Session Title:
Seeking Consensus on Quality Science-Math Teacher Preparation

MSP Project Name:
Promoting Institutional Change to Strengthen Science Teacher Preparation

Presenters:
Charles Coble, APLU
Jennifer Presley, APLU

Authors:
Charles Coble, APLU (Lead)
Jennifer Presley, APLU (Lead)

Project Session

Strand 3

Summary:
In 2008, A·P·L·U launched its Science and Mathematics Teacher Imperative (SMTI), the goal of which is to increase the quantity and quality of secondary science and mathematics teachers. To better define 'quality' SMTI staff, Jennifer Presley and Charles Coble and consultants interviewed 32 national teacher preparation experts, practicing teachers and policy leaders and conducted group interviews with representatives of six disciplinary or professional societies - from October 2011 to May 2012. Using a standard interview protocol, respondents were asked to describe their vision of an ideal science and mathematics preparation program. A clear consensus emerged and synthesized into four thematic briefs and the focus of an invitational conference in Boulder, Colorado, April 2012.

Section 1: Questions framing the session:
The 10 Key Questions are:

1. How do leaders convey a clear and strong message for the value of quality teacher preparation at your institution?

2. Does the selection process into teacher preparation programs attract candidates with demonstrated academic success and evidence that they have the skills and dispositions that will likely lead to their becoming good teachers?

3. Are there exit standards beyond minimum state requirements that ensure that the teacher education programs produce competent novice teachers?

4. Do teacher preparation programs have a culture of evidence and accountability, one that tracks and assesses the progress of teacher candidates from entry to completion and

as novice teachers and uses those data to make appropriate interventions and program changes as warranted?

5. Is teacher preparation clinically based, all the way from early classroom exposure, to more extensive, but still well supervised student teaching?

6. Do teacher preparation programs blend courses in disciplinary content and pedagogical content knowledge so that students acquire deep content knowledge and the ability to transmit core disciplinary concepts in an age-appropriate way?

7. Do programs have vigorous university-school partnerships that demonstrate a shared responsibility for teacher preparation and development with the public schools in which most teacher candidates are placed for clinical experiences and student teaching?

8. Are master teachers and teachers-in-residence, those with strong disciplinary backgrounds and evidence of exemplary understanding of teaching, engaged as essential colleagues in teacher preparation?

9. Do the teacher education programs ensure that co-operating classroom teachers assigned to student teachers are master teachers or are teachers under the supervision of a master teacher in the school or district?

10. Do the teacher education programs include support to their novice teachers through an induction period as a part of their formal programs?

Section 2: Conceptual framework:
The 6 Interview Questions used to frame our "Quality Initiative" were:

1. If you could start from scratch, how would you design your ideal science or mathematics teacher preparation program? What would be the most central or critical elements? Are the two areas of science and mathematics different enough that different designs would be preferred? If so, in what respects?
   Prompts, as needed, to stimulate possible responses across the teacher development continuum and in support for teacher preparation:
   - Recruitment, Selection and Admission
   - Content, Pedagogy and Clinical Practice
   - Beginning Teacher Support
   - Teacher and School Development (in partnership schools)
   - Leadership, Policy and Infrastructure
   - Connections with research and researchers on teaching and learning

2. What evidence do you think is critical to support claims of program effectiveness?
   Regardless of the type of program (undergraduate or graduate) or portal of entry (university-linked or alternative.)

3. What research evidence is most important to generate in the near future regarding the effective preparation of beginning teachers of science and mathematics – or teaching in general?

4. How can teacher preparation reduce the wide variability in outcomes, even within the same institution, and produce more consistently effective graduates?

5. What do you consider to be the most critical challenges or obstacles to improving preparation, especially in science and mathematics teachers?

6. And finally, if you were all-powerful, what changes would you promote in state and/or federal policy to ensure that teacher preparation programs produced effective science and mathematics teachers?

Note: For these purposes, "effective" is dually defined as: (a) beginning teacher's self-reporting a sense of success *and* progress in teaching and being observed and reported by supervisors and/or principles to be a successful beginning teacher; (b) showing evidence of student engagement and learning across gender, racial, ethnic and economic groups.

Section 3: Explanatory framework:
Four Themes Emerging from the Quality Initiative interviews and focus groups

Theme #1: Entry and Exit requirements
Consensus Statement: It matters a great deal who is selected into and who exits from teacher preparation programs, but quality control of who enters and who exits programs is not done well across the country.
Questions:
1. Do we have the right conditions and incentives in place to recruit consistently strong teacher candidates to prepare for careers in science or mathematics teaching?
2. Are we clear about the characteristics and abilities we are looking for in individuals we recruit and select into science and mathematics teacher preparation?
3. Ideally, what processes and procedures should we use to recruit and select accomplished individuals to prepare for teaching science or mathematics?
4. Should there be nationally agreed upon exit standards for certification in science and mathematics teaching?

Theme # 2: Clinical Preparation
Consensus Statement for Theme #2: Learning to teach should primarily be a clinical practice thoroughly grounded in the realities of schools and classrooms.
Questions:
1. What are the purposes of clinical preparation?
2. What is the ideal scope and sequence of clinical experiences?
3. Who should supervise teacher candidates through clinical experiences?
4. Where should clinical experiences occur?
5. What are the universities' responsibilities for the success of beginning teachers?

Theme #3: Knowing and Teaching Disciplinary Content
Consensus Statement: Teachers need to both know the discipline they are teaching and have the pedagogical skills to teach it, requiring deep collaboration between education and disciplinary departments.
Questions:
1. Is there an ideal structure of a mathematics or science teacher preparation program?
2. How is pedagogical content knowledge best delivered?
3. How important are out-of-classroom experiences for teacher candidates?
4. How can connections across education and disciplinary departments be strengthened?
5. How do programs address state and district demand for broad-field science certification versus more in-depth single disciplinary science certification?

Theme #4: Evaluation and research to improve Teacher Preparation
Consensus Statement: There is a need for ongoing evaluation within programs, and better research to inform the design and development of teacher preparation programs.
Questions:
1. What are the major goals of program evaluation?
2. What research urgently needs to be done?
3. Who will do that research, and how?
4. How can research findings be communicated to users for action?

Section 4: Discussion:
What remains to be done is to build criteria and metrics for assessing the degree to which these strategies are successfully being implemented within programs. This would help programs as they undertake their individual, ongoing assessment for continuous improvement, but might also lead to the development of a national competition to recognize exemplary teacher preparation programs.

However, the lack of empirical evidence has not impaired decision-making and program development in teacher preparation. The models and portals of entry into science and mathematics teacher preparation programs continue to proliferate across the United States. And while the authors fully support innovative program design, we also support an adherence to attributes of quality. Research drawn from the collective wisdom and judgments of quality by experts with a variety of perspectives on teacher preparation can add to the knowledge base, as we have attempted to do with rigor in this project. In that way, we trust this work will be useful to a wide audience.

Section 5: How will you structure this session? What is your plan for participant interaction?
Co-Directors Coble and Presley will present an overview of the project and the key findings from the 4 Thematic Briefs and how we derived the 10 Key Questions. We then plan, depending on the size of the audience, to create 4 small groups to discuss selected questions under each of the 4 major themes and share their observations with the larger group. The co-directors will then seek input on the logical next steps for both implementing the findings from the Quality Initiative and how to engage in the next level of research and the creation of the metrics to assess the 10 Key Questions.