Sub-Report 2 also identifies the range of issues that mediate the effective teaching of all of the CSUN graduates in our study. Among those that clearly constrain teachers are an absence of teacher’s identification with the math discipline, lack of knowledge of particular assessment and differentiation practices, time pressures including a limited amount of time to reflect on practice, administrative logistics, and credentialing bureaucracy. Issues that clearly aid new teachers include knowledge acquired from CSUN methods courses and positive relationships with CSUN faculty. A number of issues are double-sided; they constrain some new teachers while aiding others. These include: student teaching, the influence of state standards, relationships with new colleagues, perceptions of pupils, motivations for becoming a teacher, CSUN’s identity as an institution, certain other coursework at CSUN, and early memories of learning.

Sub-Report 2 derives these findings from two qualitative analyses -- anthropological analytical methods and analytical portraits of teachers -- produced from an integration of interview and participant observation data. Based on these analyses, we describe the circumstances that impede and facilitate the practice of the teachers who were observed. We also discuss additional themes that emerge from fieldnotes – a triangulation approach that helps illuminate the meaning of observation data presented in Sub-Report 1 and help illuminate avenues for future research.

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A. Introduction and Overview

This study is part of the on-going Teachers for a New Era (TNE) Initiative to demonstrate evidence of the impact of teacher education programs. The overarching hypothesis is graduates from the single-subject math credential program use practices encouraged by the program. In addition, the overall project examines the circumstances that facilitate and impede the implementation of effective teaching practices taught to graduates at CSUN. This study is one of two substudies investigating evidence of the impact of teacher preparation programs at CSUN. The two studies examine teachers who graduated from the single-subject math credential program.

Study 1, which produced “Sub-Report 1” (under separate cover), quantifies teacher behavior in terms of amount of time spent implementing effective practices identified by the SED Math faculty. Classroom dynamics and other features of the classroom and teaching activities were also recorded. In brief, Study 1 finds that teachers implement practices taught at CSUN to a low degree. (See Sub-Report 1 for a fuller description.)

Study 2, which produced “Sub-Report 2” on behalf of the Evidence Team, analyzes the variation among teachers’ abilities to implement SED-identified effective practices, and the impeding and facilitative circumstances that mediate new teachers’ ability to implement such practices.

Sub-Report 2 exclusively focuses on methods, procedures and outcomes of Study 2. Study 2 derives its findings from two qualitative analyses -- anthropological analytical methods and analytical portraits of teachers -- produced from an integration of interview and participant observation data. Based on these analyses, we describe the circumstances that impede and facilitate the practice of the teachers who were observed. We also discuss additional themes that emerge from fieldnotes – a triangulation approach that helps illuminate the meaning of observation data presented in Sub-Report 1 and help illuminate avenues for future research.

B. Research Questions and Methods

Research Question

This study addresses the following research question:

- What facilitates or impedes implementation of ‘effective practice’ pedagogies taught in the CSUN secondary education math credential program?

This study employs an anthropological definition of “practice.” Typically, practice may be taken to mean exercising a technique, strategy or art. Putting into effect a technique often entails use of the body, mind, and verbal communication. From an anthropological perspective, “practice” is more encompassing. It is a concept that emphasizes how humans are versatile in different situations and can change forms of action quickly,

unpredictably, consciously and unconsciously. The study of “cultural practice” entails consideration of patterned human social interactions, accommodations, adjustments and worldviews (or perceptions). Expressions of identity are an enactment of negotiated social conduct; therefore, they are also considered to be a patterned form of cultural practice.

Sample

The participants in our study were derived from the pool of graduates who earned the traditional, single-subject math teacher’s credential between Fall ‘04 and Spring ‘06. There were 31 graduates in total. We were able to find and communicate with 27. 21 of the 27 were fulltime secondary math teachers at the time of the study. 12 of the 21 agreed to participate. We eliminated 2 because of distance, leaving a final size of 10 teachers (6 men, 4 women). All ten participants were observed and interviewed at least once. We conducted second observations of 6 of the teachers, for a total of 16 observations/interviews. All were recruited according to CSUN- and LAUSD-approved Human Subjects protocols. Additional characteristics of the sample include:

- 4 individuals in the sample are European-American. One is African-American and 2 others are Korean-American. 5 individuals are bilingual. 3 speak Korean, one speaks Armenian, and one speaks Hebrew. 5 individuals only speak English.
- 5 individuals migrated to the U.S. or grew up in immigrant families. 5 individuals were born in the U.S.
- 7 participants completed high school in the Los Angeles metropolitan area. All but one completed one or two Advanced Placement or Honors courses in math, calculus, physics, biology and/or history.
- 4 completed bachelor’s degrees in CSUN. Most others attended schools in California. The educational background of 2 is unknown.
- 4 participants have master’s degrees.
- 4 teachers had previous careers in accounting, aerospace engineering, or I.T. consulting.

The sample is small but our anthropological approach to ensuring validity of data collected from a small sample (inductive triangulation, described below) provides assurance that themes emerging from this research are worthy of follow-up in future research.

Research Design and Procedures: Built on Anthropological Principles

As a means of addressing the study’s research question, a 45-minute qualitative semi-structured interview was administered by trained fieldworkers following a period-long observation of teaching. Interviews elicited teachers’ perceptions of pre-teaching and CSUN experiences, current teaching practice (including lesson observed), perceived aids and obstacles to effective teaching, and future career plans. Emphasis was placed on

eliciting teachers' perceptions of their practice and circumstances that mediate their teaching practice. Additional participant observation data were collected to complement perception-based interview data, in keeping with six research principles in cultural anthropology.

First, we adopted an anthropological approach for ensuring validity of qualitative data drawn from a small sample. This approach, which involves taking an inductive "multiple-look" (triangulated) approach to answering research questions, has been proven useful in anthropology for highlighting emergent themes and providing a sound foundation on which to rest suggestions for further research. In our case, research triangulation involved the concurrent assessment of several data streams produced from behavioral, interview, and survey-based inquiry. While we are fully aware that a small sample is not "robust" enough to warrant full-scale policy change recommendations, we do find use here for anthropology's inductive triangulation approach as we pursue the question of the factors that impede or facilitate math teacher practice. This report will share the themes that emerged from this inductive triangulation and make suggestions for how the themes in themselves are clues for what to focus on in future research.

Second, we established that rather than collecting perceptions-based data in a vacuum, it was important to tie perceptual data to human practices in broader social and structural contexts. The Observations Study took an inventory of teacher behaviors and this cataloguing of practices was useful to an extent; however, it did not paint a contextualized picture of teaching dynamics. Therefore, as a complement to interviews and inventories, fieldworkers for the Perception Study were trained to take notes on more subtle structural dimensions (school conditions, the regimentation of time in the school setting, state mandates, etc.) and psychosocial dimensions (student and teacher discourse, interactions between teachers, teachers' moods, the classroom atmosphere, etc.)

Third, anthropologists acknowledge the subjective nature of interviewing and observations but strive to strike a balance with the scientific method by conducting interviews and fieldwork systematically. There are numerous ways to achieve this balance; in our case, we established that interviewers would not be acting as solo researchers but rather would function as part of a team whose work would be subject to many cross-checks in the training and data collection phases of the study. For example, the team collectively constructed the research instrument, shared interview training and interpretation [in which mock interviews were conducted and analyzed and fieldnotes were compared], administered the interviews, and met, following interviews, to debrief.

The team approach provided an opportunity to address a fourth principle in anthropology: holism. Anthropologists perceive that people viewing a subject from different vantage points (positions, backgrounds, etc.) will be able to illuminate the subject's different facets. Taken together, these facets provide a holistic, complex understanding of the subject. Anthropologists use holistic approaches to avoid reducing human behaviors to single factors. In our case, this principle translates into forming a research team which was represented by members with varying experiences and disciplinary backgrounds. The

team was comprised of cultural anthropologists, veteran math teachers, supervisors of new teachers, and specialists in education research. The research team was fortunate to have several members who had prior relationships with the study participants, either because they instructed or supervised them. For some kinds of inquiries, this familiarity is considered as introduction of bias; however, in anthropology, these relationships are considered to be beneficial because they allow for a deeper grasp of context and strengthen validity.

The fifth anthropological principle that guided the study design was the importance of building rapport with research participants. Rapport is critical in our research because of the personal nature of the information we sought to obtain. For example, we were interested in knowing teachers' childhood learning experiences, their feelings about CSUN, their hopes and dreams for the future – and such topics are difficult to investigate without a certain amount of trust between researcher and participant. Given the limited parameters of our study, we maximized our opportunities to have our team members connect with study participants. For example, although we weren't able to visit research participants frequently, we built into the research several opportunities to get to know them through phone contacts during the recruiting and preliminary data collection.

The sixth anthropological principle that came into play in this study is ethical treatment of research participants. This study was conducted with the approval of both CSUN and LAUSD institutional review boards and we trained fieldworkers according to ethics standards in anthropology.

A surprising issue relating to ethics emerged in the research team. For anthropologists, ethics involves developing an equal relationship between research participant and researcher. Earlier anthropological modes of inquiry were rooted in colonialism and treated subjects as passive objects. Contemporary anthropology is highly sensitive to the treatment of participants and thus goes as far as to share as much information about the research process as possible. In our case, sharing the instrument and research questions, as well as our rationales for probing for information, would have been a way of creating equality. Epistemological differences among team members led to our conceding this point, but future research designs should strive to honor this principle.

Processes of Analysis

Two procedures were adopted for analyzing data in Study 2. Both analytical procedures were adapted from anthropological methods for use in an educational setting. The procedures, which were undertaken in conjunction with the execution of the six anthropological principles described above, are as follows:

Content Analysis

A team of trained ethnographers read interviews, coded responses, cross checked each other's responses, and derived emergent themes from responses provided to two interview instruments (see Appendix 3 and Appendix 4 for first and second post-observation instruments). We anticipated that a number of themes would emerge in teachers' responses. A list of these anticipated themes guided our analysis (see Appendix 5 for list). The majority of these items emerged in the analysis. However, a number were not proved for with enough depth. In addition, a number of unanticipated themes emerged. These were also recorded.

In the Key Findings section of this report the reader will find a synthesis of the facilitating and impeding circumstances that shape our teachers' practice. This synthesis of issues is based on the summary and content analysis of our teachers' responses to interview questions. The summary of responses is found in Appendix 6. We recommend that readers review this appendix for it illuminates information that goes beyond the scope of our research question yet is useful for developing a full picture of new teachers who graduated from CSUN.

Teacher Portraits

This section sketches several teachers' personal stories about their work and experiences in the profession. They are based on the triangulation of outcomes from the content analysis, participant observation and the observational data.

The rationale for analyzing teacher performance in terms of analytical portraits is based on several ideas:

- i. The circumstances that aid and constrain effective teaching practices cannot be reduced to simple and clear "factors." There are overlapping circumstances that shape teacher practice; thus, a holistic approach such as narrative can illuminate the various physical, political, social and psychological contexts in which new teachers are making use of lessons learned during training and deciding upon strategies for their classroom.
- ii. From an anthropological perspective, analyzing behavior in terms of a story or narrative, especially narratives that include subjects' voices, can be a powerful way of conveying the tensions, contradictions and dilemmas of the human experience.

Six teachers were selected for this portion of the analysis. These six are the participants who we were able to visit twice during the study and for whom we had the most data. One of the cases was eliminated, however, due to time constraints for analyzing the data.

Once the cases were selected, we identified the most compelling stories that each teacher told through their discourse and classroom practice. We were interested in representing variation among teachers who rarely implement the SED-identified effective practices. Therefore, we grouped the stories into three categories which seemed to emerge from the

cases: 1) teachers who exhibit no evidence of SED-identified effective teaching practices and little awareness of these practices; 2) teachers who display some awareness of these practices and believe themselves to be implementing them to some degree; however, much of their teaching could be described as teacher-centered and focused on rote memorization; 3) teachers who display some ability to implement a few SED-identified strategies and a great awareness of many other effective teaching strategies; however, specific external circumstances appear to impede their ability to fully implement a broad range of SED-identified effective math practices (see section Teacher Portraits: Variation Among “Low Implementers” for further description).

Once grouped into these three categories, we further outlined the points of tension and contradiction in what participants believe and say they are doing and their actual performance in the classroom (e.g. why do some teachers say they embrace group work, but do not practice it? Why do some aspire to become teachers of teachers but are unable to implement effective strategies in the classroom?). We then put together information from the following categories which we deemed to be relevant to understanding teacher practice and conveying an illustrative story:

- i. A snapshot portrait of a compelling and complex moment of strategy implementation (or lack of strategy implementation) in the classroom.
- ii. Background information on the teacher and his/her motives for becoming a professional and his/her future plans.
- iii. A discussion of the circumstances that constrain and aid the practices described in the snapshot portrait of the teacher in his/her classroom, and other constraints and aids brought up by the teacher during the interview process.
- iv. An analysis of the role of CSUN in teacher’s profile.
- v. A brief discussion of the major themes shaping the individual teachers’ practice.

The teacher portraits aim to paint a holistic and diverse picture of the participants in our sample, and do not seek to weigh the circumstances that aid or block effective math teaching. They also depict the complexity of teachers’ lives and the many influences that come together in what becomes their practice.

In some cases the researchers were contacted during the writing process in order to cross check fieldnotes and to collect a further elaboration of information in the fieldnotes. Often, these conversations proved to be extremely interesting because researchers revealed a great amount of empathy for the new teachers and they often conveyed a more complex view of classroom dynamics than was actually recorded in the fieldnotes. It was also interesting to debrief with the researchers because each brought a unique perspective to the process as a result of their training and experience. The combined perspectives rendered rich data from which to derive the portraits.

After drafting the narratives, they were shared with the members of the research team who initially conducted the observations and interviews and revised according to the feedback that was received.

C. Key Findings

In this section, we present the findings of the study from two perspectives: A synthesis of facilitating and impeding circumstances that shape effective teaching (based on data presented in the Appendix 6) and teacher portraits (based on 5 participants who we were able to interview twice). This section includes data from all the teachers in the study (N= 10).

Overview of Facilitating and Impeding Circumstances

The host of issues that appear to mediate effective teaching practices are complex. Some clearly constrain effective teaching while others clearly aid. Yet others have a double valence: In some circumstances they facilitate effective teaching and in other circumstances they are obstacles to it. Below we outline the range of aids, constraints and circumstances that have a double valence.

Aids: Coursework, Student Teaching, and Faculty at CSUN

There is a great deal of agreement about the positive aspects of studying at CSUN. The methods courses, student teaching, positive relationships with faculty, and selected courses are cited as the program's strengths. Although teachers do not appear to be able to implement many of the strategies they were exposed to through these experiences, new teachers are deeply aware of the importance of methods and student teaching courses. Teachers recall drawing upon their recent coursework and conversations with faculty at CSUN to prepare lessons. Students choose to attend CSUN because it is convenient and makes a career in teaching possible when it might not otherwise be an option for them. In short, this sample of teachers perceives CSUN as providing new teachers with an important bank of experiences to utilize during the first years of teaching in addition to a viable means to develop a career in education.

Multiple Constraints

Because the majority of teachers in our sample exhibited difficulties implementing the effective teaching practices taught at CSUN, it is not surprising that the study was able to uncover many constraints.

Teachers' Lack of Identification with Math

Across the sample there is a noticeable absence of commentary about personal connections with math and math related content. When asked about their motivations for becoming teachers, participants do not refer to their love of math at all. Nor when asked about their motivations for attending CSUN do participants discuss their desire to deepen their connection to math despite the strong math education and math-related programs offered at CSUN. Even when talking about pedagogy, the teachers tend not to talk about

pedagogy specific to math. Instead, they focus on general teaching strategies. Potentially, new teachers are so intensely focused on day-to-day survival that a deep connection with their discipline is temporarily submerged.

Auxiliary Practices Deficit: Assessment and Differentiation

New teachers frequently described their need for help in developing skills in assessment. Few had assessment plans for their lessons. Most cited only conventional forms of assessment. Many desired to develop further knowledge of “assessment” and did not distinguish between statewide or national tests or teacher-constructed assessment strategies for the classroom. Interestingly, assessment was not among the most important effective practices identified by CSUN SED faculty, but for our research study it is quite possible that without good formative and summative assessment skills these teachers will be unable to teach effectively.

Differentiation, or the use of providing lessons for an all levels of students in an inclusive classroom (i.e. in particular, students in special education or those learning English) is a second area of skill that new teachers are lacking. New teachers are vaguely familiar with the concept of differentiation and tend to equate differentiation with “individuation.” They cite creating special worksheets and assignments for individual pupils. Others develop ad hoc “solutions” such as putting ELL pupils next to fluent bilingual pupils, or relying on trained assistants to “take care of” students with particular needs. Differentiation appears to be viewed as “not my job” and as taking time away from other things.

Lack of Time and Logistical Difficulties

Many of the teachers lacked time to take care of things that they thought were important (e.g. correcting homework, updating grade book, calling parents, generating creative lesson plans). Some feel there was no time to reflect on their practice or to develop an organized routine. They express an inability to “self-actualize” into the teachers they hoped they would be.

Ambivalence Toward Student Teaching

Several teachers expressed conflicted views of student teaching. They recognize the value of student teaching but indicate that it is an inconvenient requirement because it conflicts with other job obligations. Some appreciated the concept but did not have helpful master teachers. These views about student teaching are noteworthy because it contradicts teachers’ view of student teaching as among the most valued experiences at CSUN. It appears that overall teachers feel student teaching is worthwhile despite inconvenience, or less helpful master teacher, and there is a desire for the student teaching program to be modified so that it is a fully positive experience.

Credentialing Bureaucracy

New teachers feel stymied by the obligation to complete credentialing requirements while getting ready to teach. Graduates feel that the credentialing process for the school district situated at CSUN needs streamlining; for example, some cited the teaching portfolio as having been time consuming and felt that their preparation time could have been better spent.

Other Missed Experiences at CSUN

Teachers described a host of desired changes in the training at CSUN. Many of these desires reflect the needs of new teachers who are struggling to survive during the first years of their career. Several mention a desire to learn more about coping with the logistics of teaching, how to reach low achieving pupils, how to cope with large curricula, a need for more practice in lesson planning and assessment, and greater discussion of ethics in teaching.

Circumstances That Have a Double Valence

As described above, there are a number of circumstances that act as aids for some new teachers and constraints for others. Below we discuss these circumstances which have a double valence.

State Standards Pressure

State standards strongly influence lesson planning, yet new teachers have diverse responses to the influence of this external force. Thus, the standards provide a framework for lesson content. Some are skeptical of the relevance of state standards and the pressure they create for teachers. Others are ambivalent about state standards and are not sure how much importance to give to them. One teacher feels the state standards are a force that he cannot contest; thus, he embraces them.

Mixed Experiences with Colleagues

Many teachers discussed support from colleagues at their school. Colleagues are an important resource for teaching ideas, of clarification of school policy, as well as an important emotional support. In some cases, though, new teachers desired more support from colleagues, or they find themselves working in schools where there is no culture of mentorship and no trustworthy veteran teachers with whom to consult. One teacher notes that veteran teachers are obstacles to effective teaching because they do not work hard to prepare pupils for subsequent levels of learning.

Perceptions of Pupils

Some teachers are inspired by their pupils and are highly motivated to help them. For some, the connection with youth motivates their desires to enter the profession. A few have positive relationships with their pupils and are clearly engaged with them. Others perceive pupil behavior as a primary obstacle to teaching effectively. Some feel that their pupils are challenging to manage. Some even express concern about pupil behavior when to the ethnographer's eye the pupils, the students seem well behaved. Others appear to be respected by their pupils, but do not appear to have a strong connection to them.

CSUN's Identity

The majority of teachers selected the credential program at CSUN because of its proximity, convenience, affordability and general "good" reputation. Those coming into teaching from other professions in particular, enroll at CSUN because of its "good" reputation. None, however, qualified what is "good" about CSUN. Thus, CSUN's reputation as an institution appears to be generalized and non-specific (versus vague or non-descript).

Motivations for Becoming a Teacher

The majority of teachers say they entered the profession for practical and/or idealistic reasons (e.g. the need to make a career change or the love of teaching and helping others). Others are propelled to the profession by positive and negative childhood memories (e.g. memories of inspiring teachers who helped them or memories of unhappy learning experiences). It is surprising that none of the teachers were primarily motivated by the subject of math itself; however, when considering their reasons for entering CSUN, the practical bent is understandable.

Memories and Lesson Planning

Teachers think of their early childhood memories of school as playing a large role in their lesson planning. However, none of the teachers referred to early memories when discussing the resources they drew upon for preparing the day's lesson. Memories may ignite reflection upon one's identity and inspiration for practice; however, other sources actually fuel practice more directly such as recent training experiences at CSUN, professional development workshops, discussions with colleagues, observations of others' classes, observations of pupils, texts, and on-going independent reading and research.

Teacher Portraits: Variation among “Low Implementers”

The results of the Perceptions Study resonate with the Observations Study in that they confirm that teachers in the sample implement few of the Secondary Education (SED) - identified effective practices. The practices of all of the teachers observed in the study are mediated by a host of issues discussed below.

Overall, these teachers are ‘low implementers’, when measured by the SED-identified practice list (See Study 1: Observations), but a more subtle distinction can be made. Namely, teachers vary in their awareness of ‘effective practice’ along a continuum that mirrors math educator Liping Ma’s (1999) continuum of procedural → conceptual knowledge. At one end of the spectrum we see teachers who did not exhibit any of the SED-identified effective math teaching practices during the observed lessons. These teachers also predominantly exhibit procedural-level awareness of math teaching (characterized by rote memorization, over-reliance on rules, etc.). At the other end of the spectrum we see teachers who implement several of the SED-identified effective math teaching practices. This leads them to exhibit conceptual-level awareness of math teaching (characterized by an awareness of higher-order questioning, emphasizing thinking process over products, giving students authority to judge solutions, etc.). A middle ground exists whereby individuals have an awareness of the SED-identified effective practices but do not implement many of them consistently. Generally, these individuals have other teaching strengths that are relevant to the future implementation of math-specific strategies.

To help explain this continuum, we propose three categories.

	Characteristics of Math Teaching in Discourse, Behavior and Levels of Awareness
Tier 1	Little to no awareness of SED-identified effective teaching practices; little to no evidence of SED-identified effective teaching practices in discourse and behavior; predominantly teaching procedural knowledge of math.
Tier 2	Some awareness of SED-identified effective teaching practices; little to no evidence of SED-identified effective teaching practices in behavior; predominantly teaching procedural knowledge of math.
Tier 3	A high degree of awareness of SED-identified effective teaching practices. Some implementation of SED-identified effective teaching practices; teaches conceptual knowledge of math however inconsistently.

To further elaborate on these categories, we provide the following descriptions of the three tiers.

Tier 1

- Do not appear to use the SED-identified effective practices.
- Seem to lack an awareness of other effective teaching practices, apart from math (e.g., teachers in this group do not seem to have an internalized plan for how they are going to teach on a given day or how they will assess student learning).
- Are highly reliant on external guides such as pre-formatted software templates, standards lists, and traditional classroom discipline methods. These external guides may help these teachers keep up a semblance of routine, but basic aspects of teaching (such as reaching diverse levels of students, dealing with cultural diversity, busy schedules) seem to easily throw off the seeming routines.
- Do not seem to have a plan for professional development, mentors who could help them, or a clearly articulated professional identity as teachers.

Tier 2

- Appear to have an awareness of SED-identified effective practices (as evidenced in discourse) but do not implement the practices to any significant degree.
- Emphasize procedural knowledge of math (memorization, etc.).
- Are somewhat reliant on external guides that help these teachers keep up a semblance of routine.
- Exhibit additional teaching strengths not covered by the SED-effective practice list such as cultural/communication competency, among others.
- Articulate a vision of themselves in the profession in a future marked by further professional development.

Tier 3

- Have an awareness and basic conceptual knowledge of SED-identified effective practices (as evidenced in discourse) but do not implement these practices consistently. They explain this gap by pointing to logistics (e.g., limited time, small classrooms) and external circumstances (e.g., state standards, under-resourced schools) that constrain their practice.
- May exhibit additional teaching strengths not covered by the SED-effective practice list such as cultural/communication competency, among others.
- Articulate a vision of themselves in the profession marked by further professional development.

Case Studies: Five Teachers

This study focuses on math pedagogies but they are of course integrated with other teaching practices. As these portraits below show, many of the teachers get very far with other strengths such as abilities to communicate and build rapport with pupils, abilities to

manage the classroom, and abilities to appeal to pupils with one’s personality and charisma. It is hard to talk about our teachers’ math competency and assess the effectiveness of their math teaching without also acknowledging the fact that the teachers have a broad range of teaching skills not represented by the SED effective practice list. Given that the motivations for becoming teachers for many in our study were empathetic, charismatic primary and secondary school teachers of their own, it is not surprising that these teachers show strengths in these very areas.

In this next section, we present the stories of teachers who reflect elements of the three tiers of teaching that we describe above. Teaching is a complex practice that is not neatly captured by simple labels and categories. In order to appreciate the complexity and the variety of teachers in our sample, we find it nonetheless useful to loosely sort our cases into Tier 1, Tier 2 and Tier 3 categories:

Tiers	Teachers	Grade Level	Subject
Tier 1	“Grace”	8 th	Intro to Algebra
	“Shoshona”	7 th -8 th	Pre- Algebra
Tier 2	“Michelle”	7 th	Algebra I
Tier 3	“Moon”	9 th -10 th	Geometry (for AVID pupils)
	“Caitlin”	7 th	Honors Pre-Algebra

Below are our teachers’ stories. Their names and several other characteristics have been changed to protect their identities, but the characteristics of their classes are unaltered. Both the observational data and the interview or perception data are combined in these case studies.

“Grace”: “*Write Down What I Say*”

The Classroom Scene: “Take out your class notes. We have a lot of class notes today, as usual, like the past two weeks [Grace puts up a transparency]... Write that down...today we are going to be talking about polygons. After you write that down I will tell you more....Ok, guys, write that down....draw something like this....do you all know what this is....Just write ‘means of interior angle’ and then write “A and B and the interior angle’....”These are instructions we heard Grace give while teaching a class on polygons to 35 English-speaking European-American eighth graders enrolled in “Introduction to Algebra I”. She is wired for sound, so that one blind and deaf pupil can access course content. Other pupils access content in the way Grace instructs them to do (primarily by having them write down ‘class notes’ and waiting for explication, or by having them draw the same shapes she drew on the board and again waiting for explication.)

Grace occasionally calls on pupils to provide definitions from the reading, or directs them to copy a chart of information that is supplied by the textbook. The pupils pay attention to Grace and follow her directions. A few assertive pupils ask questions from time to time. Some try to be funny by critiquing the clarity of Grace's hand-drawn polygons. One pupil challenges her solution to a problem; this prompts her to run to her calculator to check her arithmetic.

As the class period goes on Grace appears to have control of the classroom but at the end of class something changes. She instructs pupils to work on the homework exercise while she passes back quizzes. Most pupils follow her instructions until they are called to pick up their quiz at the front of the class. They use the short walk back to their desks as an opportunity to visit and talk with other classmates in the room. Some take seats on the desk tops while they chat and laugh with their friends. During this time, Grace also invites pupils with high quiz scores to take stars that she has cut out of construction paper and pin them up on a bulletin board on the side of the classroom. Many pupils begin to congregate near the bulletin board to comment on the stars. Between the action at the bulletin board and others taking round about routes back to their desks, the classroom suddenly becomes a social scene where only 3 or 4 pupils are actually working on the homework. The socializing lasts until the end of the period which is nearly ten minutes.

Below we highlight insights on why Grace tends to emphasize procedural learning such as prompting her students to copy down descriptions and procedures for solving math problems and mimic her thought process for solving problems. We also examine her concerns about classroom management and why at times she has a great deal of control and at other times the pupils appear to have free reign.

Insights: Grace is a bilingual Asian –American. She attended a local high school in LA and excelled at AP science. She remained in California for her BA, and then attended the credentialing program at CSUN. One observer suggests that possibly Grace prefers to lecture about geometry because the curriculum is not fresh in her mind from her own training and she may in the process of learning it as she teaches it.

Based on observations and interviews, Grace is unable to implement any of the SED-identified effective teaching strategies in her practice and does not exhibit an awareness of their value in her discourse. It appears that she aims to impart strictly procedural knowledge of math. She relies heavily on direct instruction and expects her pupils to memorize math rules, not to question them. She does not give the pupils much opportunity to express themselves. In fact, it was observed that when Grace would turn her back to the class, pupils leaned across the aisles to help one another. When talking about how she conceptualized the lesson plan, she provides a general explanation of the plans objective by saying, "Oh, we're doing polygons!" and then lists terms that were a part of the lesson. She is not able to articulate *what* the pupils are learning about these terms or how they are relevant to preceding and following lessons other than to say, "they are in the book."

Grace's teaching seems to be greatly impacted by a rush to meet state standards. She says,

“I would like to do group work in Algebra, but we have so much to cover. We are pressured to get through it. If they don't understand it, well, I try to go back over it but there isn't a lot of time. Class is only 50 minutes. It's all I have to teach them the lesson. Sometimes there isn't enough time to go over the homework. Sometimes I like to get students to go to the board to write up the answers....if we have time.”

No doubt Grace feels pressured by the standards, since the majority of teachers in our study feel the standards impact their teaching. What is noteworthy, though, is that her discourse and classroom behavior do not coincide. Although she perceives the standards to consume all of her instructional time, in fact, she allotted approximately 1/5 of her class time to non-instructional activities such as handing back quizzes and “homework.” Thus, it may be the case that some new teachers are so overwhelmed by state standards and the limited number of hours in a school day, that it difficult to become aware of the spaces and times of the day that are underutilized. And by extension, it is difficult to see how strategies that entail less well-defined times and spaces (e.g. pupil-lead discussions, group work, etc.) may fit into the regular teaching routine.

Grace also seems to feel that her teaching is impeded by her need for better classroom management. Again, there seems to be a gap in her perception of this skill and how pupils actually behave in her classroom. On both visits to her classroom pupils were well behaved during formal lessons. Yet Grace believes her pupils need greater discipline. She says, “I learned from BTSA how to be firm. I saw from observing others' classes that they were strict with them. I decided that I need to be more strict with my pupils.” There is more to classroom management, however, than adopting a “strict” or “loose” stance towards pupils. As evidenced in the description above, Grace is aware that there are techniques for keeping pupils on-task while attending to administrative business; in fact, this issue was brought to her attention during her student-teaching assignment. Nonetheless, she does not appear to know how to implement strategies to keep pupils on-task consistently.

Grace's maturity as a professional may be keeping her from sorting out this issue. On the topic of developing a stronger sense of boundaries for pupil behavior she notes,

“I think that I am changing in this area....I am trying to find a balance. I struggle the most with that. I am learning to overcome feeling bad. I take it (pupil behavior) so personally. If they took a book from the class, I would think that it had to do with me....once the pupil came back and explained that she forgot about it and put it in her knapsack by accident. She gave the book back. I am learning to detach, not get so involved.”

Grace is understandably sensitive to pupils' perceptions of her as either a “mean” or “nice” teacher. Focusing on this, however, is not leading her to reflect on how she might

structure the flow of activities in the classroom so that the pupils are on task and following the steps that she would like them to take in order to master math. Further, she is not considering how structuring the flow of activities in the classroom will lead her pupils to success, render her a supportive and effective teacher, and thereby make her well-regarded by her pupils.

According to Grace, parts of her training at CSUN have been helpful to her getting organized in the new job. In her view, student teaching was extremely helpful, especially when she developed a positive rapport with the master teacher. She claims that one of her master teachers gave her “a lot of attitude” and was not very helpful, however. Courses at CSUN were equally mixed. She says that some were boring, dry and irrelevant. Others were interesting. That said, there were assignments that did not seem useful at the time, such as the teaching portfolio, which are now turning out to be important sources for her lesson planning. She regrets not paying more attention to the lessons that she then considered to be boring and dry. Like her relationship to classroom management issues, it appears that she is slowly making connections between effective teaching concepts that she studied in the abstract and how they may be relevant to her classroom now. Her understanding of effective teaching practices appears to need strengthening, however, before she can move to implement them with some measure of success.

According to Grace, having contact with other teachers seems to catalyze this learning for her. She reports enjoying BTSA because she finds, “...it’s really helpful to go to conferences and get more training and to just talk with other teachers. We are having the same struggles. I have a consulting teacher. Just talking with her once a week or once in a while is really helpful.” That said, apart from her connection with BTSA colleagues, she has relatively little support from teachers at her school. She claims that her department is very supportive of her, but she also reports interacting with no other teachers and staying in her classroom throughout most of the day—including her prep and lunch periods. She says she does not even know who teaches in the classroom next door. Grace admits that she stays in her room because there is too much to do. She says, “You are always short on time. I need to teach so much. I wish that I had 5 prep periods for one class....before becoming a teacher I didn’t know that teaching is an individual thing. I don’t get a chance to talk with other teachers. They are also very busy.”

In sum, the resources that might be helpful to Grace, such as support from colleagues—she does not access because she feels so pressured by the workload and the need to cover lessons. The pressure and Grace’s perception of its gravity lead her to isolate herself and to forfeit the opportunity to take care of some of her own basic needs (e.g. eating lunch and having contact with peers). This may be read as the sign of a new teacher who is committed to working hard, open to receiving help, but who is also unable to develop a coherent routine in the classroom due to being overwhelmed and unable to access and process useful resources.

Despite her lack of depth of pedagogical content knowledge, Grace expresses enthusiasm at the thought that she could, in the future, return to academia for a graduate degree in

teaching. She sees herself as a prospective professor of education who trains future teachers. Her potential for such a future career is difficult to perceive now, given that the teaching witnessed did not incorporate many effective practices. Nonetheless, she strongly identifies with the profession and perhaps with time will develop new skills.

“Shoshona”: Streamlining Teaching and Learning

The Classroom Scene: In Shoshona’s seventh and eighth pre-algebra classrooms, pupils begin by working on a warm up written on the board. When it seems that most have finished, Shoshona reviews the exercise at the board. She calls on individuals for the answers and says “Good” and “Excellent” when correct answers are given. When incorrect answers are given, Shoshona moves on to ask another pupil who probably can answer the question correctly, or she supplies the correct answer herself. After the warm-up, Shoshona either assigns more problems for pupils to practice or she lectures on a new concept that will be covered on the state exam. The pupils are silent most of the time. When pupils speak it is because Shoshona has called on them. In these instances, pupils generally give very brief answers and do not ask many questions. Once in awhile, usually towards the end of the period, Shoshona allows her pupils to work in pairs. This is just about the only time pupils are permitted the freedom to speak to one another and to collaborate. Otherwise, there is the sense in this classroom that Shoshona, a somewhat petite woman with a soft voice, keeps a tight lid on conversation and pupil interactions.

Even at the level of solving math problems, there does not seem to be much choice about the way in which anything is done. Shoshona seems to prefer to direct her pupils and to have them passively accept her instruction. Despite the semblance of order and control in the classroom, Shoshona does not seem at ease. As we describe below, the need for survival strategies, ambivalence towards lessons learned at CSUN, and her commitment to classroom teaching influence some of her discomfort as an instructor.

Insights: Shoshona is a new American who grew up outside of the U.S. and did her secondary education in the Middle East. Before coming to the CSUN credentialing program, Shoshona completed a bachelors of science degree in biology and planned to pursue a career in medicine. She did not make it clear to us why she switched from pre-med to education. Nonetheless, she clearly had some basis for deciding to become a teacher. Prior to accepting her first teaching job, she acquired extensive experience tutoring children and she worked as an instructional assistant with special education pupils in a local high school. When asked about her future career plans in education Shoshona revealed that classroom teaching was not the only goal on her horizon. She plans to pursue counseling or to become a resource specialist. She believes that classroom teaching is giving her “the advantage of experience,” and it will be an asset for her as she looks for work in these other areas of education.

As depicted in the scene above, Shoshona has established a functioning routine in her classroom. The pupils follow her commands and do the work that she asks of them. It appears that they are well-behaved because there are consequences for misbehaving. In

addition, Shoshona does not give her pupils much opportunity to fall out of line. She controls most of the classroom discourse and only on occasion permits pupils to interact with one another. She does not employ any of the SED-identified practices that give pupils the opportunity to make meaning on their own such as engaging in high level thinking tasks or exercising the authority to judge the mathematical soundness of publicly presented solutions. Once in a while pupils are allowed to work in pairs, although this is approached as a special “treat” for well-behaved students and not as a pedagogical strategy central to the discovery of knowledge in Shoshona’s class.

Based on our observations and interviews with Shoshona, she appears to be a teacher with procedural knowledge of math education. She is aware of a number of pupil-centered math strategies such as the usefulness of group work, using manipulatives, asking high level cognitive questions, and making math relevant to learners’ daily lives. However, she is hesitant to employ them. Instead, she claims that there is no space to move desks for group work. And, there are other circumstances that prompt her to feel that if her pupils memorized the formulas and rules for solving problems, they could easily master math.

First, Shoshona feels pressured by the state standards. She feels that there is a lot of material to cover. This prompts her to want to decide for the pupils what they need to know and streamline the delivery of ideas. Shoshona says,

“I try to think through what’s the easiest way for them to understand this... what do they really need to know, rather than giving them all of this information they are not going to recall and they’re not going to spend time trying to recall at home. I try to get it down to how can I convey the standard? How can I prepare them for the final in the way that will be the most effective for them because they don’t really deal very well with information overload.”

Shoshona is also aware that there is a time limit for covering the standards. As finals approach, she looks for shortcuts to covering the curriculum. She says, “I’ll look at the standards, but I don’t have time to really consider fully what exactly is entailed.”

Due to her perception of her pupils’ low capacity to recall and invest time at home studying, in addition to her own need to reduce the quantity of content that she must cover, Shoshona feels it is necessary to streamline the learning process. For example, she chooses to directly deliver selected content, instruct pupils on how to solve problems, and give them some opportunity to practice as per her instructions. She does not give her pupils an opportunity to explore on their own terms the logic of math problems and to propose alternative approaches for solving problems. According to one observer of Shoshona’s class, she also streamlines the process of lesson planning. Our ethnographer writes,

“I have the sense that this teacher is trying to make things easy for these pupils whom she believes can not learn very well. She

talks about just putting things together so they can understand. She seems not to have any specific source other than the text book, which she really doesn't like....She referred to none of the sources on our interview schedule as something which was helpful to her."

Another way that Shoshona tries to streamline teaching and learning is to ignore the need to differentiate instruction in the classroom. According to Shoshona, her pre-algebra class is hard to teach because, "over half of the class has 1's and 2's on their California Standards Test (CST), but then there are people who are 3's and 4's....it's really hard." Given these dynamics, Shoshona says that she tries to ask more challenging questions to the advanced students and on different occasions she has designed different worksheets for pupils on different levels. She was quick to add that she found this to be too much work and not something that she could do on a daily basis. She appears to be aware of the need to differentiate instruction and is even familiar with an approach for addressing varying pupils' needs; however, she has eliminated differentiating strategies from her practice because in her view it is time consuming and not worth the effort.

In addition to approaching lesson planning and instruction as a matter of efficiency, Shoshona feels it is important to maintain tight control over the pupils, especially low performing ones. It appears that she believes that pupils with limited skills are completely dependent upon the teacher's authority and ability to maintain silence and order in the classroom. Too much pupil interaction is viewed, in Shoshona's eyes, as a distraction from receiving wisdom from the teacher. Shoshona says,

"I think that keeping the pupils' behavior in check is something [important] ...I feel that I can't be as energetic or as funny, you know, because they don't know how to take funny and they....you might lose the complete concentration of the whole class....I can't be as free as I'd like to be...I sort of have to be on top of them a little bit more than I would have to be with pupils who were motivated a little bit more."

Not only does Shoshona streamline lesson planning and the transmission of knowledge, but her assessment of her pupils' prompts her to streamline classroom interactions. Interestingly, keeping tight control over her pupils does not feel natural to Shoshona. She does not feel free to be herself and to interact with her pupils the way she would like. Thus, Shoshona's focus on imparting procedural knowledge to pupils requires a way of being in the classroom that is identity-altering and taxing. Yet, Shoshona is not able to step out of this role and to implement alternative practices.

Shoshona's orientation towards the procedural aspects of teaching is further echoed in her commentary about her training at CSUN. In her view, a few elements were missing in her training. She wishes CSUN had prepared her better to deal with the practicalities of the job. For example, she feels she should have been taught about grade keeper programs and systems for easily checking off and keeping track of homework. She feels that she needed better preparation in how to add "spice" into math lessons while still covering the state standards. Additionally, she feels that she was introduced to strategies that are mainly appropriate for motivated pupils. According to Shoshona, group work and Jigsaw activities do not always work well with "remedial" pupils and sometimes not even with math content. It appears that while at CSUN Shoshona was introduced to some strategies for taking pupils beyond memorization skills; however, she was not persuaded by their effectiveness (and/or she is unclear about how to implement them in an effective manner). As a new teacher, concerned with maintaining order in the classroom, lessons on logistical matters seem more relevant to her now than models of activities that engender complex thinking and autonomous learning.

Shoshona is an interesting teacher to follow. She appears to be somewhat aware of some effective math teaching practices, but does not implement them because she does not believe they will be effective given the challenges she faces in the classroom (e.g. unmotivated pupils with limited skills, limited time, and an extensive curriculum to cover). She relies on standard routines and her ability to silence the pupils in order to get by. Potentially, there are other issues that keep Shoshona from developing a conceptual understanding of effective math teaching practices such as her commitment to becoming a classroom teacher. It is not clear if classroom teaching is a stepping stone towards a "better" career, or if counseling and resource specialists are backup plans should she discover she is unable to cope as a classroom teacher.

In conclusion, the case of Shoshona raises several questions: what are new teachers' concepts and expectations of teaching and the teaching profession? To what extent does the transition from one career plan to a career in education shape teacher training and new teachers' abilities to implement effective teaching practices? To what extent does her education in a different socio-cultural context than the U.S. influence her teaching, specifically her need for control and order? If this is the case, should teacher education programs make its cultural values explicit for pre-service teachers and find a common ground between the teachers' experiences and values and those of their learners? Is Shoshona's tendency to emphasize pupils' inabilities rather than capabilities due to her ambivalence towards classroom instruction, an outcome of being overwhelmed during her first year of teaching, or a worldview that could not be reoriented during training? What are the factors that prompt new teachers to view low student performance as a "problem"? Will Shoshona's own discomfort in the classroom eventually lead her to reflect on her teaching practices, to consider sources other than the textbook for designing lessons, and

to experiment with other approaches to classroom instruction? Given the combination of circumstances shaping Shoshona's low implementation of SED-identified effective teaching practices, what interventions would strengthen this new teacher's ability to perform?

"Michelle": Moving Towards Conceptual Teaching

The Classroom Scene: On a typical day in Michelle's seventh grade Algebra I class, the lesson begins with a warm-up on the board. Michelle has control over the class but she also has a casual way of interacting with pupils. For example, she takes a thumbs up/down vote from the pupils to assess their understanding of a math problem. As she reviews the problem on the board, Michelle peppers her pupils with a lot of questions. For example, she asks pupils to describe their knowledge of certain problems and how they might test their answers. At times it seems that more questions are fired at the students than they can answer fully. Despite some questions left hanging, there is a good deal of pupil participation and interest.

Once the warm up and a few other problems at the board are worked out, Michelle hands out a worksheet entitled, "Star Test Review." The sheet has approximately 5 problems on it. She asks pupils if they are familiar with these kinds of problems and indicates that they will be on an important part of a test that they are required to take. Some pupils seem to be aware of what she is talking about. Others do not. Some begin to refer to their texts for help in solving the problems. Michelle leads the class through a review of the worksheet. Pupils passively write down her answers and respond to her many questions.

Below we describe the circumstances that prompt Michelle to emphasize procedural knowledge and to teach to "the test" despite her desire to engage pupils through high level questioning and ultimately instill within pupils a conceptual understanding of math. She is aware of the difference between procedural and conceptual teaching; however, she is not quite able to always conduct a class where the activities lead pupils to develop conceptual knowledge. Evidently, a number of different circumstances impede her ability to shift out of the procedural mode. What makes Michelle a "tier 2" "procedural teacher"? What will it take for her to surmount the obstacles that keep her from meeting her true goals in teaching?

Insights: Michelle is a young teacher who came into the profession directly after attending high school. Concomitantly, she completed her BA and credentialing program at CSUN. She is one of the few participants in our study who earned a degree in Math. Like several others in the study, Michelle accepted her first teaching job without prior classroom teaching experience other than, in Michelle's words, "a million years of tutoring."

In our view, Michelle is a low implementer whose ability to operationalize her conceptual knowledge is partially compromised by a number of circumstances; thus, when viewing

teaching strategies in her classroom it appears as if she absorbed very little from her training at CSUN. However, when speaking with her about her teaching, it is evident that Michelle has a great deal of knowledge of conceptual teaching but she is blocked from taking teaching to another level for a variety of reasons.

When talking with Michelle she is able to clearly articulate some of the goals of conceptual teaching. For example, Michelle is aware that effective teaching often entails employing manipulatives. To this end, she keeps a closet in her classroom well stocked with a pan balance, math tools, games and other learning aids. About her “treasure trove” she says, “This school has too much money! I was given most of this when I came. I also get \$500 a year for buying this stuff.”

While Michelle is lucky to be working at a school that is able to invest in up-to-date manipulatives, and she grasps the idea that using manipulatives is one means to foster active learning, it is interesting that Michelle actually hesitates to use manipulatives. During one lesson we observed, she did not use manipulatives other than hand gestures. In another observation, she did not use manipulatives to the extent that she might have. In this case, she brought out a game that mainly served to entertain pupils. It did not support the development of a math concept that she was trying to get across. Her own words suggest that she is somewhat aware that there is a gap between handing out math manipulatives and employing them to teach a math concept. She says, “When I look through the catalogues I think, ‘Oh, I can use that to teach this!’. Many times I try something in 1st period and it blows up in my face, and I have to tweak it for other periods or start over and use the book instead.” Michelle appears to be aware that in order for manipulatives to engender effective learning a certain amount of planning and thinking through is needed; however, this planning is not happening. It may be the case that the time for planning may be in conflict with the drive to cover content for the standards. Her comments suggests that even though she’d like to employ manipulatives, she finds herself going back to the book because it is a more reliable way to getting information across. In sum, it appears that Michelle has a theoretical understanding of the value of manipulatives. At this juncture, though, she is lacking practical knowledge and perhaps is also influenced to abandon the use of manipulatives due to the time pressures related to the standards.

A second example of Michelle’s keen awareness of conceptual learning is her interest in seeing her pupils divide information into learning sequences and explain the internal structure of their ideas. An example of her orientation towards externalizing thought processes surfaces when Michelle comments on one of her lessons. She said, “They can all solve the problem. The kids could see the answer. They are so smart that it’s hard for them to break down what they’re thinking.” She says that sometimes she asks pupils to stop and solve problems in their heads. She feels that this kind of mental exercise leads them to become more aware of their own cognitive processes.

Although Michelle strives to have her pupils articulate their internal thinking processes and emphasizes process over product, observers note that Michelle does not capitalize on her ability to pose strong questions that lead the pupils into a discussion about math

processes and alternative methods for solving problems. In fact, questioning is not exactly approached as a method for prompting cognitive reflection. Rather, for Michelle questioning is a tool for “covering bases” (or content) and controlling pupils. For example, Michelle says, “By questioning I know I haven’t missed anything; it’s like a checklist in my mind.” This phrase indicates that Michelle’s ability to pose high level questions leads her back to teacher-centered strategies where she and/or the textbook become the primary authorities in the classroom and pupils slip back into passive and dependent modes of learning. Michelle is aware that merely asking good questions is not effective teaching. She recalls one of her methods teachers at CSUN pointing out to her that she has a tendency to fire many questions at the class without leaving time for pupils to answer them (as if the questioning is an end in itself). She says that this is a skill area that she is trying to change in her practice. In short, Michelle is aware of an effective strategy and is only partially able to implement it. Perhaps with more experience, practice, and time for reflection she will shift away from procedural teaching and towards engendering conceptual learning.

Given her interest in connecting with one’s cognitive processes, it is not surprising that Michelle (consciously or unconsciously) takes a “cognitive” approach to lesson planning. She describes her planning process as a form of exploration where she looks over the textbook, considers the state standards, pours through catalogues, and reflects on how she was taught in high school. She then sits back and decides, ‘whatever approach makes sense to me, I go with it’. This way of negotiating standards and tests, a source of pressure that impedes nearly every teacher in our study, shows that Michelle has a sense of authority as a teacher and can apply a cognitively-aware decision-making process to difficult subjects.

Despite this conceptual capacity, Michelle still does not practice up to her potential. She seems still to be bound by test-taking strictures and has not overcome the challenge posed by the state standards pressures. This is evidenced in her labeling exercise worksheets according to the mandated test where pupils are likely to see such exercises. It is also evidenced in Michelle’s concern to cover material that will be on state tests, and her inability to carve out more time in class to develop deeper questioning and discussion about specific math concepts. That said, Michelle also let on in the interview to resenting the fact that she has to review for the state standards when she has so much else she wants to teach students. Thus, she appears to be a teacher who is being pulled in opposite directions by two very strong forces. She has a strong desire to help her pupils do well on state exams while at the same time desires to implement conceptual learning strategies that take time away from the opportunity to cover material for the state exam. At the moment, the force of state exams seems to be winning. However, it remains to be seen if Michelle will not find a way to negotiate a balance of forces in the upcoming years.

In addition, Michelle acknowledges that her cognitive approach doesn’t work well with every cohort of pupils. In fact, only her honors classes respond in the way she would hope students would respond – and she feels hard-pressed to come up with ways to reach lower-level pupils. It is possible that such pupils need very concrete examples to illustrate concepts – and that is her very weakness, it seems. Finding concrete examples is hard for

her and it means that she does not seem comfortable working with a wide range of pupils. She does not know how to adjust a high-cognition model for struggling pupils – even those who are in an accelerated class – and this causes her to feel very frustrated.

In conclusion, it appears that Michelle is overly focused on process and sees process as an end in itself. She forgets the basics in the quest to illustrate her own strands of thinking, which are creative, to be sure, but opaque to most pupils. Will Michelle be able to harness her inherent creativity and cognitive capacities in order to address the state mandates effectively? Will she be able to move beyond questioning-as-control and questioning-as-means-of-ensuring-topic-coverage? Will she be able to widen her reach so that she can teach students with a wider range of abilities, or will she only function effectively as a teacher to the highest-performing pupils? These questions can only be answered with further and on-going participant observation of Michelle as she develops her teaching in the upcoming years.

“Moon”: *Banking on the Past in the Transition to Conceptual Teaching in the Present*

The Classroom Scene: In Moon’s geometry class for low performing ninth and tenth graders in a special college preparation program (called AVID), the class begins with pupils silently working on a “warm up” written on the white board. Moon circulates checking off homework and answering individuals’ questions. Although the classroom is set up with desks in rows for approximately 40 students, there are only 13 pupils enrolled in the class. Thus, it takes Moon less than five minutes to check off everyone’s homework and to make contact with everyone. Sometimes during the warm up Moon directs a pupil to the white board to work out a problem in front of the class. Moon asks pupils who go to the board to explain the process for solving the problem as they work it out. When pupils appear to be stuck, rather than tell them the solution directly, he asks probing questions such as, “What do you do to make lines the same in equilateral triangles? “What is the parallel idea between this math problem and the other we were working on yesterday?” He sometimes also asks pupils to relate the process to a lesson the class worked on earlier in the year.

After homework review, Moon directs students to the day’s lesson. This may involve the presentation of new material, or practice and further elaboration on a concept. During our visits Moon was teaching about bisecting and circumscribing triangles. Moon passed out protractors for bisecting triangles and compasses for circumscribing triangles. He then directed pupils to draw a number of geometric constructions. He later told us that it is his belief that pupils understand geometry principles best if they do constructions rather than memorize them from a lecture of the textbook.

The atmosphere in Moon’s classroom seems comfortable at first. But then there is something amiss. The pupils do not seem to be able to figure out how to do the constructions. Moon seems flustered by this. He does not seem to have a back up plan for helping them. Individuals ask him a lot of questions and he spends a lot of time going around the room attending to specific pupils’ needs. Meanwhile those who wait for help

begin to get off task. Moon does not seem to be very clear about the direction that he would like to take the class. At one point he says that he would like for pupils to work in groups but then he doesn't put them in groups. He does most of the talking in class and mediates the majority of pupil talk. He seemed sort of scattered and does not seem to be following a planned lesson.

Moon is one of the few teachers in our sample who has some idea about how to approach teaching conceptually instead of procedurally. However, why did he appear to lose focus in the class? Why did he hesitate to allow his pupils to engage in group work? Why does he dominate the discourse in class if he is aiming to encourage pupils to put concepts into their own terms? These questions are partially answered by a look at Moon's background and self expectations, his experiences of day-to-day teaching, and the particular groups of pupils he is aiming to motivate.

Insights: Moon is a new American from Asia who completed his high school education in Los Angeles in 1997. He is one of the few teachers in our sample who took a direct route to the teaching profession after finishing high school. After graduating, Moon studied at a local community college. Within a year he transferred to CSUN. During this time he also completed the credential program at CSUN. He then returned to the high school that he attended to seek his first professional teaching job.

Moon's decision to take such a direct route to teaching seems to have been determined at a young age. Moon struggled as an elementary school pupil and thus developed a blasé attitude toward school as a defense mechanism. One of his teachers picked up on this and took him under her wing. The attention from his teacher boosted his confidence and propelled him to apply himself especially in the area of math. When he migrated to the U.S. he continued to struggle with his schooling. This time, he had difficulties learning English and was not doing well in many of his language arts classes. He excelled in math, however. His success in a high school Advanced Placement -math class, as he recalls, reinforced his interest in the subject and prompted him to pursue a teaching career in math immediately after graduating high school.

Unlike the majority of participants in our study, Moon identifies with the math discipline. His eyes light up when talking about studying the history of math theory in a professional development course and his forays into math-related exhibits at L.A. museums and cultural institutions. He is also very proud of several neatly framed works of M.C. Escher hanging on the walls as well as a poster of "The History of Mathematics by Isaac Asimov" and "Men of Modern Mathematics." Moon is one of the few teachers in our study to overtly identify with the math discipline. Moon's affinity for math may be overtly expressed because he took such a direct pathway from his own secondary education to a career in math education. It may also be overtly expressed because, as one observer describes him, Moon is deeply dedicated to his work and a very passionate and engaged individual.

Based on our observations and discussions with Moon, we view him as a teacher who aims to implement a conceptually-oriented approach to math more so than a

procedurally-oriented approach. He believes that pupils learn best by doing construction, not memorizing information about them from a textbook or teacher's lecture. He has some idea of how to employ manipulatives in exercises so that pupils are engaged and exploring math concepts. He knows that it is important to engage pupils in high level thinking tasks and consistently poses questions that challenge pupils to think and articulate their knowledge. Moon is not always able to implement conceptually-oriented instruction, however. There are days when it does not appear that he has a clear lesson plan. As mentioned above, at times he has planned to put pupils in groups but never quite gets around to doing it. In another class that we observed, he gave pupils a quiz but before the assessment was finished he decided that the pupils should finish it up for a homework assignment. These changes of plans create a certain amount of confusion for the pupils and give off the impression that Moon is scattered and has not thought through his lesson plan.

When we spoke with Moon about what he believes constrains his teaching he discussed a number of different circumstances. First, he talked about the practical problems of day to day teaching. Moon's concentration is easily broken by simple things such things as intercom messages piped into the classroom, which in his view, happens all too frequently and interrupts the flow of discussion. Intercom announcements could break his concentration and distract the pupils; however, this seems like a superficial constraint given some of the other circumstances he faces.

Perhaps a more influential constraint to Moon's teaching is his expectations of his own performance. He voices a concern about what he considers to be his lack of tools for motivating blasé pupils. He feels that CSUN could have done more to prepare new teachers with more strategies for engaging hard-to-reach pupils. For example, he wishes a course had been offered on understanding the psychology of disengagement.

One observer finds it interesting to hear Moon describe himself as a new teacher with few strategies for motivating pupils. Prior to this study, the observer had the opportunity to visit Moon's classroom under a different program. There she observed his creativity at motivating second-language learners to open up and express themselves. He did this by exhibiting a great deal of care and empathy, by talking about his own experiences, and by asking compelling questions that got pupils engaged in the lesson. The observer suggests that perhaps Moon does need additional skills for motivating pupils, but more likely he would benefit from paying closer attention to his particular group of pupils and by adjusting his self-expectations. For example, under-confident ELL learners and low performing pupils in the AVID program are not the same and may be motivated by different experiences. Further, his personal experience of being "saved" in primary school may not be the most appropriate point of reference upon which to base his personal "mission" to motivate a class of low performing pupils as a new instructor. Perhaps an overapplication of lessons learned from past experiences is leading Moon to expect too much or to expect the wrong outcomes from his pupils and is serving to undermine his confidence and ability to plan appropriate lessons.

Moon discussed with interviewers yet additional constraints shaping his teaching. He feels that his colleagues are not unified in their efforts to prepare pupils for state exams. Some teachers are not covering all of the topics that will be on the exam. Thus, when pupils arrive to Moon's classroom their knowledge gaps make covering the curriculum an uphill battle. Moon also finds it to be a problem that certain colleagues do not count state exams as part of the final grade. He feels this makes the pupils give little importance to preparing for the state exams, and this feeds into the challenge of motivating them.

It should be said that Moon does not view all of his colleagues as "the enemy." In fact, he often seeks help from veteran teachers for effective lesson plans and tips on classroom management. He says that although he was introduced to lesson planning and classroom management approaches in his classes at CSUN, he often finds more immediate "solutions" from colleagues at his high school.

Nonetheless, Moon is not passively accepting that some colleagues constrain his teaching. In response to his perception of colleagues who disregard the state exams, Moon has posted the standards for his colleagues to consult on a website that he has created. He hopes that the website will generate a more unified approach to preparing pupils for success. In addition, he has created a website to inform parents about state exams, the assignments in his classes, and suggestions for helping pupils to conquer the math curriculum. In short, these examples illustrate that Moon does not throw up his hands in the face of constraints that he can identify. Indeed he is aware that circumstances beyond the walls of his classroom can shape his ability to teach and his pupils' abilities to learn. His dedication to effective teaching leads him to not only address the needs of his pupils, but the needs of the "system" in operation beyond his classroom.

CSUN may have played a role in helping Moon to detect constraints to his teaching in addition to developing an appreciation for conceptual learning. Moon claims he attended CSUN because it was the only college that he could afford, but his experiences at the institution were positive enough for him to give a favorable assessment of his overall experience at CSUN and in the Secondary Math Education program. Moon recalls having especially positive experiences in the Secondary Education Department. According to Moon, the most valuable lesson he learned has to do with developing an appreciation for the multiple approaches to solving problems. A second valuable insight he cites is developing a greater sensitivity towards the needs of pupils with disabilities. Moon is one of the few participants in our program who also mentioned benefiting from developing a community of peers with whom to compare notes and find support. One could argue, given Moon's commentary, that his experiences at CSUN contributed to his development of a strong platform from which to implement conceptual-oriented math strategies. In his coursework, he was introduced to the theoretical concept of multiple pathways for learning, and then was able to explore this concept through exchanges with peers in these courses. Although Moon is not able to smoothly implement teaching strategies in his classroom that foster conceptual thinking about math, he can cite and describe various experiences at CSUN and in his own life that have helped him to distinguish conceptual from procedural learning. It appears that his next steps are to

figure out how to translate his experiences so that conceptual learning works well in the classroom. Possibly, the peer-support he received at CSUN could carry over in his selection of targeted colleagues at his school with whom he would want to collaborate.

In conclusion, the case of Moon is interesting for several reasons. Moon is a teacher who intends more so than many others in our sample to teach so that pupils grasp math conceptually and not just procedurally. That said, he struggles to meet his goal due to a number of circumstances. He seems unsure about how to structure activities so that pupils are not wholly dependent upon him. He is easily disappointed and frustrated by the low level of response he receives from pupils with a long history of low performance in a program designed to push them towards higher education. He feels that there is not a unified approach to servicing pupils and that colleagues prevent each other from being effective teachers. One might say that Moon may be on his way to developing into an effective teacher as soon as a combination of personal and external constraints are resolved, he gains more experience, and he reflects more deeply on the knowledge and experiences he already possesses.

The case of Moon also raises interesting questions for further investigation. How do new teachers make use of past experiences effectively? In some cases, one may over-apply lessons learned from past experiences and create unnecessary constraints to one's teaching. In other cases, one may not analyze past experiences enough to understand how to apply them to the present. To what extent do on-going professional development programs acknowledge the bank of experiences that new teachers bring with them to the job? To what extent are these programs helping new teachers analyze their past experiences and aiding new teachers to translate them into successful teaching strategies? To what extent is the role of on-going professional development to introduce teachers to new experiences?

Further, one observer suggests that Moon appears scattered in the classroom because he is trying anything and everything to motivate pupils who, perhaps, an experienced teacher might find difficult to motivate. Without a complex understanding of pupils and the meaning of their interactions with the teacher, it is difficult to fully comprehend the meaning of teachers' behaviors. Our study attempted to comprehend some of pupil behavior; however, we were not authorized to interview pupils. Therefore, we cannot make claims to fully understanding pupil "chemistry" and its implications for the presence or absence of certain teaching practices. Future studies, however, should look more closely at this dynamic.

"Caitlin": Talented But Vacillating Plans and External Pressures

The Classroom Scene: The day's lesson in Caitlin's seventh grade honors pre-algebra class was on graphing systems of equations. Typically, Caitlin's pupils begin class by independently working on a warm-up problem. One or two are invited to the front of the class to solve a problem on the board. During another part of the lesson, Caitlin selects a pupil to display his solution to the warm-up on the board. As the pupil works through the problem Caitlin watches closely but remains relatively silent. The pupil continues to

explain his process for solving the problem. In the middle of his explanation it appears that he has made a mistake on his graph. Other pupils watch in silence while the pupil continues to work through the problem. Some seem to observe the error. They have puzzled looks on their faces and they repeatedly check their own notebooks. Yet others do not seem to notice the error. By the look on Caitlin's face, it appears that she noticed the error, yet she does not say anything to direct the pupil's attention to his mistake either. Instead, she allows the pupil to continue with his work but she does ask him to elaborate a little bit more on the process. Before the pupil finishes solving the problem he realizes that there was a problem with his graph. Without input from the teacher or his peers, he erases his error and corrects it. Other pupils in the classroom nod in agreement at the final product. A few others focus more closely on their classmate's board work and at their own notebooks. Once the pupil sits down Caitlin recaps the solution and compliments him for his effort. Throughout the warm-up exercise, Caitlin maintains a self-assured demeanor. It appears that she knows her pupil is capable of discovering his errors on his own.

Caitlin seems to grasp a constructivist approach to math learning, and appears to be skilled at asking high level thinking questions and guiding pupils as they articulate problem-solving processes. She is one of the few teachers in our sample who possesses a reasonably strong understanding of conceptual teaching for a new instructor. That said, Caitlin does not practice a broad range of the SED-identified effective practices taught at CSUN. Among the skills that were not evident in her teaching include relating math to other math topics or other academic topics, and infusing writing, reading and speaking skills within math lessons. Moreover, behind the scenes Caitlin is just about holding together the routine in her class. Once the bell rings, she is bombarded by pupils and their personal needs in addition to administrative duties that seem overwhelming to her. Further, although she was enthusiastic about participating in our study, she proved to have difficulties setting aside time to speak with researchers. Conversations with her were characterized by numerous interruptions from pupils and others, and her underestimation that a 30 minute conversation could be compressed into 15 harried minutes or less.

As we show below, there are numerous external circumstances pressuring Caitlin and on occasion affecting her interactions with pupils. One of our observers noted that contrary to her overall positive rapport with pupils, the seemingly benign behavior of a particular pupil easily frustrated her and prompted her remove him from the classroom. Ejecting the pupil backfired for when he reentered the classroom he was more distracting than before. In short, the solid routine in Caitlin's class appears to have its points of fragility. As we got to know Caitlin, we discovered that the list of circumstances pressuring Caitlin may indeed prevent this highly skilled teacher from making a full transition to a highly skilled and experienced teacher. Take a look at what we have learned about Caitlin as a new teacher.

Insights: Caitlin is in her mid to late twenties and although she is young, she is an experienced professional. Prior to becoming a math teacher, Caitlin studied and worked in an office job. She felt that she was "chained to a desk" and missed having contact with

youth, so she decided to leave accounting for a career in teaching. To this day, some of her friends do not understand her desire to teach and her willingness to work at a school with youth from economically and culturally diverse backgrounds³. Nonetheless, Caitlin is following her instincts by pursuing teaching. Her instincts are bolstered by positive memories of learning math in high school. Then, she had a male teacher who used a lot of discovery learning techniques that made students think conceptually about math and not just memorize the concepts and procedures. These memories appear to have shaped her expectations of how teaching and learning should look in her classroom. In our conversations with Caitlin she referred to this experience when talking about the resources she draws upon for developing a lesson plan.

In both observations of Caitlin's classroom she came across as a teacher who aimed to instill in pupils a conceptual understanding of math knowledge. As described above, she displayed an ability to ask questions and pose tasks with a high level of cognitive demand. She is also very strong in the area of relating math concepts to real world problems. With her honors pupils, the class analyzed and compared the cost of annual gym membership fees. They challenged them to represent membership fees in graphic equations. In her class of "low achievers", pupils calculated the cost of skateboards, Lakers jerseys and Apple iPods with discount offers and sales tax. This lesson was informed by her former experiences working as a cashier in retail. Customers were often impressed by her ability to calculate in her head the cost of a discounted garment. Since she had this experience, she feels it is important to teach pupils how to calculate discounts on their own without the help of calculators or other human beings.

Further, Caitlin displayed some ability to provide opportunities for pupils to judge their own presentation of work. As we described above, with her honor' pupils, she demonstrated an ability to create a classroom atmosphere where students comfortably reveal their thought processes, discover math concepts, and assume authority over their own knowledge. She was not always able to implement the same strategies in her other classes, however. While teaching a group of low achieving pupils (85-90% of who are Latino) only on a few occasions were pupils given the authority to judge the soundness of publicly presented solutions. With the honors class, pupils were allowed to choose among methods for solving equations. There was no evidence of this strategy in the lower achieving class, however. Honors pupils were also encouraged to use multiple forms of representation to display their knowledge. This strategy was also not employed with lower achieving pupils. In short, it appears that Caitlin is more successful at implementing empowering strategies with honors pupils. This may be because these pupils have already experienced a good deal of success in math learning and therefore are easy to engage and manage in the classroom. There may be other factors mediating her limited ability to differentiate learning for two different groups of pupils.

³ Although the school has a large magnet for gifted students and has a reputation for being an academically strong school, it is located in a "trendy" part of Los Angeles that encompasses a mixture of middle class and lower than middle class families.

During our brief conversations with Caitlin, she told us about the things that help her to teach. As we mentioned above, it appears that she draws on her memories and personal experiences for inspiration. She listens to her pupils, observes closely their learning patterns, and adjusts her class according to the information that she gathers. For example, she is one of the few teachers in our sample who can clearly articulate specifically the thinking patterns of her pupils. She is quite aware of her pupils' tendency to want to divide instead of multiply when calculating discounts and percentages. She took note that many in the honor's class have difficulties graphing and are unable to see how using the first quadrant instead of working in all four quadrants may offer an efficient approach to solving a problem. In short, it seems that Caitlin's close observations of pupils enable her to easily guide them.

Taking graduate courses while teaching appears to be another important aid for Caitlin. She says that she adapts many of the lessons that she is introduced to in her graduate coursework. Although it is difficult to teach for the first time while taking graduate courses, she finds that the combination of theoretical learning and immediate practice engenders fast learning on her part.

Caitlin spoke of a number of specific constraints to her teaching. First, there are too many bodies and insufficient furniture in her classroom. Because of the large number of pupils and individual desks attached to chairs, she is unable to put students in groups or pairs effectively. When she puts pupils in groups, it appears to them as a "special" activity. She would rather that her pupils sit in groups all of the time. She requested a change of furniture; however, her request was denied.

Time pressures also seem to constrain Caitlin's teaching. In fact, Caitlin is quite overloaded between the demands of her job, her efforts to clear her credential, and her studies at CSUN. In addition to this, at the time of our visitations she was planning her wedding. As intimated above, possibly Caitlin is overextended and unable to reflect on her practice. External circumstances may be fragmenting Caitlin's focus and wearing down her patience and energy on occasion.

Overall, Caitlin is certainly an engaged and pupil-centered teacher. She is one of the few teachers that we observed who decorates her classroom with math-based art projects produced by her pupils. Each piece hung on the walls of her classroom is unique and testifies to the genuine appreciation that Caitlin has for her pupils' self expression. It is also evidence of her ability to teach math concepts in a creative manner.

Caitlin also appears to have benefited from her training at CSUN. According to Caitlin, studies at CSUN are, "... a lot of work --a lot of people don't go to CSUN because the workload is tremendous." Nonetheless, she says that her methods instructors and other mentors at CSUN have been helpful. That said, some of the classes she did not find valuable. She cites, for example, overuse of powerpoint and excessive amounts of review. Thus, like Moon, Caitlin expects to apply her experiences as a learner to her own pupils.

While Caitlin's commitment to youth, ability to communicate effectively, and ability to analyze her own experiences is clear, it is not clear what direction her career as a teacher will actually go in the upcoming years. On the one hand, Caitlin is undertaking a master's in math, enjoying the coursework, and immediately applying the lessons to her practice. On the other hand, she has also said that she is planning on leaving the teaching profession in the very near future in order to start a family. In our conversations with her we got the feeling that she views the teaching profession as intermittent - it is easy to drop in and out of the profession. While this may not be an unreasonable expectation, it does raise an interesting question about the durability of training. Do new teachers who leave the profession for years at a time retain many of the lessons learned during training, especially if they have had only one year or two years to experiment with these practices? How is one's effectiveness as a returning teacher impacted if one has a strong grasp of conceptual learning and a previous professional identity when one leaves teaching? Do teachers who teach procedural knowledge of math struggle more when they return after an extended leave? Is the profession well-suited to brief commitments from new teachers? Is math education impacted more than other disciplines by itinerant teachers? If so, how may math programs address this situation? [How do teachers who take a stop-out, such as for child rearing, regain momentum and get the appropriate professional development to bring the newest resources to their aid?](#)

Similar to the case of Moon, to what extent do the qualities of pupils complicate new teachers' abilities to implement effective teaching strategies? Why is Caitlin able to implement many more effective teaching strategies with honors pupils than with lower performing pupils?

And finally, will teachers like Caitlin be able to implement a full range of effective teaching practices if classrooms are not structured to accommodate group work? How might this situation be addressed by math and other programs in education?

D. Conclusions

Study 1 conducted by the Evidence Team found that graduates from CSUN are not presently implementing [a strong evidence of](#) effective teaching practices emphasized in the secondary math education credential program. Study 2, which this Sub-report concentrates on, argues that there is significant variation among these low implementers. Some teachers are low implementers with a low awareness of their practice and the practices that were taught at CSUN. Others are low implementers with "procedural" knowledge of effective practice (i.e. view practices as "techniques" rather than possessing a coherent conceptual understanding of effective teaching). Yet others are low implementers whose ability to operationalize their conceptual knowledge of effective practice is partially compromised by the logistics of teaching among many other issues.

In addition to these varying levels of awareness and abilities, teachers come to CSUN with diverse expectations for the profession and it likely that their previous experiences as learners, group facilitators, and as professionals shape what they are able to absorb

while undergoing their training. The economic, social, and personal circumstances of their own lives further mediate their absorption. Once in the field, yet other circumstances come into play. Some teachers land at schools that are supportive of new teachers and have a tradition of mentorship. Others find themselves at schools that are unable to and/or are unwilling to provide special support to newcomers to the profession. In some cases the pupil morale adds another layer of challenge. In short, the demands of the job are great.

Circumstances that clearly constrain teachers are an absence of identification with the math discipline, lack of knowledge of particular assessment and differentiation practices, time pressures including a limited amount of time to reflect on practice, administrative logistics, and credentialing bureaucracy. Issues that clearly aid new teachers include knowledge acquired from CSUN methods courses and positive relationships with CSUN faculty. A number of issues are double-sided; they constrain some new teachers while aiding others. These include: student teaching, the influence of state standards, relationships with new colleagues, perceptions of pupils, motivations for becoming a teacher, CSUN's identity as an institution, certain other coursework at CSUN, and early memories of learning.

Although the implementation levels of those we observed in this study may be low, we find that "the glass is half full." Despite the range of challenges that these teachers face, a number of them are savvy and are generating lessons that prompt pupils to relate math to real world situations. Others are making mileage out of their lively personalities and genuine love for their pupils. Others are harkening back to their experiences at CSUN in search of lessons, advice, examples and other clues that will help them to activate pupil learning.

Yet, we wonder how many graduates of CSUN are prepared to continue in the teaching profession. Nearly half of the sample seems to approach teaching as a stepping stone to other careers in education. A few do not seem deeply engaged with pupils, making it unlikely that they will teach for many years. Several others have life mediating circumstances (e.g. spouses who do not want them to teach, family obligations, hectic personal lives, and transnational lives) such that it is not clear that they will be able to continue teaching despite their dedication.

The varying degrees of "buy in" to the profession among new teachers raise many questions: what kinds of teacher candidates are admitted to the program? What are the expectations of future teachers and how are the job requirements clarified during training? What will be the career trajectories of teachers who leave CSUN? What is the definition of a "new" teacher more broadly and specifically in the context of LAUSD? If teachers are not able to implement effective practices within the first several years of their current careers, will they leave the profession—or worse—remain and negatively impact student learning? Most importantly, what are the developmental milestones that should be targeted throughout the career of teachers? In other words, are these CSUN-trained teachers on par or way above the typical first year teachers overall? Is their ability to reflect on their own teaching something that is foundational for their on-going growth?

[What aspects of their teaching are most malleable and might be targeted for sequenced nurturing? What kinds of support and incentives might be essential for sustaining careers in secondary math education?](#)

E. Suggestions for Future Research Directions

In keeping with the anthropological principles that guided this research into the facilitative and constraining factors that shape teacher practice, we would like to conclude our report with several suggestions for future research directions. These suggestions emerge from the application of inductive triangulation methods considered in anthropology to ensure data validity under small sample size conditions.

While not intended as prescriptions for action or as conclusive recommendations for programmatic change, the suggestions will, we hope, incite fruitful discussion among stakeholders of future research such as CSUN and TNE administration, SED faculty, the Evidence Committee and representatives from regional K-12 schools. We hope that the suggestions will enable future researchers acting on behalf of these stakeholders to create testable hypotheses for future research designs. We also hope that the stakeholders can view our suggestions, based on data validated through inductive triangulation, as a preliminary jumping off point for program improvement on both the CSUN and K-12 side of the equation.

Finally, we also hope that the suggestions that follow, as well as the validated protocols that our study used, will prove useful to other TNE research projects such as the Induction Research Project as they move forward with their investigations of pupil learning and teacher effectiveness.

Investigate Students' Mastery of Conceptual Math Knowledge: Future program evaluation research could test for procedural versus conceptual math knowledge at the beginning, middle and end of students' training careers, with the goal of more precisely describing how the SED program is progressively equipping its students to work on a conceptual basis.

Investigate Students' Training in Assessment and Differentiation: Formative and summative assessment and differentiation skills are a core component of effective teaching. With this in mind, future researchers could design a program evaluation inquiry that looks at the ways in which assessment and differentiation instruction is presently built into the credential program curriculum. This research could also investigate the degree to which the current student teaching experience builds on the platform developed in the program. Finally, this future research could examine how SED students are presently being taught to work with low performing and ELL students, both considered to be significant populations of need in the LAUSD context. Lessons learned from this future research may provide support program change.

Investigate Students' Ability to Situate Adherence to State Standards in a Broader Context of Best Teaching Practice: State standards and state mandated curricula change over time and students need to be able to flexibly handle new requirements without compromising effective teaching practices. Understanding how and why state standards change necessitates building the capacity for a critical discussion about state standards among faculty and students. Future researchers could design a program evaluation inquiry that looks at how SED prepares teachers to handle state standards in a broader context of best teaching practice that combines good time management skills, creativity and content mastery. The degree to which students are then found in their practice teaching to be able to apply best practices, creativity and time management skills while also meeting state requirements could provide useful feedback to the SED program. Such feedback could be used to foster discussions in SED about how students are being taught to negotiate the balance between mandates and effective teaching practice.

Investigate Students' Identification with Math Teaching: Future researchers may find it fruitful to investigate how students' formative connections with the discipline – in the case of our study, the math discipline – are forged through participation in the CSUN curriculum. The fruits of this research, a clear understanding of what the specific math-related curriculum offers students in terms of professional identity formation, could be used in the future to attract students to CSUN.

Investigate Students' Ability to Make Use of Collegial Networks and Mentors: Future research could inquiry into how the CSUN SED program trains students in making use of collegial networks and identifying mentors. A cohorted approach to this future research could test the effects of such training (which may or may not be a part of SED training) on future graduates.

Investigate How SED Shapes Programs to Fit Diverse CSUN Students: The teaching profession benefits from teachers who come from diverse class backgrounds. CSUN, as an institution that attracts *students* who come from diverse class backgrounds, is well-positioned to provide a diverse set of teachers to the profession. Future research could investigate how SED is presently matching the program to the backgrounds of CSUN students. Such research could consider, for example, the degree to which the administration of the credentialing process is (or is not) organized, and the degree to which alternative student teaching opportunities (e.g. night courses) are provided for teacher candidates who are unable to leave other job commitments during their training. Also worthy of future research would be the degree to which SED offers [scaffolded experiences](#) for students who may not have had sufficient opportunities (because of economic constraints) to see first-hand how pupils learn.

Investigate How CSUN Defines and Reinforces Teaching Identity: Future research may wish to compare how urban schools with similar teaching credential programs to CSUN (such as Hunter College of C.U.N.Y.) define and reinforce their students' identities as teachers, for the purpose of improving retention.

F. REFERENCES

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G. APPENDICES

Appendix 1. Effective Teaching Practices As Defined by the Faculty of the Secondary Education Math Department, CSUN

Practice
a) Teacher asks question or poses task with a high level of cognitive demand <i>(Pupils decide/invent approach, meaningfully connect ideas or rep. form, analyze/synthesize/evaluate ideas/strategies, apply math in a real problem setting, deepen conceptual understanding)</i>
b) Pupils are given authority to judge the mathematical soundness of publicly presented solution or method (rather than the T or text)
c) Teacher connects (or poses task that prompts pupils to connect) the featured math topic to another math topic.
d) Teacher connects (or poses task that prompts S to connect) the featured math topic to another academic topic.
e) Teacher connects (or poses task that prompts S to connect) the featured math topic to a real-life situation or object.
f) Pupils allowed or encouraged to choose among solving methods or present alternative methods.
g) Teachers or pupils use technology, manipulatives, body movement, or other nonverbal support for a math concept.
h) Specific attention is paid to developing writing, reading, or speaking skills.
i) Teacher uses or encourages pupils to use multiple forms of representation (English, symbolic, graph, table, diagram, physical model) for the same problem.

Appendix 2. Mail-In Portion of Background Information for Each Participant and Class Information for Each Class Observed

Background Information About You

1. Name: _____

2. Name of your school: _____

3. Languages other than English that you speak: _____

4. If you speak other languages, what is your level of fluency?:

_____ (fill in language); (circle): completely fluent/ somewhat fluent/ conversational

_____ (fill in language); (circle): completely fluent/ somewhat fluent/ conversational

5. How do you identify yourself culturally and/or ethnically? _____

6. Please describe your education beginning with **high school**:

Institution participated	Dates Attended	Degree Earned	Any special programs/classes you in such as A.P., BA major/minor, or special research projects
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

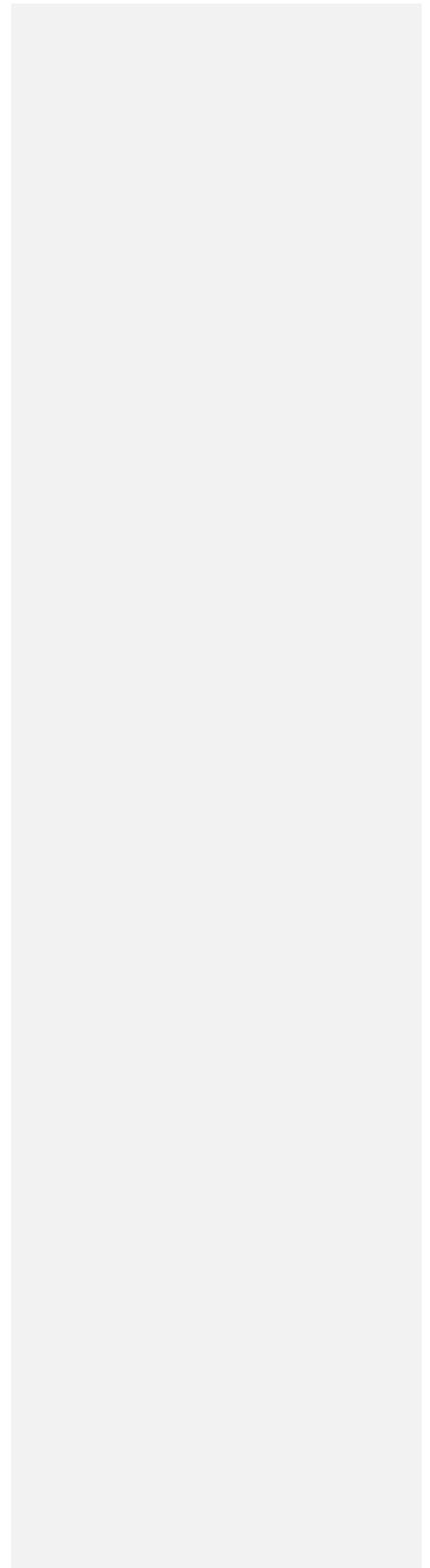
7. Subject Matter Competency (circle): CSET/Exam Program Undergraduate BA Program

8. Describe your teaching experience:

Ex. In what other schools/grades have you taught? What other formal or informal teaching experiences have you had?

School/Institution/Organization Pupil	Subject Matter	Grade or Level of
_____	_____	_____
_____	_____	_____

9. After graduating from CSUN, what additional coursework have you taken relevant to math teaching?



Background Information About the Class To Be Observed
(We will call you for this information)

1. Name of the course:

2. Grade level: _____

3. Number of students officially enrolled in the class:

4. Ethnic or cultural characteristics of your students:

5. Number of special education students in the class:

6. Number of English Language Learners in the class and languages spoken by students:

7. Transitory nature of the students:

For example, are there many recent immigrants or do students only spend a short time in the school before moving? Please describe.

8. Is there anything unusual or special about the students we will observe? Please describe.

9. Other comments you'd like to add about yourself or the class that we will observe:

Thank you for telling us about your class.

Appendix 3. First Visit Interview Schedule

Post-First Observation Interview Questions

Script: *“I just had the opportunity to observe your lesson. Thank you very much. Now I have some questions for you about your class, experiences in teacher education at CSUN, and specifically about today’s lesson. You may skip any question if it causes any stress. Remember that your comments are strictly confidential and none of your remarks will be associated with you by name.*

In your consent form, you indicated your permission to allow tape recording of this interview. If that is still agreeable to you, I would like to turn on the recorder and begin our interview. Do you have any questions before we begin?”

A. Becoming A Teacher

1. What motivated you to become a teacher? (**Motivation for Teaching**)
Probe: past experiences as a student; model teachers; family profession; social status, economic factors; cultural factors
2. What motivated you to study teaching at CSUN? (**Motivation for CSUN**)
Probe: reputation, convenience
3. What were the most useful or influential courses or experiences you had at CSUN that have impacted your teaching? Describe how and why these were especially useful.
(Probe for three responses) (**CSUN Impact**)
4. Was there anything that happened at CSUN that was particularly encouraging to you in pursuing a career in teaching? (**CSUN Encouragement**)
5. Was there anything that happened at CSUN that was particularly discouraging to you in pursuing a career in teaching? (**CSUN Discouragement**)
6. Given what you now know about teaching, what do you think should have been part of your CSUN program but were not? Be specific and tell why these would have been useful in math education. (**CSUN “Deficiencies”**)

B. Today’s Lesson

7. How would you define the objective of today’s lesson? (**Lesson Objective**)
8. How does today’s lesson relate to previous and forthcoming lessons? (**Lesson Relationship**)
9. In planning and teaching today’s lesson, what experiences and information sources were you drawing upon? (**Today’s Sources**)

	√	Item	Comment

a	How you were taught in the same grade/course in high school (Pre-college Education)	
b	Experiences w/in your family (as a sibling, mother, daughter, father, son) (Family Experience)	
c	Previous teaching (Previous Teaching)	
d	Lessons from your coursework, at CSUN. Be specific if the class was in the field of math, of educational psychology (such as Psychological Foundations, classroom management) or content knowledge such as math courses. (CSUN Coursework)	
e	CSUN mentor (CSUN Mentor)	
f	Other coursework (Non-CSUN coursework)	
g	Lessons from your clinical practice, supervised fieldwork aligned with CSUN (Clinical Practice)	
h	Suggestions from principal, chairperson (School Authorities)	
i	Suggestions from school peers (School Peers)	
j	Knowledge of Standards (Standards)	
k	Knowledge of Pupils (Pupils)	
l	Knowledge of Parents (Parents)	
m	Knowledge of Community (Community)	
n	Professional Development such as those run by the school, district, etc. (please describe) (Professnl. Development)	
o	Your own reading about teaching (Independent Reading)	
p	Other	

10. What kinds of experiences and information sources do you usually draw on when planning and teaching? (refer to probes above) (**Usual Teaching Sources**)

	√	Item	Comment
a		How you were taught in the same grade/course in high school (Pre-college Education)	

b	Experiences w/in your family (as a sibling, mother, daughter, father, son) (Family Experience)	
c	Previous teaching (Previous Teaching)	
d	Lessons from your coursework, at CSUN. Be specific if the class was in the field of math, of educational psychology (such as Psychological Foundations, classroom management) or content knowledge such as math courses. (CSUN Coursework)	
e	CSUN mentor (CSUN Mentor)	
f	Other coursework (Non-CSUN coursework)	
g	Lessons from your clinical practice, supervised fieldwork aligned with CSUN (Clinical Practice)	
h	Suggestions from principal, math chairperson (School Authorities)	
i	Suggestions from school peers (School Peers)	
j	Knowledge of Standards (Standards)	
k	Knowledge of Pupils (Pupils)	
l	Knowledge of Parents (Parents)	
m	Knowledge of Community (Community)	
n	Professional Development such as those run by the school, district, etc. (please describe) (Professional Development)	
o	Your own reading about teaching (Independent Reading)	
p	Other	

11. I saw you use [*group work, certain technology, real-world connections, etc...*]. Tell me more about what it is like to use that in this class with this group of students.

(Reflections on Practice)

******Ask for each practice observed**

Probe if participant cannot address this at all: How frequently do you do this? Do your students typically respond in this way? What do you like about using this method? What challenges do you face? What constrains you from using this method more often?

12. How did this lesson turn out differently from what you planned? (**Unanticipated Outcomes**)

Probe: Would you like to have used other methods but you were prevented from using them for some reason?

13. More generally, when you are planning lessons what kinds of other constraints prevent you from teaching the way you'd like? (**Constraints**)

14. What do you think these students learned from this lesson? (**Pupil Learning**)

15. How do you or will you assess what these students learned from this lesson? (**Pupil Assessment**)

16. What do you think helps these students learn best? (**Pupil Aids**)

17. What challenges do these students encounter in their learning and how do you modify instruction to address these needs? (**Differentiated Instruction**)

Probe: How do you teach students with different skill levels? With language issues? With special needs?

18. How might you change the methods and lesson plan you used today if you were with a different set of students? (**Cross-Class Comparison**)

Probe: Do you teach or have you taught a different age or skill level? If so, how might you teach this subject matter to them? How might you teach this same subject matter to ELL or students with special needs?

19. (**Free Question**) *[Interviewers may follow up on anything they noticed during classroom observation]*

C. Future Expectations

20. What are your long term career plans? (**Career Plans**)

Probe: Do you plan to stay in teaching? Why/why not?

21. How do you expect to develop as a teacher in the future? (**Professional Development**)

Probe: What are your goals? What practices are you hoping to acquire/build upon/eliminate?

22. What do you think would help you develop the most as a teacher? (**Teacher Aids**)

Probe: Additional knowledge, alternative structures, additional experience, additional resources

23. What currently stands in your way of developing as a teacher? (**Teacher Obstacles**)

D. Additional Comments

24. Is there anything else you would like to tell me about your teaching experiences, teacher education at CSUN, or about the lesson today? **(Other)**

Thank you very much for talking with us and letting us see your class. We hope that you had as positive an experience as we did. We would very much like to come back to visit again. Would you be open to another visit in a few months? What would be the best way to contact you about scheduling this?

Thank you once again.

Appendix 4. Second Visit Interview Schedule

Post-Second Observation Interview Questions

Script: *“I just had the opportunity to observe your lesson. Thank you very much. Now I have some questions for you about today’s lesson. You may skip any question if it causes any stress. Remember that your comments are strictly confidential and none of your remarks will be associated with you by name. In your consent form, you indicated your permission to allow tape recording of this interview. If that is still agreeable to you, I would like to turn on the recorder and begin our interview. Do you have any questions before we begin?”*

Today’s Lesson

1. (B7) How would you define the objective of today’s lesson? (**Lesson Objective**)
2. (B8) How does today’s lesson relate to previous and forthcoming lessons? (**Lesson Relationship**)
3. (B9) In planning and teaching today’s lesson, what experiences and information sources were you drawing upon? (**Today’s Sources**)

	√	Item	Comment
a		How you were taught in the same grade/course in high school (Pre-college Education)	
b		Experiences w/in your family (as a sibling, mother, daughter, father, son) (Family Experience)	
c		Previous teaching (Previous Teaching)	
d		Lessons from your coursework, at CSUN. Be specific if the class was in the field of math, of educational psychology (such as Psychological Foundations, classroom management) or content knowledge such as math courses. (CSUN Coursework)	
e		CSUN mentor (CSUN Mentor)	
f		Other coursework (Non-CSUN coursework)	
g		Lessons from your clinical practice, supervised fieldwork aligned with CSUN (Clinical Practice)	
h		Suggestions from principal, chairperson (School Authorities)	
i		Suggestions from school peers (School Peers)	
j		Knowledge of Standards (Standards)	
k		Knowledge of Pupils (Pupils)	

l	Knowledge of Parents (Parents)	
m	Knowledge of Community (Community)	
n	Professional Development such as those run by the school, district, etc. (please describe) (Professnl. Development)	
o	Your own reading about teaching (Independent Reading)	
p	Other	

4. (B10) What kinds of experiences and information sources do you usually draw on when planning and teaching? (refer to probes above) (**Usual Teaching Sources**)

	√ Item	Comment
a	How you were taught in the same grade/course in high school (Pre-college Education)	
b	Experiences w/in your family (as a sibling, mother, daughter, father, son) (Family Experience)	
c	Previous teaching (Previous Teaching)	
d	Lessons from your coursework, at CSUN. Be specific if the class was in the field of math, of educational psychology (such as Psychological Foundations, classroom management) or content knowledge such as math courses. (CSUN Coursework)	
e	CSUN mentor (CSUN Mentor)	
f	Other coursework (Non-CSUN coursework)	
g	Lessons from your clinical practice, supervised fieldwork aligned with CSUN (Clinical Practice)	
h	Suggestions from principal, math chairperson (School Authorities)	
i	Suggestions from school peers (School Peers)	
j	Knowledge of Standards (Standards)	
k	Knowledge of Pupils (Pupils)	
l	Knowledge of Parents (Parents)	

m	Knowledge of Community (Community)	
n	Professional Development such as those run by the school, district, etc. (please describe) (Professional Development)	
o	Your own reading about teaching (Independent Reading)	
p	Other	

5. (B11) I saw you use [*group work, certain technology, real-world connections, etc...*]. Tell me more about what it is like to use that in this class with this group of students. (**Reflections on Practice**)******Ask for each practice observed** Probe if participant cannot address this at all: How frequently do you do this? Do your students typically respond in this way? What do you like about using this method? What challenges do you face? What constrains you from using this method more often?

6. (B12) How did this lesson turn out differently from what you planned? (**Unanticipated Outcomes**) Probe: Would you like to have used other methods but you were prevented from using them for some reason?

7. (B13) More generally, when you are planning lessons what kinds of other constraints prevent you from teaching the way you'd like? (**Constraints**)

8. (B14) What do you think these students learned from this lesson? (**Pupil Learning**)

9. (B15) How do you or will you assess what these students learned from this lesson? (**Pupil Assessment**)

10. (B16) What do you think helps these students learn best? (**Pupil Aids**)

11. (B17) What challenges do these students encounter in their learning and how do you modify instruction to address these needs? (**Differentiated Instruction**)

Probe: How do you teach students with different skill levels? With language issues? With special needs?

12. (B18) How might you change the methods and lesson plan you used today if you were with a different set of students? (**Cross-Class Comparison**)

Probe: Do you teach or have you taught a different age or skill level? If so, how might you teach this subject matter to them? How might you teach this same subject matter to ELL or students with special needs?

13. (B19) (**Free Question**) [*Interviewers may follow up on anything they noticed during classroom observation*]

Additional Comments

14. (D24) Is there anything else you would like to tell me about the lesson today?
(Other)

Follow-Up From Last Visit

15. (D25) During our last visit, you spoke about your experiences at CSUN. You spoke about what motivated you to study at CSUN, the most influential courses you took at CSUN, and helpful and discouraging experiences at CSUN. Is there anything else that you would like to share about your experiences at CSUN?
(Follow-Up CSUN)

16. (D26) During our last visit, you spoke about your long term career plans, how you expect to develop as a teacher in the future, what would help you develop the most as a teacher, and what currently stands in your way. Is there anything else that you would like to share about your future as a teacher? **(Follow-Up Future Career)**

Thank you very much for talking with us and letting us see your class. We hope that you had as positive an experience as we did. Thank you once again.

Appendix 5. Perceptions Expectations and Guiding Themes for Content Analysis

We anticipated a number of themes would emerge in teachers' discourse. Our expectations were based on literature in education, faculty members' experiences observing new teachers, our own experiences as teachers and our previous work on other TNE studies. The themes are listed below. They shaped our development of a qualitative questionnaire that was used in an interview setting.

1) A Teacher's Personal Experiences:

- i) personal motivations for becoming a teacher
- ii) influential models of teachers
- iii) personal enjoyment/experience in school

2) Teacher Training

- i) time available to practice concepts/or other retention activities
- ii) pedagogical competency of teacher trainers
- iv) time available to teach/help w/ retention
- v) CSUN faculty ability to assist teacher candidate's in their anticipation of the constraints likely to affect practice
- vi) on-going professional development opportunities

3) Structures of Schools

- i) structure of time in schools (i.e. bell system)
- ii) State Standards
- iii) school calendar
- iv) interactions with and mandates from administration
- v) interactions with school community/local community
- vi) resources at schools
- vii) the whole merit system

4) Teacher-Parent Interactions

- i) parental complaints shaping interactions
- ii) parental presence in and around classrooms/homework assignments

5) Teacher-Pupil Relations

- i) pupil performance
- ii) teacher has limited knowledge/experience with classroom management issues.
- iii) pupils commonly challenge teacher authority
- iv) level of pupils' learning preparedness/skills
- vi) level of teachers' preparedness/skills (i.e. communication skills/preparation, etc.)
- vii) familiarity with pupils
- viii) familiarity with content knowledge pupils bring to class (e.g. previous lessons learned)
- ix) teacher perceptions of high school/middle school students
- x) teachers perceptions of appropriate styles of learning at high school/middle school level.
- xi) fear of litigation

- 6) *Pupil-Pupil Relations*
 - i) pupil “culture” (beliefs, attitudes, perceptions, social hierarchy, behaviors, grade competitions, discourse, etc.)
 - ii) socio-cultural distinctions across the pupil population
- 7) *Proxemics and Spatial Arrangements in a Classroom*
 - i) spatial hierarchies: layout of classroom, use of furniture/space, acoustics
 - ii) arrangement and movement of bodies
- 8) *Social Expectations of Teacher’s Roles*
 - i) teachers’ assumptions about what the community/school/society expects of them in their professional roles
- 9) *Professionalism*
 - i) perception of aids and constraints to becoming a better professional
 - ii) personal commitment to the profession

Appendix 6. Summary of Responses According to Interview Questions

In this appendix, we summarize the main themes that emerged from responses to the post-observation interviews (see instrument in Appendix 3 and 4). As mentioned above, 6 participants were observed and interviewed on two separate occasions. 4 participants observed and interviewed only one. Because we are interested in highlighting the range of participants' responses instead of the frequency of responses, the summaries below represent an integration of answers given to both interviews. Wherever participants' responses are represented numerically, the reader should know that participants' answers were not counted multiple times.

Motivations for Teaching and Experiences at CSUN

Teachers were interviewed about their motivations for becoming teachers and their "positive" and "negative" experiences at CSUN. In terms of motivations for pursuing a career in teaching, the participants cite their memories, practical and "romantic" reasons. 6 say memories of positive early learning experiences and bonds with former elementary and secondary school teachers influenced their desire to teach. 5 indicate practical reasons such as needing to make a career change, needing a stable job, and needing a job with flexible hours and summers off in order to spend time with one's family. 5 others express emotional reasons for going into teaching such as their love of teaching, passion for new knowledge, and the fulfillment they receive from helping others, especially youth who struggle in school. It is noteworthy that none mention a love of math or math related content as a driving factor in pursuing a teaching career.

Participants' reasons for attending CSUN are largely related to practical issues. 6 teachers choose CSUN over other schools for credentialing because it is affordable. 5 elected to attend CSUN because it is close to home. 6 choose CSUN because of its "good" reputation. However, none qualified their view of CSUN's reputation in terms of a particular teaching philosophy, specific opportunities for math teachers or teachers in general, or any other quality. Possibly, the identity of the college is not clearly defined or not clearly communicated to the public. Possibly, convenience and affordability are the main elements of CSUN's identity.

To other questions in the interview our participants frequently mention the accessibility, dedication, and warmth of CSUN faculty. Although participants did not mention these attributes in relationship to CSUN's reputation, they may be elements as well. None mentioned their interest in the math department or any other specific program as a reason for wanting to study at CSUN. It appears that teachers enrolled in CSUN because "it is here."

9 out of 10 participants spoke of the method's course as the most influential experience. Teachers appreciate the methods courses for diverse reasons. Some appreciate the opportunity to practice. Others learned that there are diverse ways of teaching a single concept.

7 out of 10 teachers indicate that student teaching and their relationship with their master teacher was the most important experience they had in their training at CSUN. Some enjoyed meeting master teachers who are satisfied by their jobs. Others appreciate how master teachers modeled methods and provided feedback.

Many participants recall specific CSUN faculty who imparted useful techniques for structuring lesson plans. Several are impressed by the genuine care for education and for their students that CSUN faculty display.

Other positive experiences at CSUN include enrollment in specific courses. The SPED and IEP courses, the Psychology of Students (420) and a computer course (514) are mentioned. One teacher cites the CSUN undergraduate program as especially positive and as shaping his decision to become a teacher. Only 1 teacher indicates that his peers and a collaborative ethos at CSUN contributed to making his training a positive and valuable experience.

There are a number of things that teachers wish they had experienced at CSUN or feel are negative attributes of the school. 4 teachers wish that they could have done more student teaching. A teacher explains, "There are 8 courses and 2 of them are student teaching opportunities. Maybe 4 [content courses] and 4 student teaching courses would be perfect." At least 2 feel that the quality of student teaching was not as useful as it might have been; however, they do not elaborate on their point of view. 2 others struggled to complete the student teaching assignment because of their financial situation. They needed to work in order to pay their CSUN tuition and their employment conflicted with the hours needed for student teaching.

There are other "problems" at CSUN. 4 teachers feel that their overall training needed to be more geared towards working with low performing and unmotivated pupils. One says that courses on the psychology of students would have helped him to "get inside the minds" of his pupils and better understand how to motivate them. 3 feel that that teaching portfolios are time consuming and not useful. One teacher complains, "It seems like a lot of paper work that could have been spared...so time consuming and not always helpful." Another indicates a more ambivalent view of the portfolios. She says, "I guess the portfolio helped, but there were so many other things that I wasn't aware of when I started teaching...." Some teachers also feel that they need more information about specific topics before going into their first job. For example, some feel they could have used more preparation on how to add variety to math education. Another feels he needed to be better prepared for coping with a large curriculum. In contrast, one feels that the course on diversity was unhelpfully redundant. Another adds that the Education Leadership course "gave white students a guilt trip". One other feels that a health course was also not as useful as it might have been because it did not address common issues that one faces in schools like drug and alcohol abuse.

Others feel they needed more help with planning and assessment. One wanted more opportunities to practice lesson planning. Another wanted to receive more advice on how

to check homework efficiently and how to prepare appropriate tests. Ironically, one other teacher feels discussions on lesson planning were redundant in CSUN's program.

Some also feel that they needed more help with the logistics of teaching. For example, one feels she needed more lessons on organizing systems such as how to use grade keeper and systems for dealing with homework efficiently. Another concurs that she needs help coping with the "paper work side of things."

In addition to the logistics of teaching, teachers cite the logistics of credentialing as needing change. Again, individuals who have jobs wish for shorter student teaching assignments in order to avoid conflicts with employment. One complains about getting the run around at the credential office. She describes the office as "inefficient and confusing...it is stressful figuring out what courses to take, which tests, it's all very stressful." This teacher wishes the credentialing process were clarified for teachers in training.

One other admits that she wishes she had a clearer idea of the workload of teaching and needs strategies for dealing with the many demands of the job. In contrast to this practical concern, one other teacher wishes for greater discussion of the ethics of teaching. Now that she is on her own and she is not confident about what she can and cannot share with her colleagues on the job, there are many issues about the fair treatment of pupils that she wishes she could have been covered at CSUN.

Approaches and Sources for Lesson Planning

According to our teachers, most of the lessons observed were a combination of direct instruction on new material and review or practice of concepts on which the observed lessons were based. The lesson plans ranged widely. Pupils were being taught how to multiply and divide fractions and find percentages; how to identify rays, measure circumferences, and construct inscribed and circumscribed angles; and how to find slope-intercepts, evaluate discriminants and solve quadratic equations. While one teacher worked to show pupils how to calculate percentage discount of actual real world items (so that they would be better able to purchase items at stores), most lessons focused on abstract concepts.

Most lessons were part of a series of topics that needed to be covered in advance of an upcoming test, final, or state test. State standards and the semester's final exams determined the sequencing of several lessons. Review was part of the observed lessons and in one case was necessitated by the teacher having 'whizzed by' certain concepts earlier in the semester. Some material taught was 'new', but also fell into a broader sequence of preparation for a test of some kind.

Teachers drew on a variety of sources when planning their lessons. Several teachers had specific recollections of their own pre-college education and seemed to draw on the experience of how they were taught. One of the teachers recalled, for example, what her own learning experience as a 'high-achieving' student was like, and determined that her

'low achieving' pupils in her current class needed a different kind of model. Another teacher recalled how inattentive she had been (as an ESL pupil) to much of the algebra vocabulary (due to a need to 'concentrate on the numbers'), and determined to pay more attention to ESL pupils' language concerns. A third teacher recalled the excessive memorizing that was expected of her, and remarked on how this experience has led her in general to find different approaches in lesson planning. On a related note, a fourth teacher 'teaches what [she] would have liked to see as a student' and concentrates on 'using strategies to make forgetful pupils learn'.

Pre-college family experiences with learning did not figure prominently in the preparation of the specific lessons observed for our study. One teacher did reference her mother's help with math at home, and other teacher remarked that her general empathy and patience for pupils comes from lessons learned at home, her experiences with divorce, and her memories of encouraging adults.

Past experiences teaching the specific lesson, either in the context of student teaching or in a previous semester, inspired three of the target teachers' lesson plans for the observed session and helped them more generally their teaching. One of these teachers also referenced CSUN coursework as having been a source of the observed lesson's material, joining two other teachers who also referenced CSUN coursework as a planning source for their observed lessons. An undergraduate geometry course at CSUN was referenced as being particularly useful for an observed geometry lesson.

CSUN coursework also helped one of the teachers figure out how to build a 'warm up' into the lesson and how to 'sequence the learning' over the course of the time period. This teacher also cited past practicum experience (clinical practice experience) as having been reinforced the warm-up idea. Three additional teachers who felt that CSUN coursework generally helped them in their overall teaching.

Neither CSUN mentors nor non-CSUN coursework were mentioned as being sources of information for the observed lessons, although one teacher mentioned a CSUN mentor as having been instrumental in lesson planning in general.

Although none of the teachers mentioned school administrators as having been helpful in planning for the observed lesson or for planning in general, several of the teachers did cite other teaching peers in their school as sources of information and assistance. These same teachers also specifically mentioned having consulted the state standards when planning the observed lesson.

When planning lessons in general, teachers benefited from trading resources, ideas, classroom management techniques, and general teaching tips with teachers who share the same classroom. As one teacher explained,

Sometimes I ask other teachers - I share other rooms with teachers: "do you explain this - is there a way that you explain it [in a way] that really clicks and

that pupils like?” Some of the lessons I ask them. Sometimes if I run out of ideas. We share resources. We use whatever works and we share those resources.

Co-teaching also appears to be a helpful general influence. According to one teacher who co-teaches with a special education teacher, “the special ed teacher has lots of innovative ways to make math simple” and has “tricks...for adding polynomials, circle scratch, and tic-tac-toe.” [To illustrate this point, our target teacher showed the observer an example on the board on how to add positive and negative numbers by setting up a scoreboard.]

Several teachers were also influenced in their lesson planning, both planning for the day’s observed lesson and planning more generally, by the knowledge of their pupils. Pupils that had been in a previous semester’s class influenced one teacher’s planning. One additional teacher planned a review of a certain concept (discriminants) because of an awareness that the pupils’ background knowledge was incomplete. This teacher remarked, “A lot forget what a square root is, even though we spend a whole chapter on square roots, and squaring for a couple of days, they should have seen it in 1A – they were supposed to learn, I know they forget really easily.” In this case, the teacher was concerned about what would happen ‘in the warm up and review’ if insufficient time was devoted to ‘detailing’ (reviewing) what the pupils had ‘seen’ in the previous year but had subsequently forgotten. A third teacher mentioned more generally that feedback from pupils helps in general lesson planning.

Knowledge of parents and community did not figure into observed lesson’s planning for any of our target teachers, although two mentioned that knowledge of parents and community has been of general help to them when they plan what to teach.

Three teachers mentioned that they had brought lessons learned from prior professional development opportunities to bear on their planning for the observed lesson (although an additional teacher mentioned how unhelpful such development opportunities were.) Of those who were positive about the role that previous development opportunities played in their lesson planning, one teacher in particular (a current PRISMA participant) was able to be very concrete about how PRISMA helped her construct questioning processes.

“PRISMA definitely made me more aware of my questioning. I try to pay attention to questions. I don’t know if I did it today, but I definitely try to do it more. When I was doing my lesson plan I think of what is a good question and I write it down. PRISMA addressed higher order thinking, asking them, not helping – asking them questions that would help them think through the lesson. It helps me plan though.”

More generally, informal professional development (e.g. attending seminars at LACMA and CMT; informal conversations with/ observations of experienced teachers; and lessons learned at conferences) helped our target teachers decide what to teach on a day-to-day basis. One teacher specifically mentioned materials provided during BTSA training as being helpful.

Several teachers cite their independent reading of teaching guidebooks (such as “Math with Pizazz”, and collaborative learning/guided practice literature) as having helped them with lesson planning in general. Other sources of lesson planning information that teachers mentioned were textbooks and textbook-related Prentice Hall software templates; the curriculum in general; the internet; and ideas gathered from the teachers of their own children.

Reflection on Practice: Knowledge of Pupil Learning, Differentiation and Instruction Modification

When asked about the practices implemented for the observed lesson, teachers seemed most concerned with keeping pupils awake, engaged and motivated. Techniques varied: teachers reportedly used warm-ups, group work, hands-on projects and tools (such as compasses); forged personal connections and referred to real-life examples; and gave pupils the opportunity to present solutions to real-life problems in whole-group discussions. Teachers varied in their opinions about whether they could or would use these techniques with other classes. One such teacher said that they would skip warm-up exercises with higher-performing classes and three other teachers mentioned the usefulness of visual aids -- drawing models, whiteboards, and technology-assisted devices (ELMO) as being generally applicable in any class.

When asked about what their pupils learned during the observed lesson, teachers’ responses ranged from mentions of concrete concepts (rays, fractions) to mentions about how unsure they were about whether pupils learned what was intended. One teacher remarked, “I don’ t think they really saw that connection today. If I were to ask them tomorrow – I am thinking I would not get good response back. And I do a lot of reviews and go back review, remind, repetition. Tomorrow we will see...”. Another teacher referred to practice being a key component of learning. Overall, teachers were not specific about pupil learning.

When inquiry into pupil learning was followed up by queries about pupil assessment (and, specifically, the issue of how teachers know what has been learned), teachers mentioned conventional assessment strategies that are generally test-oriented—quizzes, tests, finals, state tests – as well as homework and performance on in-class exercises. A few teachers mentioned other casual means of evaluating pupil learning that involved initial observations in class, evaluating pupils’ level of questioning, and eliciting pupil feedback. In short, none of the teachers described coherent plans for assessing pupil learning (or describe any formative assessment plan that went beyond the traditional test-based learning measurement.)

While assessment plans were not clearly articulated, individual teachers did have some understanding, in theory, of what helps their pupils learn. Taken as a whole, this list of what we call ‘pupil aids’ articulates well with what is considered best-practice teaching. According to this cohort of teachers, what helps their pupils is pair and group work, positive pupil-teacher relationships, teacher encouragement, well paced/clear instruction and lesson organization, connections to previous lessons, interactive lessons, coherent

routines and structures, pupil engagement through the use of whiteboards, classroom boards and hands-on manipulatives, worksheets, and strategies designed to help pupils retain information.

We intended for teachers to comment upon how they would modify the lesson we observed to meet the needs ELL, SPED pupils, and pupils with different skill levels. Teachers provided general answers instead of examples that related to the lesson observed. 3 teachers, in fact, claim that they do not differentiate instruction. One says her pupils are all on the same level. The second says that she has difficulties implementing differentiation strategies. The third says that she tries to move pupils into other classes when they are not on the same level as the majority of pupils in the class.

4 out of 10 teachers say that they generally adapt material, their questions, and the pace to the various levels of pupils in the class. For instance, they ask higher level questions to higher level pupils, prepare different worksheets for different pupils, emphasize practice, give more examples, and review problems slowly for low performing pupils. These are all very interesting responses to the hypothetical situation, especially since observers did not find much evidence of differentiated instruction in any of the classes that they observed.

When it comes to language issues, teachers reported a number of ways of modifying their instruction. At least two teachers give ELLs extra attention. One reviews math problems in Korean for the Korean ELLs in the class. Another relies on school-provided translators to bridge the language gap. Occasionally, if she knows a struggling pupil's first language she will translate a word or two as needed. Another teacher asks bilingual pupils in the class to translate for her when she speaks with ELL pupils. Yet another intentionally seats ELL pupils next to pupils who can translate.

When it comes to IEP pupils, teachers prefer to have assistants intervene. One teacher has a resource specialist supervise a pupil's work and behavior for a portion of the class. Another has a full-time aid help with a hearing-impaired pupil. The teacher wears a microphone clipped to her lapel so that the pupil may hear the lecture. Meanwhile, the full-time aid takes notes for the pupil.

Perceptions of Teaching Aids and Obstacles

There are a few common aids that new teachers say help them in their work. Half of the teachers in our sample indicate that working with other teachers is very helpful. Several say that observing other classes and reviewing lessons designed by other teachers have been especially helpful. Working within a supportive math department with colleagues who want to help new teachers has been very helpful. At least two teachers say, "it *would* be helpful" if they had mentors or master teachers with whom to consult. Evidently, they had not yet identified mentors on the job.

3 teachers mention that learning new information through conferences and other trainings is helpful. Several find BTSA to be useful (although, as indicated below, not all teachers

have been helped by BTSA). At least two teachers mention that they enjoyed a workshop on the history of mathematics.

Other aids that teachers mention include having time to practice teaching, making notes for improving lessons right after class, and putting lessons into power point slides.

One teacher feels that her teaching would improve if pupils developed a greater awareness of the CST and its importance for the pupils. She often feels that she is the only person in the classroom who is aware of role that the CST plays in pupils' education. One other teacher feels that her teaching improves when she is able to connect content across semesters.

The logistics of teaching is the number one obstacle to teaching cited by the participants in our study. 7 out of 10 teachers cite this; however, the list of logistics is quite diverse. 6 teachers say they need more time for checking homework, lesson planning, and getting through administrative paper work. One teacher says that due to paper work, he stays at school until 5:30. These late hours are interfering with his home life.² teachers cite the need for bigger classrooms. They report being unable to do group work in the classroom because there is no space to move the desks into small circles. One teacher says his school continuously changes the primary textbook. This creates the need to re-plan lessons.

Several teachers mentioned pupil behavioral problems as a constraint to their teaching practice. The three big issues appear to be distractibility, chronic tardiness, insufficient time for covering material, and frequent PA interruptions. Pupils reportedly lose focus and concentration easily and this problem causes the teacher to have to modify how they are teaching. As one teacher remarked,

I feel that I can't be as energetic or as funny because they don't know how to take funny and they... you might lose the complete concentration of the whole class. So it's like I can't be as free as I'd like to be. And I sort of have to be on top of them a little bit more than I would have to be with pupils who were motivated a little bit more.

A related problem is distraction caused by tardiness, which, according to one teacher, is chronic and disruptive and yet not handled effectively by school administrators:

I wish they would get to class on time. I tried detention. But we don't really have a set detention program... [w]e are supposed to allow them in, even if they walk in 55 minutes late and that's a distraction not only for the other pupils but for myself too."

Another major obstacle is teacher communication. New teachers appear to be frustrated by having to work with veteran teachers who do not cover all of the material they are required to cover, or who make up their own policies about including the final exam score as part of the final grade. These varied expectations of pupils put new teachers who

take the standards seriously in a vulnerable position. Other new teachers are frustrated by colleagues on the job who do not wish to help new teachers with planning and are too busy to collaborate on projects.

Other issues arose when teachers were asked to elaborate about the obstacles they face. Some feel they need improved working conditions. For example, one is overloaded by having three preps. Another feels exhausted by having to talk throughout the day and to be consistently in front of pupils. Others feel they need more manipulatives and more IT and computer resources. One teacher feels that her ability to teach is thwarted by her need to clear her credential as soon as possible. It is a big undertaking to tackle credentialing while teaching full time.

Finally, one teacher admits that if she had more classroom management techniques and a greater understanding about how to organize group work and lessons that give pupils freedom, then she would be closer to meeting her own expectations as a teacher.

Professional Identity: Future Career Expectations and Professional Development

The majority of teachers in the sample see themselves as teaching for a while before moving on to other opportunities in education. 7 out of 10 describe their future career plans in terms of gaining more teaching experience. Half of the teachers see themselves as pursuing higher education degrees for the field of education. 3 are planning to enroll in a CSUN master's degree program at the School of Education. One is planning to obtain a master's degree through an on-line course. Another is planning to attend CSUN but then would like to pursue a Ph.D. in an area relevant to education. Not all of the teachers, however, plan on remaining in the classroom forever. 3 desire leadership positions in administration (e.g. becoming the department head), becoming a resource specialist or becoming a school counselor. At least one teacher confirms that she plans to leave teaching temporarily in order to attend to her family's needs. At least two teachers see themselves teaching in other settings at some point in the future. This aspiration is not necessarily in conflict with their regular teaching jobs. For example, one immigrant teacher wishes to teach in his home country in the summers. Another teacher desires to teach at a junior college in the future.

7 out of 10 teachers expect that in the future they will acquire specific skills that they do not possess at the moment. At least 3 expect to strengthen classroom management skills. Others expect to receive more training that helps teachers with the logistics of teaching. At this point, most are not finding answers to their questions in BTSA workshops. Others expect to develop better interpersonal skills, especially for dealing with low-achieving pupils. Another teacher expects to learn how to solve "the mystery of differentiation." One other is expecting to learn how to avoid grading homework and how to dispel text anxiety for math pupils.

Yet one other teacher is anticipating learning more about IEP/Special Education pupils. In contrast to the teacher who has not found much value in BTSA, this individual says, "Ever since I've been in BTSA, I wanted to keep studying more and develop resources to

help the pupils who have difficulties learning—the special ed. Pupils in particular. During my student teaching assignment, half of the class was IEP. I want to get more into this.” Clearly the teachers are anticipating growth in their teaching capacity over the next few years and seem excited to pursue opportunities that will help them grow.

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