# The Missing Ingredient in Science Teacher Preparation: The Role of the Senior Specialist

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## Abstract

The traditional model for supervision of pre-service science teachers during the field experience within teacher preparation programs includes the appointment of a university supervisor who is often a retired teacher and/or adjunct faculty and a school-based co-operating teacher who rarely receives training from the university to be a mentor. This can lead to a disconnect between the university supervisor, co-operating teacher, and university, and a disjointed experience for the pre-service teachers.

In 2009, the New York State Education Department and New York State Board of Regents issued a Race to the Top Request for Proposals for Graduate Level Clinically Rich Teacher Preparation Programs. In late 2011, the American Museum of Natural History (AMNH) was awarded a five-year pilot to decrease the shortage of earth science teachers statewide. The position of Senior Specialist in Science and Teacher Education in the Masters of Arts in Teaching (MAT) program at AMNH is a central figure to the urban teacher residency (UTR) model the program has adopted. This model includes a summer working with AMNH Youth Initiatives programs, a full year of mentored residency in schools, a second summer in an AMNH Earth and Planetary Science Department practicum, and a graduate course of study co-taught by scientists and teacher educators that meets subject specific and teaching certification goals. A different design from most science teacher preparation programs, this residency model includes three faculty members who serve as Senior Specialists – *mentors* in school residency rotations, *advisors* in teaching as a profession, and *co-instructors* in academic courses and portfolio development. The Senior Specialist acts as the linchpin between the youth programs, science practicum, and courses as well as a support structure and anchor to the five high need, low achieving partner schools with the ultimate goal of strengthening the pre-service teachers' experience.

**The Missing Ingredient in Science Teacher Preparation: The Role of the Senior Specialist**

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The traditional model for supervision of pre-service science teachers in teacher preparation programs includes the appointment of a university supervisor and a school-based co-operating teacher during a field experience. The supervisor role often falls on junior faculty, adjunct faculty, or retired teachers and co-operating teachers usually receive little or no training from the university to be a mentor (Rodgers & Keil, 2007). Due to time restrictions and other priorities and obligations such as research and publishing, supervisors make the minimum number of required school visits to assign a grade (Beck & Kosnik, 2002). Many teachers may have had the experience of working with a co-operating teacher during their own pre-service preparation, but have never participated in a formal mentoring program and therefore find the role of being a mentor complex and confusing (Ganser, 2002). This can lead to supervisors and co-operating teachers who are disconnected from the university, the pre-service teacher, and each other. Is there a better model to support pre-service teachers during their field experiences?

With the intense media blitz surrounding teacher quality and accountability, a spotlight has been shone on teacher certification programs – the training ground and schools of the newly minted teachers of the twenty-first century. Policy makers from federal and local governments have infused money into the field of teacher preparation with the hope of fostering and funding innovative new programs in high need and low performing schools. Even with new university-based teacher education programs and field placement supervisors that "watch over" the pre-service teachers/teacher candidates during their training months, there is still a decrease in the retention rate of teachers (Ronfeldt, 2012). So what's the missing ingredient?

We suggest that the missing ingredient in teacher certification programs is being explored in a pilot program at the American Museum of Natural History (AMNH) in New York City. The position of *Senior Specialist in Science and Teacher Education* in the Masters of Arts in Teaching (MAT) program at AMNH is a central figure to the urban teacher residency (UTR) model the program has adopted. Housed at one of the largest scientific and cultural institutions in the world, the MAT program has garnered much media blitz of its own as being the first non-collegiate informal institution to produce a "rigorous, research-based STEM preparation for teachers," as recommended by the National Science Board (2010).

In 2009, the New York State Education Department (NYSED) and New York State Board of Regents issued a Race to the Top (RTTP) Request for Proposals (RFP) for Graduate Level Clinically Rich Teacher Preparation Programs and in late 2011, the MAT program was awarded a five year pilot to decrease the shortage of earth science teachers statewide. One provision in the RFP was the requirement to partner with one or more of the over 700 high need, low performing schools identified by New York State. In order to provide the future earth science teachers with a clinically rich graduate experience, AMNH put research to practice – infusing the literature on

Urban Teacher Residencies into the creation of its own residency model. The AMNH UTR model includes a summer working with the AMNH Youth Initiatives programs, a full year of mentored residency in schools, a second summer in an AMNH Earth and Planetary Science Department practicum, a living stipend, and a graduate course of study co-taught by scientists and teacher educators that meets subject specific and teaching certification goals. A different design from most science teacher preparation and mentoring programs, this residency model includes three faculty members who serve as Senior Specialists – *mentors* in school residency rotations, *advisors* in teaching as a profession, and *co-instructors* in the academic courses and portfolio development (Figure 1).

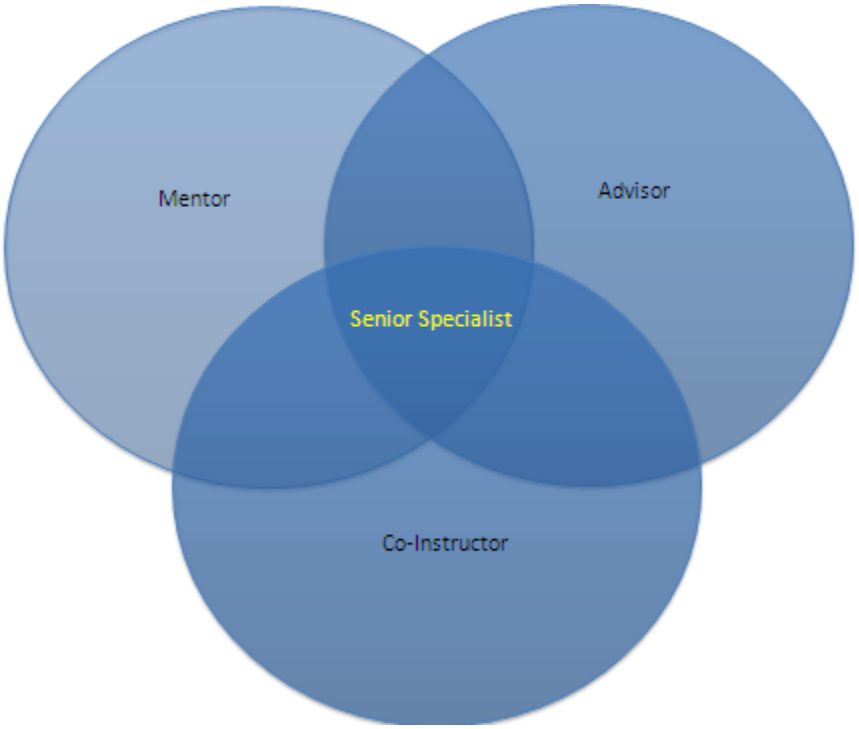


Fig. 1 The three roles of the Senior Specialist in the AMNH MAT Program

The first role of the Senior Specialist is as a mentor for the school residency rotations. First and foremost, a relationship was developed with the school administration at the very start of the planning year. Senior Specialists visited each partner school twice a month from September through February to not only learn about the culture, but to select the school mentors in collaboration with the principals and assistant principals. Upon selection, the teacher mentors participated in five orientation sessions facilitated by the Senior Specialists to develop their mentoring skills and knowledge of co-teaching. The teacher mentors and school administration were further supported with AMNH resources, school presentations, and field trips to the museum. In order to provide teacher candidates with rotations between content, English Language Learner (ELL), and Special Education mentors, the Senior Specialists worked with the administration to match mentors with candidates and create a schedule that allows each candidate to observe diverse populations during their practical field experiences. When the first cohort of teacher candidates began the MAT program in June 2012, they visited the schools with

the Senior Specialists to learn about their future residency placements, meet school mentor teachers and school administration, and get a feel for the culture of the schools. The Senior Specialists' role of mentor extends to the development of the school residency curriculum, observations of the candidates twice a month during each residency rotation, conducting monthly sessions with mentors in the schools, and co-developing the Summer I Residency with AMNH Youth Initiative staff. By offering feedback and support throughout the residency, Senior Specialists will assess candidates' level of content knowledge, pedagogical knowledge, and pedagogical content knowledge, as well as their ability to use technology effectively in the classroom, their ability to use data to assess student learning, and their ability to apply that knowledge in the classroom to support student achievement for all students, including ELL and students with special needs.

The role of advisor in teaching as a profession began during the candidate selection process. Senior Specialists were among the faculty members who reviewed applications and conducted interviews. Two advisory sessions were held with the candidates within their first month of the program to debrief about their visits to the residency schools and to learn about the co-teaching strategies they would be employing during both the Summer I Residency and the school residency. Future advisory duties include monthly advisory sessions at the school with focused topics for discussion, assistance with the development of candidate portfolios, and additional support during the candidates' first two years of teaching through an induction program.

The third role of the Senior Specialist is as a course instructor. From the beginning, Senior Specialists have assisted in the development of the MAT program curriculum. The co-teaching model is used both by the school mentors and teacher candidates in the schools as well as by the AMNH faculty in the courses they teach at the museum. Each Senior Specialist co-teaches 1-2 of the academic courses, which are held on Fridays and one weekend per month, and is responsible for co-developing syllabi and co-planning the class sessions that include both science content and pedagogy. In addition to course development, Senior Specialists have assisted in the development of the requirements for the teacher candidate's portfolio of practice that serves as the equivalent to a Master's thesis.

The Senior Specialist acts as a support structure and anchor to the five high need, low achieving partner schools, an integral faculty role created in the original MAT program proposal. In New York City alone, only 36% of 8th graders score at or above level of basic proficiency in science, with even lower scores for African American and Hispanic students, at 23% and 27%, respectively (Livingston & Wirt, 2005). Overall in New York State, 6.5% of science teachers and 16.5% of science teachers in NYC in 2006-7 were not " highly qualified" (NYSED, 2010) – an indication that the need to recruit, select, fund, and retain a high quality teacher pool of earth science educators is vital to student achievement, especially when closing the achievement gap and increasing graduation rates among diverse populations of learners.

The presenters would like to share initial feedback and evaluations of the Senior Specialist role during the planning year (Year 1) in recruitment and training of school mentors, advising the first cohort of MAT teacher candidates, course planning with co-instructors, and developing the components of the teacher candidate portfolio. We would like to show how the responsibilities of a mentor, advisor, and co-instructor established a communicative pathway in the formal-informal collaboration between the school administration, school mentors, teacher candidates, and other

AMNH teaching faculty within the MAT program.

We have identified a key faculty role (and as a result created the position of Senior Specialist) as one of the main ingredients historically missing from most traditional graduate schools of education and residency models. By focusing on the work the Senior Specialists conducted during Year 1 of the MAT pilot program, we hope to inspire new designs and research into science teacher education and the preparation programs that graduate our future science teachers into the profession. In the world of science teacher education, the role of the Senior Specialist has never been documented or tested with simply one person spearheading the traditional jobs of possibly four different faculty members. The participation in all aspects of the science teacher candidate's graduate coursework and school/museum residencies allows the Senior Specialist to be at a central focal point in the organizational structure of the MAT program – a role to be documented and shared within science teacher education as a pre-service teacher education model. In addition, the execution of the Senior Specialist role will add to the literature on formal-informal collaborations (Bevan et al, 2010; Hofstein & Rosenfeld, 1996; Olson, Cox-Peterson, & McComas, 2001; Phillips, Finkelstein, & Weaver-Frerichs, 2007; Sweeney & Lynds, 2001) within pre-service teacher development.

At AMNH, the three Senior Specialist positions were filled by two recent science education doctoral graduates and a veteran high school science administrator all of whom have experience with classroom teaching, providing professional development to teachers, supervising pre-service and/or in-service teachers in the classroom, and conducting educational research. Accomplished in the field of teaching as a profession, the background and contact base of the three Senior Specialists remains current within science teacher education – locally, statewide, and on a nationwide level. Albeit a different resume from your typical student teacher supervisor (Rodgers & Keil, 2007), it is a fundamental role in order to maintain the integrity of the program structure. The three primary faculty responsibilities of mentoring candidates during the museum and school residencies, acting as their advisor, and teaching a moderate course load can be replicated in a job description similar or the same as Senior Specialist in any teacher education program.

Additionally, the central role of the Senior Specialist as a collaborative bridge between two historically separate entities – formal school systems and informal science research institutions – can be explored for their future implications on student achievement, new teacher retention, building cultural capital, and the impact of recruiting quality teacher educators into pre-service leadership roles. Despite its novelty, the Senior Specialist is a reform-minded faculty position that is breaking ground in Year 1 of the MAT program, and is poised to broaden the current worldview of science teacher education.

Within ASTE membership, teacher educators, university professors, in-service science teachers/mentors in school settings, and educators from informal institutions will be interested in discussing the range of new non-university based graduate schools at the cutting edge of creating programs and faculty positions for quality teacher educator practitioner-scholars to shape future science teachers. The goal of this proposal is to alert the professional consensus that all stakeholders involved in preparing a quality teacher (i.e. program directors, professors, university supervisors, co-operating teachers, and school administration) are currently discrete

entities – with one or more having little to no say nor accountability in the candidates graduate school experience. However, the position of Senior Specialist aims to bridge this gap and create a collaborative network of professionals – of which they are part of – entirely invested in the success of the MAT teacher candidate throughout their 15-month graduate program. Hence, ASTE participants will engage in a dialogue that will expand their definitions and conceptions of how science teachers should be prepared to enter the teaching profession.

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