

Survey Results from National and Nebraska Science Teacher's Professional Development and Inquiry Knowledge

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Purpose of Study

- To provide a baseline of Nebraska teachers'
 - Science inquiry professional development experiences
 - Frequency and duration of training, delivery format, training strategies, distance travelled, etc.
 - Knowledge of inquiry
 - Perceptions of inquiry
 - Inquiry instructional practice
- To compare Nebraska elementary, middle, and high school teacher professional development experiences
- To compare Nebraska elementary teachers' results with those from a national sample

Participants

Nebraska Sample

- 145 teachers completing survey at 2010 NATS
- 41% elementary; 59% secondary

National Sample

- Random sample of teachers with stratification of rural/urban
- Total of 595 K-5 teacher participants

Science Survey Measures

Measure	Description
Demographics	Teaching assignment, certification, experience, class organization and size, gender, age, and ethnicity
Professional development characteristics	Characterization of best professional development experience within past year in terms of format, PD leader, total hours, time span, distance travelled, use of demonstration/modeling, opportunities for collaboration, practice, & feedback
Perceptions	Importance of science inquiry topics, degree of knowledge improvement related to topics
Knowledge	Scientific inquiry, classroom inquiry, and inquiry pedagogical content knowledge
Reported practice	Extent to which specific inquiry topics and skills are focus of teacher practice

Demographics

Demographic	NE MS/HS	NE Elementary	National Elem.
Gender	70% Female	92% Female	94% Female
Avg. Teaching Experience	14 years	16 years	15 years
Master's Degree	51%	46%	51%
Rural School Teachers	31%	27%	47%
Avg. Science Courses	14.0	7.6	
Avg. Science Education Courses	4.3	2.7	
Average Informal Science Instruction	20min/day	5min/day	
Science Inquiry PD in last two years	73%	78%	35%
Participation in KICKS	62%	89%	
Participation in LINKS	35%	11%	

Results: Teacher PD Characteristics

Professional Development Characteristic	NE MS/HS	NE Elem.	National Elem.
Format			
Single workshop	27.6%	43.5%	37.8%
Series of workshops	24.1%	34.8%	24.3%
Workshop with follow-up	17.2%	8.7%	24.3%
PD Leader			
Teacher or staff from your school	1.7%	4.5%	10.5%
District staff	1.7%	9.1%	21.1%
Regional educational unit	13.6%	31.8%	18.4%
University Personnel	20.3%	6.0%	10.0%
External PD expert	22.0%	27.3%	31.6%

Results: Teacher PD Characteristics


Professional Development Characteristic	NE MS/HS	NE Elem.	National Elem.
Time Spent in PD			*
Hours spent in PD	48.5	70.5	18.9
Span over PD (in days)	36.6	22.9	50.8
Avg. Miles traveled to PD	187	174	104
Interaction/collaboration			
Interaction was part of PD	31.7%	39.1%	57.9%
Interaction was independent of PD	46.0%	43.5%	18.4%
Did not interact	20.6%	10.9%	15.8%

*p < .05, ** p < .01

Science Areas Researched

- Nature of Science
 - Science is a complex social activity
 - Science is blend of logic and imagination
 - Science ideas are durable but subject to change
- Discipline-specific knowledge
- Traditional instruction
 - Lecture
 - Reading from course textbook
 - Demonstrations
 - Laboratory Activities

Science Inquiry Areas Researched

- Classroom inquiry
 - Engaging students in questioning
 - Guiding student in proposing explanations
 - Guiding students in conducting investigations
 - Helping students to use data to construct explanations
 - Helping students to communicate findings
 - Inquiry strategies
 - Teacher provides explicit guidance and scaffolding for students to engage in the inquiry process
 - Teacher encourages student reflection
 - Teacher facilitates student-student interactions through meaningful dialogue
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Results: Teacher PD Characteristics

- Degree of Focus in Best PD (1=not included, 2=minor focus, 3=significant focus)

Topic	NE MS/HS	NE Elem.	National Elem.
Nature of Science	2.51	2.79	
Discipline Specific Knowledge	2.56*	2.81	2.25**
Classroom Inquiry	2.66	2.68	2.42*
Inquiry Strategies	2.71	2.74	2.56

*p < .05, ** p < .01

Results: Science and Inquiry in Classroom

- Degree of focus in teacher's classroom (1=not a focus, 2=minor focus, 3=moderate focus, 4=significant focus)

Topic	NE MS/HS	NE Elem.	National Elem.
Nature of Science	2.75	2.52	
Discipline Specific Knowledge	3.64**	3.32	2.40**
Traditional Instruction	2.89*	2.68	
Classroom Inquiry	3.11	2.95	2.41**
Inquiry Strategies	3.07	3.04	2.32**

*p < .05, ** p < .01

Results: Inquiry Knowledge

Construct Measured		NE MS/HS	NE Elem.	National Elem.
Classroom Inquiry		70.1%	72.7%	65.8%*
Science Inquiry		65.2%	61.5%	50.3%**
Pedagogical Content Knowledge				
1	Direct Didactic	4%	4%	6%
2	Direct Active	11%	8%	15%
3	Guided Inquiry	56%	56%	55%
4	Open Discovery	28%	32%	26%

*p < .05, ** p < .01


Results: Comparison of Elementary PD for Reading, Science, and Math

- Time devoted to science instruction
 - Science: Nebraska: 41 minutes per day
National 26 minutes
 - National Reading: 81 minutes
 - National Math: 64 minutes
- Professional development for science
 - Science: Nebraska 75% participated, national 26%
 - Reading: 79% of teachers
 - Math: 52% of teachers

Summary: Characteristics of PD

- Nebraska PD is more likely to be led by external than internal staff/consultants
- MS/HS PD is more likely to be supported than elementary PD
- Nebraska teachers more concentrated time on PD than national sample (more total hours over fewer days)
- NE PD more likely to have interaction/collaboration external from the PD than nationally
- NE PD more emphasis on discipline specific knowledge and inquiry than nationally

Summary: Science and Inquiry

- In the classroom
 - NE elementary teachers report more time spent in science instruction than nationally
 - NE elementary teachers report a larger focus on both discipline specific knowledge and inquiry than nationally
 - Inquiry knowledge
 - NE Elementary, Middle, and High School teachers have similar inquiry knowledge
 - NE teachers have stronger inquiry knowledge than the national sample
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Professional Development Opportunities

- **Summer 2012 Professional Development Opportunities:** *KICKS2* and *CSI (Coaching Science Inquiry): Rural Schools* (UNL)
- **CSI: Rural Schools seeks**
 - Middle and high school teachers in rural schools for summer PD with focus on science inquiry as content and instructional strategy
 - Instructional coaches to provide on-going, one-on-one support during the year for CSI teacher participants

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