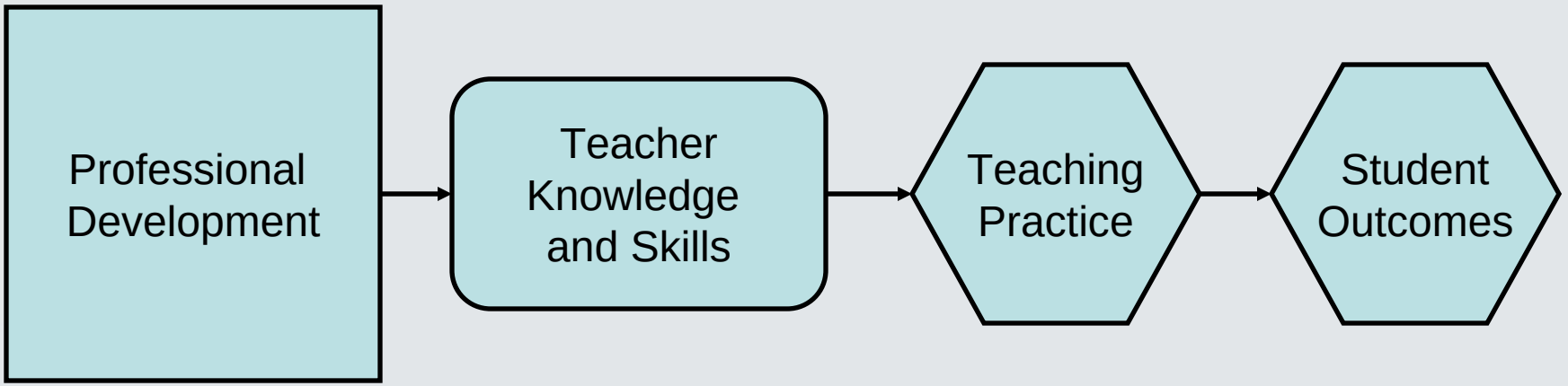
Simplified Logic Model for Professional Development



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- Purposes of PD and the learning experiences planned for teachers have implications for selecting PD providers – STEM faculty, teacher leaders, etc.

- What you need to do to prepare PD providers will depend on what their roles will be, and where the providers start in relation to those roles.

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MSP Example: Preparing STEM Faculty

North Cascades and Olympics Partnership (NCOSP)

Pinky Nelson

Director of Science, Mathematics, and Technology Education and professor of Physics and Astronomy at Western Washington University

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Preparation of STEM Faculty

George Nelson

NCOSP, PI, Director of Science Mathematics and Technology Education, Western Washington University, Bellingham, WA

Supported by the National Science Foundation under Grant No. DUE-0315060

Claim

Today's preservice and inservice teachers **can** become potentially effective teachers of science

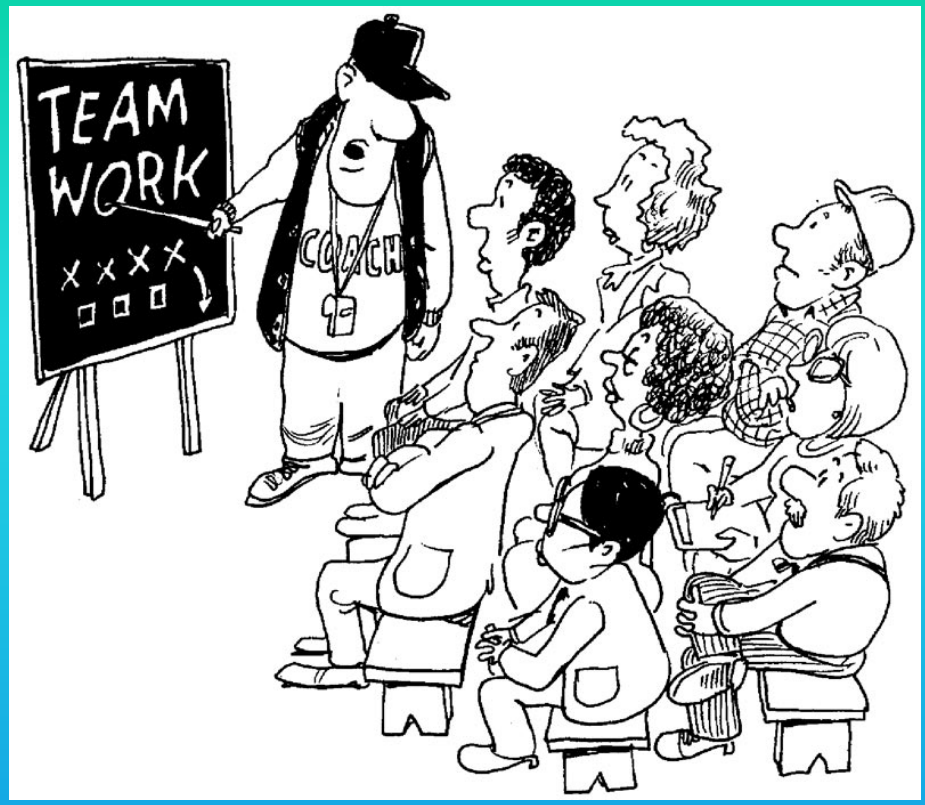
Claim

Today's higher education faculty **can** become effective science and science education teachers

Claim

It is possible to recruit and prepare an adequate number of potentially effective STEM teachers in our current system

Claim



K-12 Reform and Teacher Preparation Reform are Inseparable

Higher Education Collaborators (GUR Faculty)

Physics: Jim Stewart[1], Andrew Boudreaux[1,] ,George Nelson[1], Sara Julin[2], Ann Zukoski[3], Linda Zuvich[4], Ted Williams[5]

Biology: Deb Donovan[1], Carolyn Landel[1], Alejandro Acevedo[1], John Rousseau[2], Val Mullen[3], Rene Kratz[4], Pam Pape-Lindstrom[4], Adib Jamshedi[5]

Geology: Scott Linneman[1], Sue DeBari[1], Bob Mitchell[1], Bernie Dugan[2], Brad Smith[3], Ben Fackler-Adams[3], Steve Grupp[4], Terri Plake[5]

Chemistry: Steve Gammon[1], Emily Borda[1], Paul Frazey[2,3]

Science Education: Chris Ohana[1], Jacob Blickenstaff[1](Physics), Liesl Hohenshell[1](Biology), Don Burgess[1](Biology), Molly Lawrence[1]

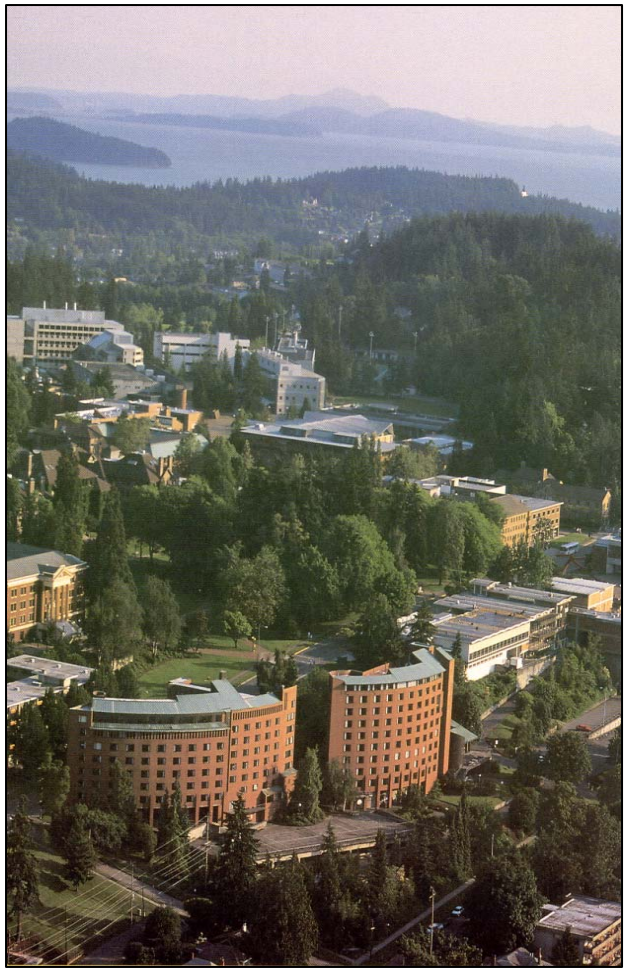
Evaluation:, Dan Hanley[1], Jim Minstrell[6], Ruth Anderson[6], Phil Buly[1], Many Graduate Students(MS)[1]

[1] Western Washington U, [2] Whatcom CC, [3] Skagit Valley C, [4] Everett CC, [5] Northwest Indian College, [6] FacetInnovations Inc.

Supported by the National Science Foundation under Grant No. DUE-0315060

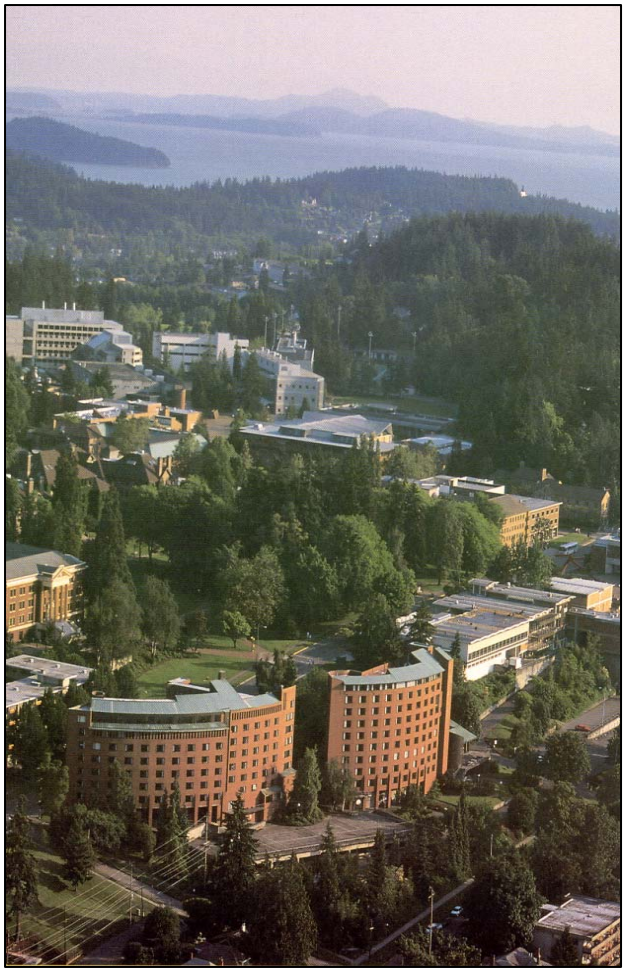
What do faculty need?

- Strong institutional commitment (time)
- Courageous, relentless leadership
- Shared beliefs
- Norms of behavior
- Integration of sciences and education
- Knowledge of learning research
- P-16 partnerships
- Focus on student learning
- Continuous assessment of results (data)
- Collaboration to improve



What NCOSP did

- Pre-commitment of participants
- Clear goals--develop and deliver
- Release time (1 class/year)
- Offer of participating in research
- HRI training
- Assessment training
- UBD training
- Regular meetings
- Co-facilitation of all content areas
  - With K-12 master teachers
- Data, data, data--visible results



K12-Higher Education Partnership

"*The Summer Academy was definitely a collaborative effort. I learned as much - if not more - than the teachers who were technically the students."*

-Higher Ed Faculty

"NCOSP didn't say 'here's what's wrong with education and here's how we're going to fix it'. Rather NCOSP said, 'here's what we know about How People Learn, let's work on this together and see what we find out'. We weren't just being told something - we were a part of something."

-Teacher Leader

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Mean rating of HE Science Lessons: Horizon Research Inc. Obs. Protocol

Quantitative Capsule Rating 2008

Faculty: **3.7**

National K-12 Comparison

1-2: 59% Ineffective Instruction/Elements of Effective Instruction

3 Low: 17% Beginning Stages of Effective Instruction

3 Med: 10% Beginning Stages of Effective Instruction

3 High: 5% Beginning Stages of Effective Instruction

4-5: 10% Accomplished/Exemplary Instruction

Mean rating of Science Methods : Horizon Research Inc. Obs. Protocol

Quantitative Capsule Rating 2008

Elementary: **3.1** Secondary: **3.3**

National K-12 Comparison

1-2: 59% Ineffective Instruction/Elements of Effective Instruction

3 Low: 17% Beginning Stages of Effective Instruction

3 Med: 10% Beginning Stages of Effective Instruction

3 High: 5% Beginning Stages of Effective Instruction

4-5: 10% Accomplished/Exemplary Instruction

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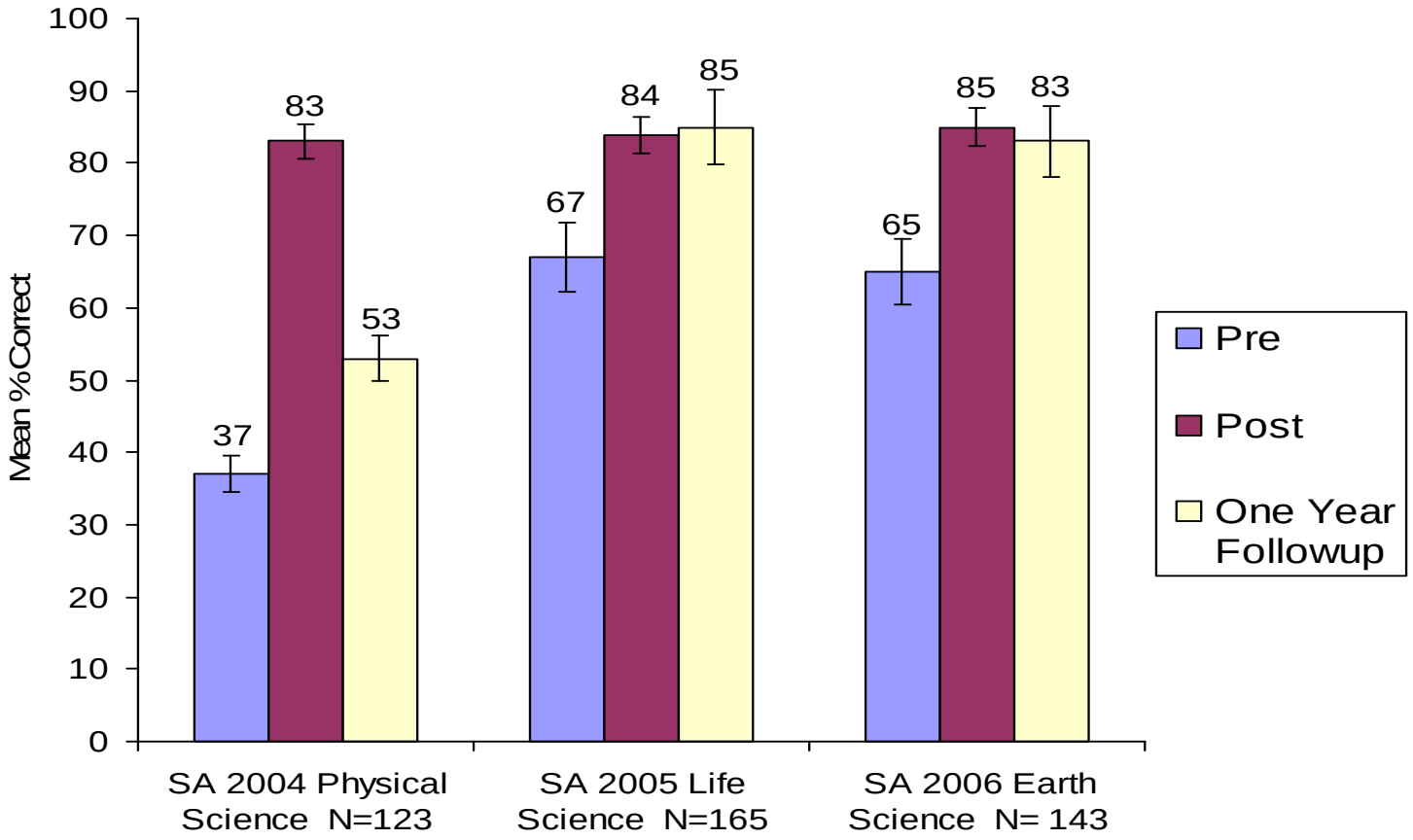
Teacher Leaders: Content Knowledge



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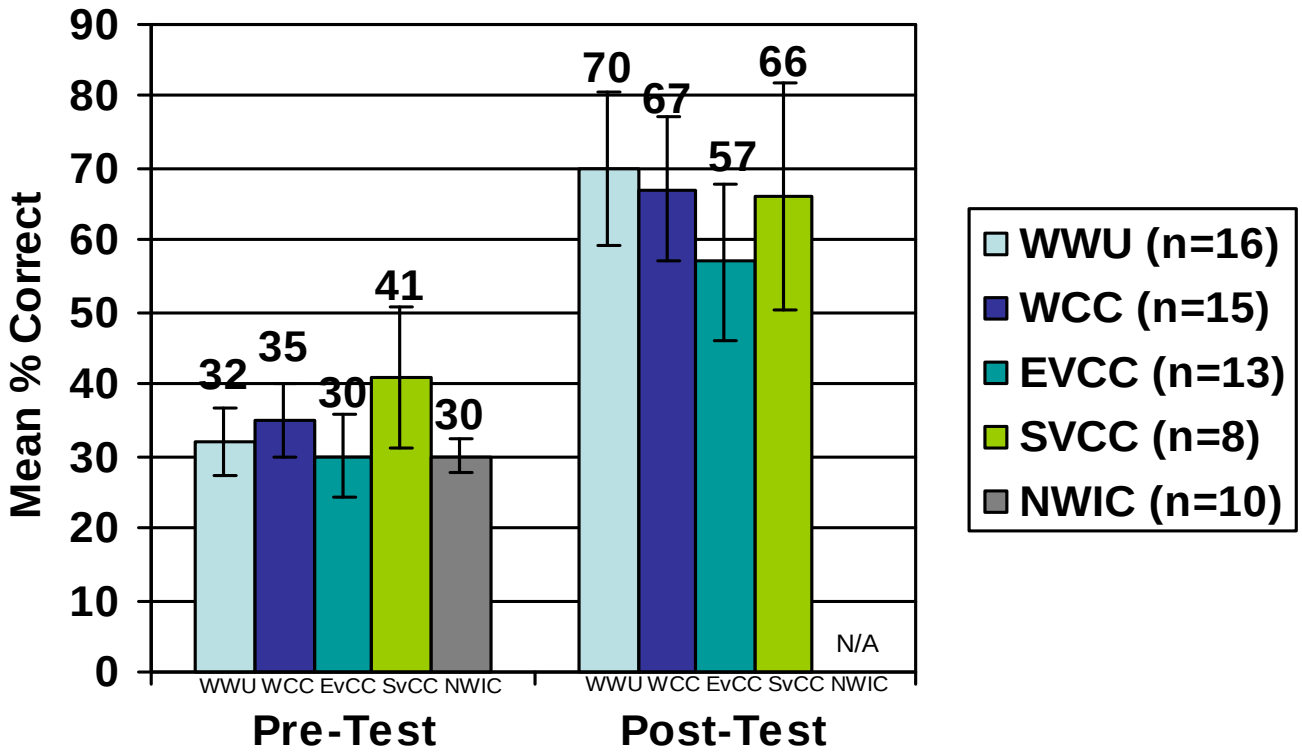
Preservice Students Pre/Post Biology

Figure X: Life Science Content Assessments in Year 5



Western Washington University Secondary Preservice Students
2006-2007 WEST-E (Praxis II)
100% Pass Rate

Discipline	Passing Score	N (69)	Mean
• Biology	152	13	175
• Chemistry	152	9	172
• Earth Science	150	4	185
• Gen. Science	153	14	181
• Mathematics	134	21	167
• MS Math	152	2	190
• MS Science	145	2	168
• Physics	140	4	163

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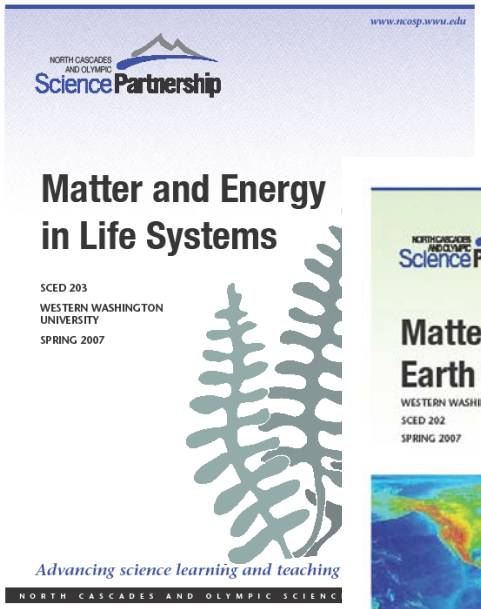
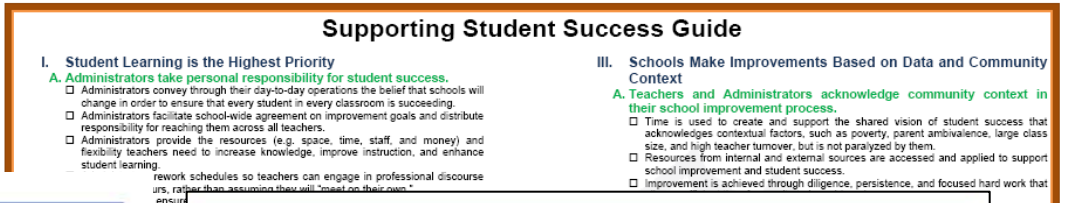
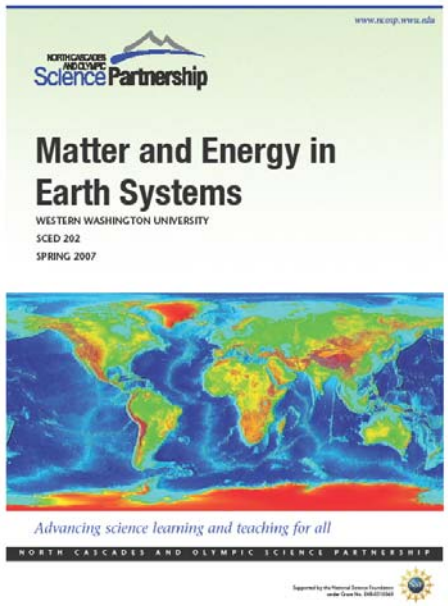
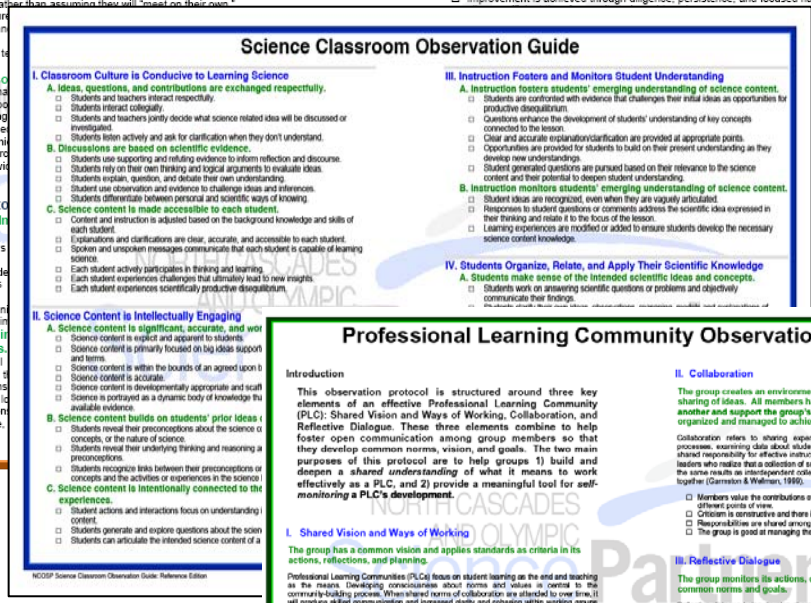
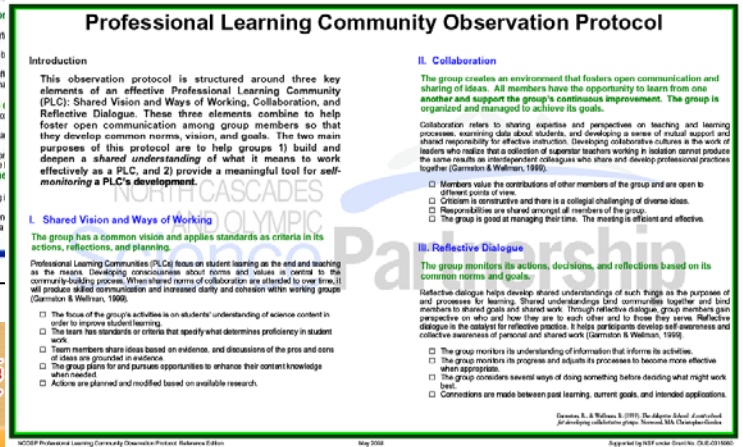
Products and Tools

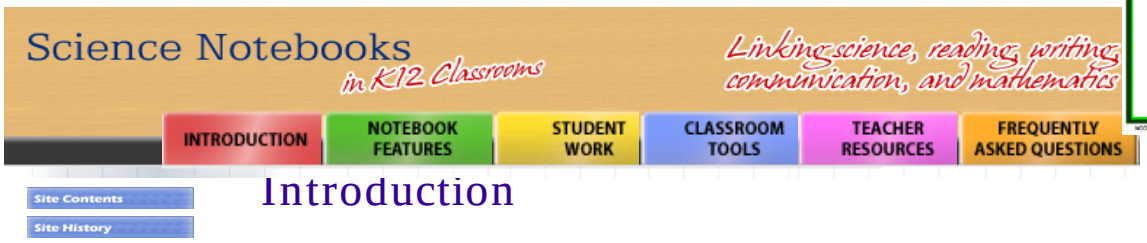












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STEM faculty roles in the design of professional development programs or courses intended to deepen teacher content knowledge:

- Identifying learning goals for teachers;
- Developing the scope and sequence of professional development programs/courses;
- Selecting/adapting/designing learning experiences for teachers;

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STEM faculty roles in the design of professional development programs or courses intended to deepen teacher content knowledge:

- Developing instruments to assess teacher content knowledge;
- Preparing professional development/course providers; and
- Providing input on redesign of professional development programs/courses.

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STEM faculty roles in implementing content-deepening experiences for K-12 teachers:

- Facilitating teacher investigations/discussions focused on mathematics/science content;
- Facilitating investigations/discussions focused on mathematics/science pedagogical content knowledge (e.g., considering student thinking);
- Providing lectures/explanations focused on mathematics/science content;

STEM faculty roles in implementing content-deepening experiences for K-12 teachers:

- Serving as a content resource to address teachers' questions;
- Monitoring teacher understanding of the content; and
- Serving as an on-demand content resource for teachers.

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Developing Teacher Leader Capacity to Work with Other Teachers

Who are teacher leaders?

Current or former classroom teachers working with other classroom teachers and other educators in the school or district

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Developing Teacher Leader Capacity to Work with Other Teachers

When do they work as teacher leaders?

- Full-time classroom release, so TL works throughout the day
- Part-time classroom release, so TL has some time during the day dedicated to TL work
- No classroom release, so TL work happens outside of teaching responsibilities

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Developing Teacher Leader Capacity to Work with Other Teachers

What might teacher leaders do?

- Lead workshops or other formal pd
- Observe teaching and give feedback
- Model lessons
- Engage in lesson planning
- Lead teacher work groups or teams

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Developing Teacher Leader Capacity to Work with Other Teachers

Why teacher leaders?

- Credibility with teachers
- Familiarity with school and district practices
- Necessary to reach large numbers of teachers
- Promise for sustainability

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What do we know from research?

- Review of empirical literature on teacher leadership
- Searches yielded 1,127 studies
- Studies screened based on “in/out” criteria
  - Designed as research, not an advocacy piece
  - Included a specific measure or analysis of teacher leadership
- 101 studies, plus 10 completed MSP studies, went through standards of evidence review

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What do we know from research?

- The work of teacher leaders, particularly providing instructional support to teachers, impacts teachers' classroom teaching

- Teacher leaders' practice is associated with positive student outcomes

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What do we know from research?

- The most frequently reported TL activities were leading workshops or professional development, and leading work groups of teachers

- TL practice was influenced by the preparation TLs had for their work

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What do we know from research?

- TL preparation focused on developing teacher leader content knowledge in combination with attention to pedagogical strategies and/or specific leadership abilities

- Importance of TL preparation to include opportunities to engage in the practices that they would employ as TLs

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What do we know from research?

- Information drawn from summaries of empirical research on teacher leadership in the MSP-KMD Knowledge Reviews

- Available at: www.mspkmd.net

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Connecting TL Practice to Selection and Preparation

- Preparation of teacher leaders should be tied to their anticipated roles
- Selection of teacher leaders should be related to preparation plan and to the anticipated practice of teacher leaders.

AND

- Roles of teacher leaders working with teachers vary broadly, making strategic selection and preparation challenging

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Team Planning Worksheet #4 (Tab 7, Green)

- Who will implement the professional development you are designing?
- How well prepared do you expect these providers to be initially for the roles you envision them playing?
- You will have 10 minutes to get started on this discussion..

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MSP Example

NSF Institute: Preparing Virginia's Mathematics Specialists

Bill Haver

Professor of Mathematics

Virginia Commonwealth University

Vickie Inge

Director of Mathematics Outreach

University of Virginia

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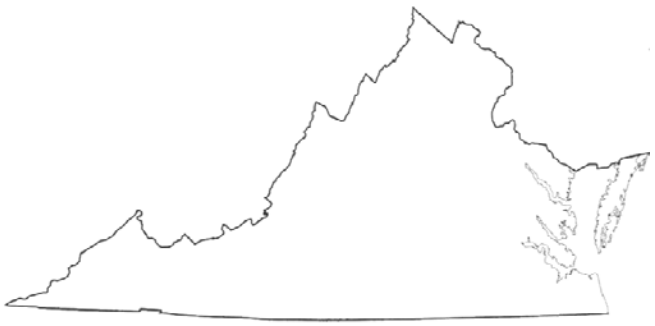
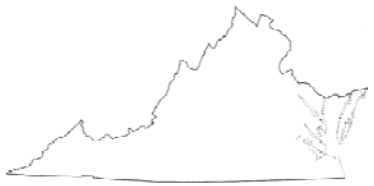
MSP Institute: Preparing Virginia's Mathematics Specialists



Virginia committed to idea of teacher leaders/mathematics specialists/coaches in k-5 schools for past 20 years

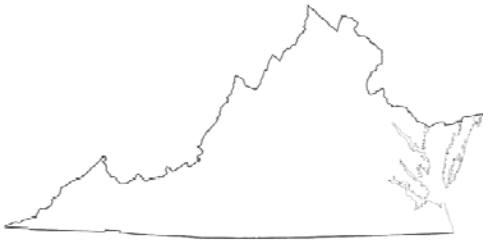


Firm commitment to this idea from:

- Leaders of k-12 mathematics community
- University math education faculty
- University math faculty
- Mathematics professionals in Virginia Department of Education
- Virginia Mathematics and Science Coalition
- Professional math organizations

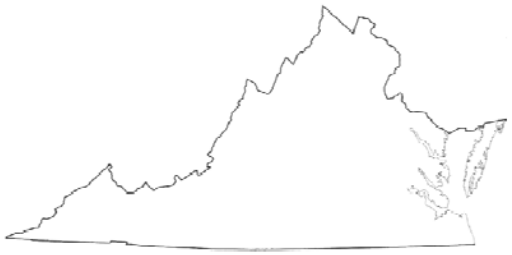
Consensus has developed on role and preparation of Mathematics Specialists

- Virginia Mathematics and Science Coalition Taskforce chaired by Vickie Inge
- Statement of Role of Mathematics Specialists
- Information can be retrieved at http://www.vamsc.org/

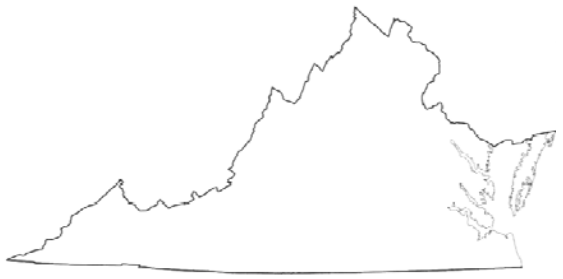


Support Gained Outside of Mathematics Community:

- Legislature
- Principals/School Administrators
- Board of Education

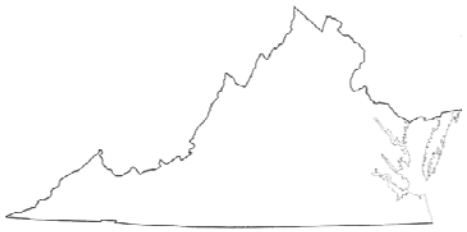


Five year process ended with state approval of Mathematics Specialist licensure endorsement in September 2008.



Masters Program Collaboratively Developed

- Six universities
- Professional development teams
- Math Supervisors, teachers, university mathematics and mathematics education faculty

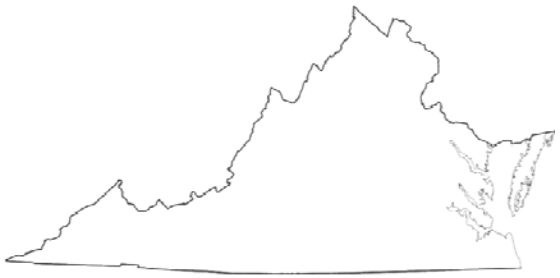


What Mathematics Specialists Do

- Provide leadership and content expertise for job-embedded professional development
- Collaborate with school-based administrators to provide leadership for the school's mathematics program
- Co-plan and co-teach with classroom teachers
- Coach teachers
- Support novice teachers learning to teach mathematics
- Collaborate to assess student learning and plan for remediation or extension
- Facilitate parent workshops

Mathematics Courses

- Number and Operations
- Geometry and Measurement
- Probability and Statistics
- Algebra and Functions
- Rational Numbers and Proportional Reasoning



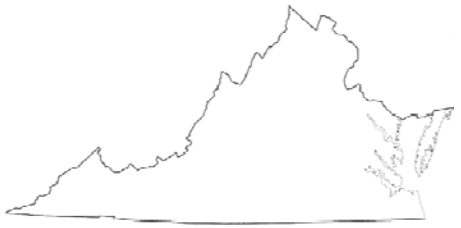
Education/Leadership Courses

I. Quality instruction
   - Standards based instruction
   - Reflective professional

II. School as a learning organization
   - Roles of Mathematics Specialist
   - Coaching

III. Facilitating a learning community
   - Assessment as a tool
   - Lesson study

IV. Diverse learners

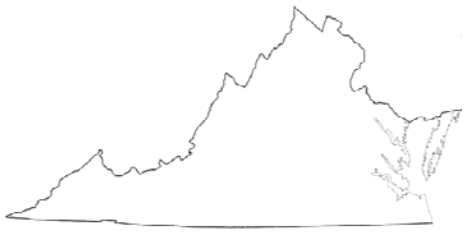


Research Findings

Treatment/Control Schools

Involving 36 Schools

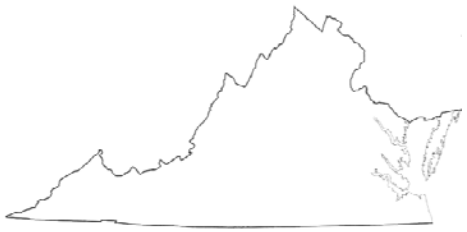
Case Study Research



Statistically significant increase in student SOL scores

- Grades 3, 4, and 5

- Difference in first year, greater difference in second year and more in third year

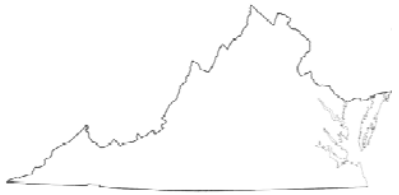


Contact Information

- Bill Haver, Virginia Commonwealth University
  whaver@vcu.edu

- Vickie Inge, University of Virginia
  vinge@virginia.edu

- Information about all of Virginia's Mathematics Specialist Projects is located at http://www.vamsc.org/



When you return from the break at 10:30 am

- Your team should sit together at a table labeled with the grade range and the topic you want to discuss:

Preparing STEM Faculty, Elementary (K-5)

Preparing STEM Faculty, Secondary (6-12)

Preparing Teacher Leaders, Elementary (K-5)

Preparing Teacher Leaders, Secondary (6-12)

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