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Field-Based Internship Models for Alternative Certification of Science and Mathematics Teachers: Views of Interns, Mentors, and University Educators

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In response to shortages of science and mathematics teachers in the U.S., many states have promoted alternative routes to certification in which individuals with non-education undergraduate degrees can become certificated in shorter timeframes than in traditional programs. One consideration in designing alternative programs is how to arrange field-based internships that help provide transformative pathways to non-traditional students in becoming a teacher. The purpose of this study was to understand the views of interns, their mentor teachers, and university personnel who participated in one alternative certification program regarding the best structures for field experiences. Through an analysis of artifacts collected in a meeting where we discussed the pros and cons of five different intership models as well as interviews with individuals in each stakeholder group, we were able to understand the various viewpoints. We found that, although perspectives were consistent within each group, they differed across the three groups. These differences were grounded in the personal needs and experiences of each group. Although our findings point to no "perfect" internship model to support the transformation of alternative certification students into teachers, they have implications for the design and enactment of field-based internships in such programs.

Keywords: Alternative Certification, Field-based Internship Models, Mathematics Teacher Education, Science Teacher Education

INTRODUCTION

We face a critical shortage of qualified teachers in the United States. This shortage is especially evident in the areas of mathematics and science, where nationally figures for those who lack state certification in their field range from 28-33% for mathematics teachers and 18-20% for science teachers (Ingersoll, 1999; Olson, 2000). In response to the teacher shortages, many states have endorsed alternative certification programs at the post-baccalaureate level that prepare individuals with non-education undergraduate degrees to become K-12 classroom teachers.

Post-baccalaureate certification programs create new challenges for teacher education programs. Post-baccalaureate students enter teacher education with experiences and learning needs that differ from those of traditional preservice teachers. Post-baccalaureate students are likely to have strong content knowledge, having worked in a content-based career for a number

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of years. However, they often have little to no experience in the classroom other than their own experiences as students, and they are often far removed chronologically from this experience.

Consequently, teacher educators are presented with a dilemma: Do we treat post-baccalureate students as we do our traditional pre-service teachers, or do we create new program structures tailored to their differing needs?

In this paper, we report on one aspect of our efforts to address this dilemma in the design and implementation of a post-baccalaureate, alternative certification program for mathematics and science teachers. Our program was originally conceived in response to a call, from the Missouri Department of Elementary and Secondary Education, for teacher preparation institutions across the state to develop alternative post-baccalaureate teacher preparation programs. With the support of funding through the National Science Foundation (DUE0202847), the science and mathematics education faculty at the University of Missouri-Columbia (MU) developed post-baccalaureate teacher certification programs for grades 5-12 science and mathematics under the auspices of the Science and Mathematics Academy for the Recruitment and Retention of Teachers (SMAR^{2}T).

We faced many challenges as we designed and began implementing this program (Authors, 2006). One challenge that arose was in the design of field experiences for the students. Like traditional preservice teachers, post-baccalureate students arrive in teacher education programs with conceptions about effective instruction, conceptions shaped by their previous experiences as students (Crawford, 1992; Stein, Smith, & Silver, 1999). Thus, both undergraduate and post-baccalaureate preservice teachers need to "unlearn" how to teach (Ball, 1988). However, due to the shortened time frame of most alternative certification programs, post-baccalaureate students do not benefit from the early field experiences that occur in many traditional teacher development programs. The internship for these students becomes a critical part of their teacher education experience, and their relationship with a mentor teacher can be an important part of their transition into a teaching career (Chesley, Wood, & Zepeda, 1997; Dill, 1996).

In designing the SMAR^{2}T program,we took seriously the importance of the classroom-based internship for our students. As a result, we have worked over the last two years to investigate aspects of the internship; these investigations served as formative assessments for us as we continually work to improve the program. We believe that other science and mathematics educators can benefit from our investigations.

Thus, the purpose of the study reported in this paper was to understand the views of alternative certification interns, their mentor teachers, and university personnel regarding how various field experiences structures could serve as a means to understand and experience what it means to be a teacher. Specifically, we addressed the following research question: In what ways do student interns, mentor teachers, and university faculty view five different internship models for post-baccalaureate mathematics and science certification students?

Considering the Literature

As teacher educators, we ground many decisions about program design in the teacher education literature. Two literatures informed this study: the research that has been conducted on preservice teachers' internships, and the research on teacher knowledge. Because the context of our study is U. S. teacher education, we restricted our search of the literature to studies conducted within U. S. teacher education programs.

Most of the research in the U. S. that has been conducted about preservice teachers' internships has occurred in the context of traditional teacher education programs. While our study is set in the context of an alternative certification program, we believe it appropriate to include this discussion as a way of situating our study.

Historically, reform movements have called for increased amount of field or clinical experience for teacher preparation (Conant, 1963; Berliner, 1985). A few studies examined the structure of field experience (McIntyre, 1983; Reiman & Parramore, 1993), but the findings of these studies did not support an increase in the length or number of clinical experiences. Researchers indicate that field experiences are often disconnected from the image of teaching that is portrayed in university methods classes (Wilson, Floden, Ferrini-Mundy, 2001). Preservice teachers can have difficulty linking theory to practice in field settings (Moore, 2003) and mentor teachers often provide little instructional support in these areas (Shulman, 1987).

Despite these potential shortcomings, evidence exists that carefully designed field placements have the potential to engage preservice teachers in exploring different instructional methods (Bullough, et al., 2002), increase pre-service teacher self-efficacy (Cannon & Scharmann, 1996), and connect university coursework to classroom decision-making (Schoon & Sandoval, 1997). In addition, field placements offer opportunities to engage in professional discourse with practicing teachers (da Ponte & Brushier, 2001), serving as a "transformative pathway" through which preservice teachers come to understand and experience what it means to be a teacher (Goodfellow & Sumsion, 2000).

Goodfellow and Sumsion (2000) suggest "an ecological perspective that recognises the interconnectedness of the diverse influences and

different contexts that are instrumental in student teachers' personal-professional development. This interconnectedness reveals numerous transformative pathways that can guide student teachers in their journeys as developing professionals" (p. 252). Among other influences, Goodfellow and Sumsion explicate the following: student teachers' prior experiences, beliefs and images of teachers and teaching; the university context; skilled practitioners; and field-based education. The SMAR²T program also considers these influences; this research focuses on the field-based education component of the program.

Because we believe that teacher preparation should be based on a comprehensive model of teacher knowledge and be performance-based, we also considered the research on teacher knowledge to inform the design of our program. Our beliefs about teacher knowledge come from the work of Lee Shulman and his colleagues (Grossman, 1990; Shulman, 1986). Shulman proposed that teachers need to have a strong command of subject matter knowledge, pedagogical knowledge, and knowledge of the context, which they synthesize and translate into pedagogical content knowledge (PCK), or subject-specific knowledge for teaching. PCK is what distinguishes the teacher from the content specialist, and includes "an understanding of how particular topics, problems, or issues are organized, presented, and adapted to the diverse interests and abilities of learners, and presented for instruction" (Shulman, 1987, p. 8). PCK also includes curricular and assessment knowledge as well as knowledge of the conceptions that K-12 students bring with them that influence learning.

This grounding in the literature on field experiences and teacher knowledge led us to design a program of study that combines university coursework with school-based field experiences. In designing the program of study, we took into consideration that most alternative certification students had little classroom experience beyond their own K-12 schooling. Thus, we developed an intensive, year-long internship experience for students (interns) in addition to university coursework (see the discussion of the program of study later in this paper).

Over the course of the first year of the alternative certification program, we engaged in many conversations with the interns and their mentor teachers regarding the intensive internship model and how it supported a transformative pathway into teaching. Through these conversations, we came to see that there were differing views of what would help interns experience what it means to be a teacher. Our desire was to understand the differing views of internships to determine what pathway would "best" serve our students in their transformation to becoming teachers.

CONTEXT

The SMAR2T Program of Study

The SMAR²T program for the APB-track students consists of campus-based coursework in science/mathematics content, general pedagogy, and subject-specific pedagogy, accompanied by an intense year-long internship in a partner school (see Table 1). The individuals enrolled in this track are full-time students and finish their certification and Masters of Education (MEd) in 15 months. SMAR²T also enrolls full-time teachers in an Alternative (ALT) track that takes 24 months to complete. (See Authors, in press, for a discussion of the different tracks SMAR²T students can take toward certification.) Our first cohort entered the SMAR²T program in Summer 2003, and graduated in Summer 2004 (Table 1).

Cohort 1 Interns and Field Placements

Thirteen APB students enrolled in Cohort 1 of the SMAR²T program. These individuals worked toward certification in mathematics or science teaching at one of the following levels: a content-specialized certification in grades 9-12 (e.g., 9-12 Mathematics); a 9-12 certification with a second endorsement in grades 5-9 (e.g., 9-12 Biology and Middle Grades Science, called a dual endorsement); or subject specific certification in grades 5-9 only (e.g., Middle Grades Mathematics). Table 2 contains a description of the certifications sought by the 13 Cohort 1 students (Table 2).

Cohort 1 students who pursued a 9-12 certification or a 5-9 certification were placed in one school, with one teacher, for four hours per day, five days per week for 32 weeks (2 academic semesters). We required that the four hours be comprised of three content classes and one period of common planning with the mentor teacher. Interns and their mentor teachers, working within those restrictions, arranged a time period during the day that was mutually beneficial to both parties.

Cohort 1 students who pursued a dual certification (9-12 with a middle grades endorsement) were placed at a middle school for 10 weeks and at a high school for 22 weeks, with the same restrictions on daily attendance of four hours. Consequently, these students worked with two different mentor teachers over the course of the academic year.

From a program design perspective, we were influenced by two factors in our decision-making regarding the internship experience. The first was philosophical and related to our groundings in Shulman's work and the framework of transformative pathways. We strongly felt that a year-long field-based experience would provide a transformative pathway for students to develop PCK as well as knowledge of

Table 1. SMAR²T APB Program of Study

The SMAR²T Accelerated Post-Baccalaureate Program (APB) is designed for individuals with an undergraduate degree in mathematics, science, or a related area who desire a high quality teacher preparation program in an accelerated time frame. APB students attend two concentrated summer sessions on the MU campus and spend one school year interning at a partner school, during which they are part of a learning community with other interns, mentor teachers, and MU faculty members.

Mathematics Only	Mathematics and Science	Science Only
	Summer #1 (11 credits)	
(3 credits) Intro to Teaching Mathematics in Middle and Secondary Schools	(8 credits) Advanced Educational Foundations of Teacher Preparation	(3 credits) Teaching Science in the Secondary School, Part I OR (3 credits) Middle School Science I
	Academic Year, Fall (8-11 credits)	
(3 credits) Teaching Mathematics in Secondary Schools: Focus on Geometry & Statistics OR (3 credits) Teaching and Modeling Middle School Mathematics Math content course (secondary only)	(3 credits) Reading in the Content Areas (2 credits) Advanced Internship	(3 credits). Teaching Science in the Secondary School, Part II OR Middle School Science II
	Academic Year, Winter (9-12 credits)	
(3 credits) Teaching Mathematics in Secondary Schools: Focus on Algebra (secondary only) Math content course (3 credits) (middle only)	(6 credits) Advanced Internship	(3 credits) Teaching Science in the Secondary School, Part III (secondary only) Science course (4310 Environmental Analysis) (3 credits)
	Summer #2 (5-8 credits)	
Mathematics course (Geometry, Algebra, or Statistics) (3 credits)	(2 credits) Integrating Mathematics and Science Instruction (3 credits) TEAMS (middle level only) Finalize and submit portfolio	Science course (Exploring Physics) (3 credits)

context, assessment, and the conceptions students have that influence learning. The second governing factor was logistical; we had to meet certain state requirements for number of field hours and fit the internship and coursework into a reasonable time frame for completion of certification (Authors, in press).

Table 2. Certification Distribution of Cohort 1 SMAR²T APB Students

	SECONDARY	MIDDLE	DUAL
Mathematics	1	2	2
Science	3	2	3

THE STUDY

Data Collection

We collected data for this study from two sources. The first data set resulted from a meeting of SMAR²T APB student interns, their mentor teachers, university supervisors (who completed the student teaching evaluations), and university mathematics and science education faculty (who designed and enacted the program). This half-day meeting (the last of a series of such meetings) was held in February 2003 on the MU campus. Mentor teachers were provided with release time to attend the meeting. Eighty-five percent (11/13) of the student interns attended the meeting; sixty-five percent (11/17) of the mentor teachers attended the

meeting[1]. Six university personnel attended the meeting. To facilitate discussion of internship models during that meeting, we divided the participants into five groups, each containing at least one student intern, one mentor teacher, and one university person. Each small group was assigned one of five internship model options (see Table 3) to discuss. Fundamentally, all of the options met the requirements as explicated by the design team (discussed above), and thus were somewhat similar. However, on closer inspection, a number of subtle differences among options appear. For example, all five options require interns to be in a classroom for 32 weeks; options A and E place students in the same classroom for both semesters, while options B, C, and D require students to change classrooms at semester. Options A, B, and E are based on a half-day, every day requirement; options C and D contain full days, but limit the number of days per week during one or both semesters. Options A, B, C, and D include student teaching supervision in the second semester only; option E would provide supervision throughout the school year. Option A represents the internship model that was in place for Cohort 1.

At the meeting, each group discussed and then recorded "pros" and "cons" of their specific option on flip chart paper. They presented their discussion to the entire group, and the meeting facilitator recorded their ideas on a master chart. Those recordings comprised part of our data corpus for this study.

The second data source was exit interviews, conducted by the project external evaluator (W. Boone) with 10 student interns, 10 mentor teachers, and three university personnel toward the end of the internship year. All interviews were audio-taped and transcribed for analysis.

Data Analysis

To begin analysis, we re-recorded the data from the flip chart paper added a fourth column to Table 3 called "pros and cons." This allowed us to see the options and the stated pros and cons for each option. We identified each comment in the "pros and cons" column as originating from one of three stakeholder groups: student interns, mentor teachers, or university persons. Once all comments were identified, we separated the data into three groups as defined by the three stakeholders.

We reduced the data from the interviews by coding those sections in which the comments matched our research question about internship models. We then reduced the data set by separating it into three parts, each defined by the source of the comment (student intern, mentor teacher, or university person) and added the resulting pieces of transcript data to the three groups of data as defined in the paragraph above. The sorts resulted in three distinct sets of data: the comments regarding internships from 1) the student interns, 2) the mentor teachers, and 3) the university personnel. Finally, we examined the data in each group, looking for commonalities and overall themes.

FINDINGS

Our data analysis revealed that APB student interns, their mentor teachers, and the university personnel had distinctly different ideas about what is important when considering the 4-hour per day, 5-day per week, year-long intensive internship required in the SMAR²T program. We present our results in the next section by describing each stakeholder group's perspectives with regard to important components of an internship.

APB Student Interns

The interns expressed their preferences for the internship models that allowed them to be in a classroom for the entire year, but limited the internship to half-day (options A and E). Their comments fell into four distinct categories that described the ways in which they felt they benefited from this internship option: 1) Developing relationships with students; 2) experiencing the scope of what teachers do across the year; 3) seeing more content taught; and 4) managing logistics with the on-campus program, jobs, and/or family.

Overall, the APB interns appreciated the long-term nature of the internship and the influence it had on their ability to develop relationships with the students. The interns found that being with a group of students over the course of the year, every day of the week, allowed them to experience a sense of continuity with the students. They appreciated being able to form teacher/student relationships; they did not think this would typically happen without the intensive and long-term nature of this internship. Katrina explained:

> I thought it was great! I liked seeing things from start to finish and I felt like if I wasn't there for the year, I wouldn't get to see the students from the beginning to the end. You develop a better rapport with them as well as the parents.

Kelly agreed: "Just the fact that I was there all year, I got to know the kids so well…and dealing with kids diverse backgrounds and things they bring to the table in the classroom."

[1] The difference in the attendance of APB students and mentor teachers is a result dual certification APB students who worked with two different teachers over the course of the internship year. Many of the mentors from the first placement did not attend this session.

Table 3. Internship Options

Option	Middle or Secondary Certification only	Secondary Certification with a Middle Endorsement
A: Model used for Cohort 1	• 32 weeks (2 semesters) in the same classroom • Student teaching evaluation occurs in the 2nd semester • 4 hours per day (including time to plan with the teacher) • 5 days per week	• 10 weeks in a middle grades classroom • 22 weeks in a high school classroom • Student teaching evaluation occurs in the 2nd semester • 4 hours per day (including time to plan with the teacher) • 5 days per week
B	• 16 weeks (1 semester) in 1st classroom • 16 weeks (1 semester) in 2nd classroom • Student teaching supervision occurs in the 2nd semester • 4 hours per day (including time to plan with the teacher) • 5 days per week	• 10 weeks in a middle grades classroom • 22 weeks in a high school classroom • Student teaching evaluation occurs in the 2nd semester • 4 hours per day (including time to plan with the teacher) • 5 days per week
C	• 16 weeks (1 semester) in 1st classroom • 16 weeks (1 semester) in 2nd classroom • 10 hours per week in the 1st semester (arranged by the teacher and intern) • Full days, 5 days per week during the 2nd semester • Student teaching evaluation occurs in 2nd semester	• 16 weeks (1 semester) in middle grades classroom, with an emphasis on independent teaching during the last 5 weeks • 16 weeks (1 semester) in a high school classroom • Student teaching supervision occurs in the 2nd semester • 10 hours per week in the first semester (arranged by the teacher and intern) • Full days, five days per week during the 2nd semester
D	• 16 weeks (1 semester) in 1st classroom • 16 weeks (1 semester) in 2nd classroom • Student teaching evaluation occurs in the 2nd semester • Full day both semesters; 2 days per week in the 1st semester, 4 days per week in the 2nd semester	• 16 weeks (1 semester) in a middle grades classroom, with an emphasis on independent teaching during the last 5 weeks • 16 weeks (1 semester) in a high school classroom • Student teaching evaluation occurs in the 2nd semester; Full day both semesters; 2 days per week in the 1st semester, 4 days per week in the 2nd semester
E	Same as option A, except that student teaching supervision would occur over both semesters	Same as option A, except that student teaching supervision would occur over both semesters

Kelly also found that the year-long experience helped her establish a teacher role: "And they thought I was Mrs. Adams. I was the teacher – no ifs, ands, or buts about that fact. I wasn't a student in there – I was the teacher." Interns did not seem to feel that they were the "real teachers" until many weeks of their internship had elapsed. Their need to identify themselves as the "real teacher" partially influenced their preference for options A and E, the options that allowed them the opportunity to spend an extended amount of the year in one classroom.

The interns also commented that the year-long nature of their internship allowed them to experience the scope of what teachers and students do across an entire school year. Katrina commented,

> There were things that schools do in the spring semester that they don't do in the fall semester. If you were only there for three months, one semester, you wouldn't get those other experiences that I got that were so valuable…[for example], we don't attend field trips in the first half of the year.

Without the long-term nature of her placement, Katrina felt that she would be missing important experiences of being in a school community.

Finally, in relation to the year-long aspect of the internship, the interns commented that the long-term nature of the experience provided exposure to a great deal of middle/high school mathematics or science content – content that they had not thought about in many years. Although all of the interns had an undergraduate degree in mathematics or science, their use of some of the subject matter in Grades 6-12 over recent years had been infrequent and their knowledge was rusty.

The interns also preferred the half-day nature of the internship, feeling that the organization in options A and E provided needed time for completing SMAR²T course requirements, working on a part-time basis, and/or attending to family responsibilities. These alternative certification students felt that a full day of internship would cause a number of difficulties with other responsibilities of on-campus courses and family commitments. Sharon said, "I liked it [the half-day arrangement] for me as a student because I had my mornings free and I could, if I wanted, get another job or work on my coursework or basically anything I wanted in the morning." In a similar vein, the APB interns were not supportive of a full day, two or three day a week organization (as in option D) because it would not allow continuity in planning or with the students.

Furthermore, the APB interns felt that the half-day internship allowed them a degree of flexibility with regard to the time of day they were required to be at their internship school. Some interns appreciated having time to transport their own children to school before having to go to their intern school. Other interns appreciated the chance to complete their internship by noon. For example, this allowed Rebecca to teach a course at a local college in the afternoon.

In the end, our analysis revealed that the interns preferred the option (E) that was most similar to what they were in the midst of experiencing (option A). We find it interesting that their reasons for this preference were based on issues not common among our undergraduate student teaching interns in our traditional program. Most undergraduates have no difficulty attending full days during their semester-long internship. None are enrolled in on-campus coursework during their internships, and few have to balance family responsibilities with their studies. Further, we strongly discourage our undergraduates from working part-time while they are completing their student teaching internship. These data provide evidence that our post-baccalaureate certification students have a different set of needs than our traditional students when it comes to the field-based internship.

Mentor Teachers

The mentor teachers' comments focused on the same two characteristics of the internship: the year-long nature and the half-day arrangement. They saw both benefits and disadvantages to the current model (option A) with the year-long arrangement. They found only disadvantages with regard to the half-day nature of the current model.

The mentor teachers felt that the long-term nature of the current model had certain benefits. They thought interns benefited from being in the field on the first day of school, and during the first week, so that they could experience setting the classroom tone for the year. They also expressed that interns benefited from the opportunity to see the long-term organization of teaching over the course of a year. Paul, for example, said,

> I wouldn't change it [the year-long internship] for anything, because [my intern] was here to meet the kids and to see how the structure was set up in the classroom and she got to see the growth over the year from beginning to end.

Many of the mentor teachers also spoke of the mentoring relationships they were able to establish with their year-long interns. For example, Janet said, "I do feel like I've had more of an impact with this [intern]…It's been really nice to have a long-term relationship with someone and watch them grow through the classroom."

However, while the mentor teachers understood the value of the year-long experience for the APB interns, they were unsure as to whether that experience needed to be in one classroom, or split between two classrooms (one each semester). In response to options B, C, and D, in which the APB students would change classrooms at semester, the mentor teachers saw a number of advantages. First, they thought more mathematics and science teachers might participate in the SMAR²T program if they only had to commit to hosting an intern for just one semester.

Further, a number of the mentor teachers felt that it would be good to "get their classes back for part of the year." When asked if they would host an APB intern the following year, many of mentor teachers were hesitant and referenced the year-long commitment. For example, Paul, who teaches at a middle school where the teachers "loop" with their sixth-grade students into seventh grade, explained,

> I have these kids for two years of math. Two years of their life depends on what I do as a teacher, and I feel like most of this year has been me turning it over to her as the teacher. If I had another [SMAR²T intern] next year, I'm not sure I would feel like I actually had [an impact on these] kids.

Similarly, Rita said that she would "definitely do this [host an intern] again, but I would do it every other year…because I like to teach." Although these teachers expressed hesitation at being "repeaters," we did have Cohort 1 mentor teachers who hosted a Cohort 2 intern the next year.

Laura expressed a different concern about the year-long arrangement. She was worried that she would be assigned an intern with whom she did not "match." Prior to her involvement in the SMAR²T program, Laura reported, "I had a student teacher before and I wasn't going to let anybody talk me into this again." She and her prior intern did not "match" personalities very

well. Thus, she was worried that she would be "stuck" for a whole year with an intern where "we have such a personality conflict, and we cannot function in the same classroom and the same set of rules."

Overwhelmingly, the mentor teachers reacted negatively to the half-day organization of the internship model. They spoke of disadvantages for both themselves and the APB interns. For example, the mentor teachers felt strongly that the APB interns needed to experience full days of teaching. They believed that the half-day arrangements did not prepare the interns for teaching full time. They argued that the interns were missing out on important components of the teaching profession, as Lena expressed:

> [My intern] did not attend faculty meetings or department meetings because she was always here in the mornings. And she really couldn't touch base with the student discipline issues because all of those take place in the afternoon – detentions and stuff.

Rita echoed those sentiments:

> In four hours, you can't do everything that is expected of a full-time teacher. For example, things like recording grades… there are aspects of the job that she's missed out on and she's just going to have to do trial by fire when she gets her first position.

Dennis saw a different disadvantage to the half-day arrangement: "They oftentimes don't get a sense of how you have to work with other teachers if you're not there for the whole day." Laura saw yet another disadvantage. In describing her intern, she said,

> I know he's going to do fine [teaching next year], but those first couple of months are going to be killers just trying to adjust to [teaching a full day]. He's going to remember, 'oh, it's not so bad. I taught three hours.' And then, boom, he's going to be teaching all day long, and possibly looking for a coaching position… and it's a mental challenge to teach all day.

Thus the mentor teachers expressed concerns about developing stamina and experiencing the full scope of teachers' work.

Other disadvantages of the half-day organization, from the mentor teachers' perspectives, included the potential for the half-day arrangement to disrupt the mentor teachers' schedules and planning, and the interns' loss of experience with the variety of students and classes they would get with a full schedule. Further, Lena, who had hosted student teachers in the past in the traditional program (in a semester-long, all-day internship), expressed concern about the amount of responsibilities her intern had outside of the internship classroom: "I just felt like she was overextended. She had too may things going on. She would give my class a test and it would be a week and a half later before they'd get the test back." While Lena felt strongly about the worth of the program overall, her experience with this intern had an impact on her willingness to host future SMAR²T interns:

> I really believe in the program and I believe to effectively teach math and science we have to have people who are grounded in everyday math and science careers before they come in to teach. I really believe that. So I would be willing to do it again, but only if we can have them first semester, all day long. I don't like this half-day business.

Like Lena, many of the mentor teachers had hosted traditional, undergraduate interns in past years. Like the SMAR²T interns, the mentor teachers appeared to be most comfortable with what they had experience with; for the mentor teachers, that experience consisted of a full-day, semester-long internship experience with students who had no outside-of-school commitments. Many of their comments about the current "different" model for an internship may have stemmed from being in unfamiliar territory.

University Personnel

The university personnel consisted of mathematics and science education faculty members who designed and implemented the SMAR²T program and doctoral students who were engaged in supervising the APB students during the second semester of their internships. The faculty had designed the year-long, half-day internship to provide sufficient hours to meet state certification requirements, but also to allow students time to complete on-campus coursework. In reflecting upon their experience with the first cohort of SMAR²T students, they expressed views on both the year-long and half-day nature of the experience.

Like the interns and mentor teachers, the university personnel thought the year-long internship (options A and E) allowed for continuity in the interns' experiences. In particular, they wanted the interns to observe and understand student learning across the school year. The subject specific pedagogy courses that they developed and taught focused on student learning as the framework for thinking about teaching. Because some of these pedagogy courses took place concomitantly with the internship, there would be opportunity for cross-talk about student development.

Further, the university personnel felt that a benefit of interns being at the same school for an entire year was that the intern could develop relationships within the school system, with principals, guidance counselors, and other teachers. This was important partly because, in the design of the alternative certification program, they had eliminated a course on the culture of schools that was part of the traditional program, opting instead for increased subject specific pedagogy coursework. According to the program director,

> Whether or not that will prove to be a good decision, we don't know. But I think part of that just stemmed from our belief that you learn to teach science or math by thinking about teaching science and math, not by thinking about general pedagogical issues.

In order to have the program approved by their College of Education colleagues, the science and mathematics education faculty agreed that the learning outcomes in some of the general pedagogy courses, such as the course on culture of schools, would be addressed in the year-long internship.

From a logistical perspective, the university personnel perceived disadvantages to year-long placements with a single teacher. They thought it might be easier to find teachers who were willing to host an APB intern for a single semester (as in options B, C, and D) rather than for an entire school year (options A and E). Semester-long placements would also 'free up' teachers for other needed placements in the traditional program. According to the program director, there was some concern among College of Education colleagues that the alternative program would compete with the traditional program for placements.

> Because every time we place somebody, we are taking away a placement for some undergraduate. Because we have three courses plus student teaching in which we place people in the undergraduate program for math and science. So, we really have to be careful about how we get the placements made.

However, university personnel also remarked that, if the SMAR²T program changed to semester-long placements, they would need for twice as many school placements, which could create much more work on their part.

The university personnel also commented on the supervision aspect of the year-long internships. They were concerned that, in the model enacted for Cohort 1 (option A), APB interns had not received sufficient support from the university in the fall semester of their internship year. They thought that waiting until the second semester to have an official university supervisor might be too late to have an impact. They saw the benefit of an extended period of internship supervision that would cover both semesters, as in option E. Both of the university supervisors for Cohort 1 stated that starting supervision in the first semester would allow relationships among the intern, mentor teacher, and university supervisor to form early, which would help build open channels of communication.

Regarding the half-day format of the internship, the university personnel saw only advantages. Like the interns, they felt that the half-day organization allowed ample time for the interns' commitments to on-campus coursework. They recognized that the interns were older students who needed to support themselves and, in many cases, their families. They knew that many of the interns held other jobs (as teaching or research assistants on campus, as instructors at a local college, in local businesses) that they would need to maintain during their internship. For these reasons, the university personnel thought the viability of the program in terms of student recruitment depended on finding a way for student interns to continue working part time while enrolled.

DISCUSSION

The purpose of this study was to understand the views of various field placement models from the perspective of alternative certification interns, their mentor teachers, and university personnel who deliver alternative certification programs. We found that, although perspectives were quite consistent within each group, they differed across the three groups. We were surprised to find that subtle, but important, distinctions existed among the underpinnings of each groups' perspectives.

One factor that appeared to impact the perspectives of the three stakeholder groups (interns, mentor teachers, and university personnel) was the personal needs of the individuals within each group. The student interns needed to have time for work and coursework and were most concerned that their internship would be arranged temporally to facilitate their lives. The mentor teachers desired to teach their own science/mathematics students and were concerned about their personal relationships with the interns. The university personel attempted to please many masters (Authors, in press), including: adhering to their philosophical groundings for the program; meeting state and College of Education requirements for certification, finding sufficienct numbers of quality placements for the interns, and sustaining their program by recruiting sufficient numbers of students.

Even where it appeared that the three stakeholder groups agreed on advantages and disadvantages of various internship models in their support for transitioning the interns into the teaching profession, the origins of their perspectives were distinctly different. For example, all of the stakeholder groups agreed that the continuity afforded by the year-long experience was an advantage of the current model. However, their reasons differed in what they viewed as important for supporting their transformations into teachers. The interns felt that the year-long internship supported them to build their identity as a teacher in the eyes of the students. For the interns, the advantage of continuity was the opportunity to build their relationships with students. The mentor teachers focused on interns' ability to see all phases of the work of teachers and to realize that teaching takes stamina and dedication. To the mentor teachers, the benefit of continuity was the

interns' indoctrination into the work of being a teacher. The university personnel focused on the interns' opportunity to observe student learning over time, in order to build PCK for science and mathematics teaching and learning.

Not only were stakeholders' views influenced by their perspectives what it means to become a teacher, they were also influenced by past experiences. Mentor teachers, who had previously supervised student teaching interns in the traditional program and who themselves had completed their own student teaching in a similar format, had developed a comfort with the full-semester, all-day model. This comfort and familiarity confronted them when they agreed to become part of the new internship model in the alternative certification program. On the other hand, the interns, who knew nothing of either model prior to entering the SMAR²T program, more easily accepted the year-long half-day design. Thus, one role of the university personnel associated with alternative certification internships for full time students is to help mentor teachers understand the differences between these students and those in traditional programs, and recognize how those differences can be addressed through different internship options.

In the end, we are no closer to finding the "perfect" internship model that supports the transition of our alternative certification students into the teaching profession. Each option that we presented and examined through the perspectives of three stakeholder groups has advantages and disadvantages associated with it. What we have learned from this study is that a key to supporting a successful experience for all stakeholders involved in the internship process is making explicit the expectations and perspectives of the members of the three groups.

Based on this study, we took action in the form of an adaptation of the option A internship model for SMAR²T Cohort 2 interns. We felt it was important to address the major concerns raised by the interns and the mentor teachers in a manner that was also viable for the university personnel who administer the program. Consequently, for Cohort 2 we enacted an internship model similar to option E. We still required interns to be in a school for four hours per day, five days per week, which satisfied the interns' need for continuity and provided time for other responsibilities. To address the mentor teachers' concern about interns needing to experience the gamut of the work of teachers, we required Cohort 2 interns to complete a number of school-related activities outside of their internship classrooms. These activities included, but were not limited to: attending a school-wide faculty meeting each semester; attending an IEP (Individual Educational Plan) meeting for a special needs student; attending an extra-curricular activity in which their students participate; and doing bus duty, lunch duty, and/or hall duty with their mentor teacher. To address the university personnel's need for providing continuing classroom-based university support, we implemented formal university supervision in both semesters.

We believe that supporting university-school collaboration is a critical component of providing our preservice students, whether at the undergraduate or post-baccalaureate level, with a quality teacher education program. We feel that the findings from this study helped us to understand better the importance of this particular transformative pathway, the internship, for our post-baccalaureate, preservice science and mathematics teachers. Further, this study aided our local efforts as we worked to enhance our post-baccalaureate students' opportunities to build PCK and develop into highly qualified science and mathematics teachers. We have found little research in the mathematics and science education literature that addresses internship experiences for this type of post-baccalaureate certification student (one who is not a full time teacher). We believe that our study begins to fill a gap in the literature, and our hope in presenting this research is that it supports other science and mathematics educators who are designing internship programs for post-baccalaureate science and mathematics certification students.

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