School District Science Coordinator Professional Development (Paper 3 in Paperset)

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Abstract

Recent studies have found that school and district initiatives focused on increasing student learning across the district depend on the leadership provided by the district office personnel (Copland & Knapp, 2006; Honig, 2006). In this study, the authors investigated the impact of a weeklong academy for new science coordinators (less than five years). The following questions were asked: 1) To what extent do the science coordinators gain knowledge about each of the New Science Coordinators Academy (NSCA) goals during the five day NSCA?; 2) Which goals of the NSCA were viewed as most beneficial to the science coordinators?; 3) What needs do the science coordinators express to facilitators that are not met by this NSCA?; 4) To what extent do the science coordinators use the new knowledge in their district work? Analysis was on participant reflections. Grounded theory drove the determination of themes/categories from reflections. A comparison of themes to the NSCA goals occurred, which allowed preliminary answers to the study questions. The overall purpose of this Academy is to support the statewide infrastructure necessary to bring improvement to classroom instruction and student achievement. The participant reflections indicate that they gained from the experiences designed to match each Academy learning aim/goal and they intend on using their new knowledge.

Keywords: inquiry-based science, problem-based learning, science coordinators, professional development, VISTA

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Past studies of district level staff suggest their impact is minimal, while recent studies have found that school and district initiatives focused on increasing student learning across the district depend on the leadership provided by the district office personnel (Copland & Knapp, 2006; Honig, 2006). Virginia received an Investing in Innovation (i3) grant from the U.S. State Department of Education in the fall of 2010. This award is for the Virginia Initiative for Science Teaching and Achievement (VISTA) that is designed to improve science teaching and student learning of science throughout Virginia. VISTA works as a partnership of K-12 school districts, universities, and the State Department of Education to build an infrastructure of sustained, intensive science teacher professional development to increase student performance. One component of VISTA works to build, support, and sustain the infrastructure of science educators. District level staff, especially science liaisons/coordinators, is a critical part of this infrastructure. In Virginia, all school districts have a designated science contact/liaison/coordinator.

To build, support, and sustain, district level staff, VISTA provides two opportunities for science liaisons/coordinators. The first opportunity is the New Science Coordinator Academy that supports new district leader. These individuals have at least a Master's of Education in Administration and Supervision. Often, their preparation does not focus on their roles as a district-level science leader and for some individuals science is not their primary job responsibility. Last spring, VISTA conducted the first five-day New Science Coordinator Academy (NSCA). This paper reports on the impact of this first NSCA on meeting its goals and efforts to support the state infrastructure.

The second opportunity provides support for speakers and participant attendance at the fall meeting of the Virginia Science Education Leadership Association (VSELA) consisting of science coordinators, department heads, specialists, lead teachers, professional employees of state, regional or governmental science education facilities, and faculty members in Virginia institutions of higher learning.

Research Questions

The following questions guided assessment of the impact of NSCA: 1) To what extent do the science coordinators gain knowledge about each of the NSCA goals during the five day NSCA?; 2) Which goals of the NSCA were viewed as most beneficial to the science coordinators?; 3) What needs do the science coordinators express to facilitators that are not met by the NSCA?; 4) To what extent do the science coordinators use the new knowledge in their district work?

Review of the Literature

Role of the District Level Staff in Supporting Student Learning

Over the last thirty to forty years, research on the role of the district level staff in supporting principals learning, teachers learning, and student learning has changed. Much of the research in the 1980s and 1990s focused on effective schools and emphasized the school as the unit of change (Anderson, 2003; Rorrer, 2008; Spillane & Callahan, 1999, 2000). More recently research has found that district level staff plays an important role in supporting schools working to improve student-learning outcomes (Copland & Knapp, 2006; Honig, 2006).

The introduction of standards and state accountability assessments shifted the focus back to the instructional role that districts can play (Marsh, 2002; Marsh et al., 2005). In two studies by Marsh, district level staff provided a critical context for supporting policy implementation

and instructional reform (Marsh, 2002; Marsh et al., 2005). Research on the impact of district office staff supporting science education, most notably elementary science, is minimal (Miller, 2010). It is felt that if reform efforts are to be effective educators at all levels must consider elementary science as the starting point (Levy, 2008). Research by Copland & Knapp (2006) and Honig (2006) found that promising school initiatives call on district offices to be a leader in strengthening student learning across the district.

The Role of District Level Staff on Work at the District Level

Districts facilitating a systems approach to reform serve as a mediator between state and national policy and schools with respect to implementation of standards and assessments (McLaughlin & Talbert, 2003; Marsh, Kerr, Ikemoto, Darilek, Suttorp, Zimmer & Barney, 2005; Rorrer & Skrla, 2005; Rorrer et al., 2008; Togneri and Anderson, 2003). In the report *The Three Essentials: Improving Schools Requires District Vision, District and State Support, and Principal Leadership* by the Southern Regional Education Board (2010) identified these three areas as critical for improvement based on a study of seven very different school districts. They found that districts must develop and articulate both a vision and a set of practices that sends a clear message of "what schools are about". They must communicate with the community at large this same message of the vision for schools and the best practices to be used. They should have a strategic plan that shares the vision and conditions for principals and teachers to create this type of school (SREB, 2010). They found the most significant impact focused on changing the mindset and job descriptions of district staff. The new focus was on curriculum, instruction, and school support, rather than district hierarchy, job titles, and district organization (SREB, 2010). The NSTA Position Statement on Leadership in Science Education and the National Science Education Standards support these areas of focus. The NSTA Position Statement also

highlights the need to focus on a variety of professional development opportunities to support the range of teacher skill and comfort. For the district leadership work to have sustained impact, Horizon research found in their study of the Local Systemic Change projects, that long-term sustained work is essential when implementing new instructional strategies and materials (Banilower et al., 2006).

The Role of District Level Staff at the School Level

In a literature review conducted by Mac Iver and Farley (2003), they found that capacity-building for schools to improve instruction and achievement required district level staff to

- advise on good curriculum and instructional practice,
- recruit and equip principals and teachers,
- help school staff to analyze data and decide what instructional changes need to be made, and
- provide administrative support so that good instruction can occur.

Honig et al. (2010) in their report to the Wallace Foundation found that district level staff must have 1:1 relationships with schools. The 2010 SREB report *The Three Essentials* supports these findings. In the SREB report, they also found that district level staff needed to support schools by

- developing collaborative and supportive relationships with the school;
- supporting the principal to become an instructional leader;
- spending a lot of time in schools;
- using high quality "look-fors" that go past addressing the standards to look at creating an engaging learning environment, teaching in a relevant, rigorous, and hands-on way, showing students that the teachers believe in them, making sure every student is

connected to at least one teacher (must move past test prep to improve low performing schools);

- focusing principal accountability toward helping teachers identify and reach the district vision for high performing schools;
- prompting the importance of professional learning, and
- promoting job embedded and relevant professional development.

Marsh et al. (2005) in their study of three urban school districts found that district developed curricular and instructional guides were helpful in "promoting the consistency of instruction and helping principals observe and monitor teachers."

The Role of Support for All District Staff

An important finding to summarize the research in this area focuses on how the district views supporting all district staff. In the SREB report *The Three Essentials* (2010), their analysis found that highly effective districts have high quality professional development for teachers, principals, district level staff, and the school board. The investment across the spectrum of district constituents, not just in student learning, was essential.

Structure of the Academy

The NSCA is a five day program (three days initially in the early spring and then two days later in the spring for this first year of the Academy) with additional networking and support for participants at the Virginia Science Education Leadership Association (VSELA) meeting in the subsequent fall. The NSCA has five goals for participants. The goals are to:

1. Learn to make improvements in leadership, teacher learning, quality teaching, and student learning.

2. Develop a common understanding of hands-on science, inquiry, problem-based learning, and nature of science.

3. Identify aspects of effective science teaching and learning.

4. Compare district models of creating standards-based science curricula.

5. Investigate data sources available to use to provide a focus to improve district science programs.

6. Develop a science program strategic plan.

The facilitators address these goals by weaving a variety of activities and opportunities to revisit the goals together.

The first day of the NSCA (see Appendix) engaged the participants in an introduction to VISTA, an introduction to the other participants and VISTA staff, and then a daylong simulation, *The Building Systems for Science Literacy Simulation*. Kathy Stiles of WestEd facilitated this simulation, which is under development by WestEd. The game is based on the ideas and principles of *Designing Professional Development for Teachers of Science and Mathematics* (Loucks-Horsley et al., 2009). The simulation allows players to "discover what activities and resources have the greatest impact on teacher and student learning, why some teachers struggle to improve their instructional practices, and how much it "costs" in time, materials, and commitment to provide effective professional development. Through the simulation, teams learn to make improvements in four key areas: leadership, teacher learning, quality teaching, and student learning (Playing, 2009)." These activities promote Goals 1, 5, and 6.

Day 2 of the NSCA began with an introduction and discussion of four areas: Facets of an Effective Science Program, Effective Teaching, Curriculum Development, and Professional

Learning. This discussion set the stage for the participants to consider the intersection of Hands-on Science, Inquiry, Problem-based Learning, and Nature of Science. Next, engaging the participants in a model Problem-based Learning lesson explored this intersection. After participating as learners in the lesson, the participants discussed "How can we identify effective teaching?" Following this discussion, the participants discussed and developed an observation protocol/evaluation ("look-fors") for individuals observing and supporting effective science teaching and learning. The day concluded with a discussion supported by a panel of experienced science coordinators on "How do we develop curriculum? These activities promote Goals 1, 2, 3, 4, and 5.

Day 3 engaged participants in considering the data sources they typically use to support their science program. The participants discussed the data available to them and data they would like to have access to. Participants, supported by the facilitators, had time to examine a variety of data sources, Educational Informational Management System (EIMS), Student Achievement Data, Class Enrollment Data, Schedules, and AP/IB Data via district websites. The agenda then had the participants spend time considering how they might assess their science program and developing an initial strategic plan and road map for their work over the next several months. These activities promote Goals 5 and 6.

Day 4, two months later, began with participants discussing in small groups how they had incorporated their work from the previous session into planning and activities in their districts. An introduction to the basics of the NSTA Science Program Improvement Review (SPIR) tool occurred next. This tool engages external reviewers and districts in assessing their program using a set of standards identified for high quality science programs (http://www.nsta.org/pd/spir/). This tool was selected as an example of the tools available for district analysis of its science

program. The day finished by discussing the use of Professional Learning Communities and Professional Development Protocols. The participants shared how their districts currently engage in these opportunities and how they might use them in the future. These activities promote Goals 1, 5, and 6.

Day 5 engaged the participants in revisiting effective science instruction. The focus of the session was on Inquiry and Problem-based Learning. The participants were introduced to strategies to help teachers craft more inquiry-based lessons and how to use a question map to develop Problem-based Learning units. The day concluded with the participants considering the 7 Habits of Highly Effective Leaders from the work of Stephen Covey. These activities promote Goals 2 and 6. In addition, the participants all attended the Virginia Science Education Leadership Academy (VSELA) and Virginia Association of Science Teachers (VAST) Conference.

Methods

Participants

Thirteen individuals attended the first of five NSCAs. The participants included 3 males and 10 females ranging in age from 30 to 54 years of age from 12 different school districts in Virginia. There was 1 Asian, 2 African American, and 10 Caucasian participants. All of the participants hold a M.Ed. or M.S. degree and seven participants hold or are in the process of earning an Ed.D. or Ph.D. in Education (Bell et al., 2011). All participants are currently in leadership positions in their respective school division (K-12 science coordinator, science lead teacher, science specialist, instructional coach, vertical team leader, beginning teacher advisor coordinator, elementary principal) and ten of the participants have led science professional

development. Participants' years of experience in their current leadership role range from 7 months to 13 years with an average of 3.7 years of experience.

Measures

For this paper, we collected two types of data, interviews with the lead facilitators and participant exit slips. The interviews conducted with the two lead facilitators were by email as one is no longer in his position and one lives out of state. The exit slips were examined to determine the impact of the NSCA on their work. Grounded theory drove the determination of themes/categories from the participant reflections (Glaser & Strauss, 1967). The exit slips were read several times. Then, each question was read and responses were categorize by emergent themes. Next, a comparison of the themes to the NSCA goals for alignment occurred. Finally, the themes and their alignment to the goals allowed us to develop answers to the research questions. Data to determine the extent to which science coordinators used new knowledge in their district work (question 4) have not yet been collected.

Results/Findings

Based on interviews with the two lead facilitators, they felt the Academy addressed its overall goals. They described the process of development of the 5 day agenda as one that involve using the goals outlined in the grant, collaboration with experienced science coordinators to learn what would have helped them, and researching other similar program agendas and interviewing those leaders. They felt that the program could be "tweaked" with special attention paid to maintaining stricter adherence to the agenda so that sessions later in the day do not lose time that was planned for them. They indicated that the agenda has challenges as the participants have a wide range of prior experiences and skills. Four of the participants, several months after the Academy, contacted one of the facilitators and shared that they were

working on their own strategic plan and were using the PLC protocols shared at the Academy. The facilitators indicated that future challenges for these coordinators included other content responsibilities in addition to science, district initiatives that may or may not emphasize science, and the Framework for K-12 Science Education released by the National Research Council. They viewed these as challenge because only about 50% of Virginia school districts have a coordinator that focuses only on science. They feel the Framework is a challenge as Virginia currently is not a part of the core standards for mathematics and language arts and they are not participating in the national work focused around the Framework and subsequent standards. With the challenges, they felt positive about the Academy and the impact that it had on the participants.

The paragraphs that follow provide insight into the impact of the Academy from the participant's perspective. Day 1 of the Academy opened with the simulation, *The Building Systems for Science Literacy*. This simulation served a variety of purposes. It provided a common learning experience for the group and framed the work for the next four days. The participant's reflections on the simulation indicate that the simulation was very beneficial for them. Table 1, organized into themes, example responses, and the number of similar responses, provides insight into the benefits of the simulation for the participants. The themes identified match the goals and outcomes of the simulation. Some goals of the simulation resonated more strongly with participants than other goals, such as needing to know your staff and school needs; professional development must be allocated time, be supported, and be sustained; and successes must be celebrated. A key learning goal of the simulation is that student learning gains come when teacher learning and implementation of that learning has occurred. Only a

couple of participants mentioned this goal in their reflection, but participants revisited and talked about this goal throughout the five days of the Academy.

Table 1
Benefits of the Simulation (n=14 participants responding)

Themes	Example Response(s)	Number of Responses
Know the needs of staff, students, and school. Key: Different individuals need different types of Professional Development.	"You have to know your staff and their needs as well as the needs of the school and students to determine the type of Professional Development needed."	6
Professional Development goals need to address vertical alignment and strengths of the district, time must be allocated, and it must be sustained and supported.	"Continued need for vertical alignment of Professional Development goals." "Sustained and supported Professional Development at school admin level."	5
Valuable experience for use with a wide variety of district staff.	"Given district focus on program implementation and goal attainment, I recommend playing."	4
Professional Development plans are needed.	"Our county needs to clearly define a Professional Development plan for quality science education."	4
Student learning comes from teacher learning and effective teacher implementation.	"Student learning comes from teacher learning and effective teacher implementation "	4
We must celebrate the successes.	"Must celebrate and monitor success"	3
The simulation provided time to make connections and build relationships with colleagues we did not know.	"Helped a new group in the process of collaborating around school improvement, prioritizing activities given limited resources, focus on outcomes of leadership to teacher learning to student learning"	2
We must make time for science in discussions and work within the district and school level administration.	"Make time at our every other month principal meeting for science"	2
The Loucks-Horsley et al. Professional Development Design Framework is a valuable tool.	"Using Professional Development Design Framework is a good tool for reaching a "big picture" plan"	2
We must meet the needs of all professional development learners, including the resistors.	"At lead teacher meetings, need to think about what type of professional development will reach out to their school resistors and have a variety of offerings."	1

The participants also provided insights into areas they were struggling with that the simulation highlighted. These included:

- how to assess teacher needs;
- how to gain buy-in from principals;
- how to build capacity within the district to deliver professional development;
- how to provide consistent, sustained, high quality professional development;
- how to find time in the school year;
- identifying the supports teachers need to sustain the work after professional development; and
- how to "concretize" the skills learned in the simulation as they relate to their own district.

Day 2 focused on quality science instruction from the perspective of the learner, the teacher, and as an administrator. The participants felt day 2 connected well with day 1 as indicated by comments of four of the ten participants in their reflections. Nine of the ten participants commented on the inquiry/PBL experience that began day 2. Participants had different reasons for finding the experience significant that appear to reflect the prior experiences of the participants. These reasons included developing a deeper understanding of inquiry-based teaching and PBL, experiencing the use of questions and question maps, and the opportunity to discuss how these ideas present challenges in their jobs. Table 2 organizes these ideas into themes, provides example responses, and the number of similar responses.

Table 2
Inquiry and Problem-based Learning Experience

Themes	Example Response(s)	Number of Responses
Understanding of inquiry and PBL and an example of what good instruction looks like	The inquiry experience "hammers the concept of what good instruction looks like."	3
PBL application to classroom and incorporation of nature of science	"The PBL was interesting and can be applied in the classroom. The hands-on activities in PBL are effective for addressing initial ideas and many components of the Nature of Science."	1
Changes to improve the experience for participants	'Display the mode we should be in, be sure directions are explicit, consider explaining the one-minute wait time before we begin"	1
Related experience to obstacles in their jobs	"saw PBL and inquiry in action and discussed obstacles to our work at Central Office"	1
Ideas for what should be in Professional Development	"The modeling of the inquiry skills the second day helped lend a structure to what should be included in training sessions for science."	1
Question Map would like to learn more about	"I'm interested in learning more about the Question Map/Matrix. "	1
Use of Questions to drive instruction	"I really like the idea of organizing everything around questions. I think it sets a purpose for the learner, and…."	1

Five of the ten participants found the discussion and development of a tool ("look-fors") for principals a significant part of day 2. They indicated that the tool should be "user-friendly," "important for the development of a science plan," should consider "what would be helpful to the teacher" and "whether you are interested in fidelity of implementation" or other goals. Two participants would have liked to spend more time working on the tool. One participant indicated that they had never considered a science specific tool. These variations in thought again reflect the differences in the participant's prior experiences. The third part of day 2 involved several experienced science coordinators from the region sharing their perspective on their jobs, their successes, and their challenges. Four of the participants indicated that the experienced coordinators perspective was extremely helpful and they could relate to what they had to say.

During Day 3, participants focused on assessing their program and beginning on developing a strategic plan. At the end of the day, they were asked what they felt the major roadblocks were for getting teachers on board with inquiry-based teaching using a problem-based learning approach. Four themes, also frequently heard across the United States, emerged from the reflections. They are time for teachers to learn and develop a deep understanding of what it looks like, funding and resources, competing time constraints, and overwhelming job requirements (Table 3).

Table 3
Key Roadblocks to Implementation of Inquiry and PBL

Themes	**Example Response(s)**	**Number of Responses**
Time for teachers to learn and develop a deep understanding of what it looks like	"lack of professional development time with teachers" "allocating time for continuous professional development"	6
Funding and resources to learn and to teach using this approach	"resources in some cases" "budget"	4
Competing for teaching time with other content areas	"Competing with other subjects; math and language arts in particular." "lack of time for science instruction"	3
Teachers overwhelmed with the required tasks	"Teachers feel like there are already too many things on their plate." "Everyone is focused on SOL Test Strategies"	3

At the end of day 3, the participants shared ideas for what they would like to learn more about in the last two days. As in other questions, the participants shared a range of ideas reflecting their needs for additional learning opportunities, such as additional professional development strategies for specific types of initiatives in the state, planning professional development,

helping administrators understand how science should be taught, and suggestions for future Academies (Table 4).

Table 4
Ideas to Learn more about

Themes	Example Response(s)	Number of Responses
Professional Development Strategies	"Strategies for implementing the upcoming Standards Of Learning revisions and how to roll them out effectively" "I wish I had learned more about technology resources that help organize and learn new strategies "I wish I had learned more about developing curriculum." "I wish I had learned more about examples of PBL in K-5."	4
Planning Professional Development	"More about longitudinal planning for professional development to expand what VISTA is doing within our counties" "Identifying strengths and needs to develop professional development for teachers" "How other divisions implement professional development (in terms of what it looks like, cost, effectiveness, how to evaluate it)"	3
Bringing Administrators on board	"How to get administrators on board"	1
Suggestions	"Send out surveys to new coordinators on things like their knowledge of data collection, resources, inquiry, etc. and use that to base your schedule and guest speakers."	1

The main focal area for days 4 and 5 expanded the participants understanding of strategic planning and introduced them to several tools to assess their district program. Their reflections

indicated that the sessions on strategic planning were "confirming for a district with a well-developed plan," "validating," "important," and "reinvigorating." They also found that the sessions made the process of strategic planning "clearer" and helped them "develop a greater appreciation" for the process. Key components identified by the participants included "long and short term goals," strategies for "measuring growth in professional development and growth in student achievement," and involving "all stakeholders in the development process." One participant admitted that they thought they had a clear plan in their head but that they needed to get it on paper. One participant felt that strategic planning was important because "creating a district/department mission or goal keeps all thinking and planning focused and collaborative when working with a team of educators." Several participants indicated that the "many tools, resources, and connections" made this task helpful.

A second focal area for days 4 and 5 was Professional Learning Communities (PLC). Three of the participant districts are currently implementing PLCs and at least one participant indicated the use of the Lesson Study approach. The participants identified conditions necessary to support PLCs consistent with the research on PLCs. These include consistent scheduled meetings, focus upon student achievement, time in the schedule, administrative support, use of protocols, common goals, and willingness to share instructional practices. Similarly, the participants identified conditions that impede PLC work. These conditions include lack of specific focus, lack of true collaboration, lack of teacher authority, lack of time, and lack of facilitator training. The participants identified different strategies for taking their learning back to their district. These ranged from protocols shared with all levels of district staff to using some of the protocols in lead teacher meetings (Table 5).

Table 5
Strategies for Implementing PLC Protocols in Districts (n=11)

Strategies	Example Response(s)	Number of Responses
Share with district staff at all levels	"PLC protocols will be shared with administrators and teacher teams"	6
Lesson Study	"Lesson Study with PLCs in buildings (with instructional coaches and other facilitators) as a way to tighten PLC practice"	4
Data-driven and teacher needs	"The implementation of PLC will be both data driven and based on teacher needs."	2
Vertical Teams	"I want to look at vertical teams as the vehicle for the PLC. My first thoughts are to group grade 5 teachers with life science grade 6 and Biology teachers."	1
Protocol for Studying Student Work	"I am interested in a form of the protocol to examine student work."	1
Like to do research on impact on teacher practice and student achievement	"I would like to do research or in-depth case studies of changes in teacher practice and student achievement more so than what the article presented."	1

The NSCA has five goals for participants. They focus on: (1) honing science leadership skills, (2) developing a district-level, inquiry-based science strategic plan, (3) creating standards-based curricula, (4) developing effective teachers and leadership capacity through science communities of practice, (5) using data to make program decisions and improve student achievement. Examining the themes identified from the daily reflections allowed us to assess whether the NSCA achieved its goals. For the goal of honing science leadership skills, emergent themes include activities that aided them in developing relationships with other colleagues and the activities that provided valuable leadership experiences for them and would for others in their district. For the aim of developing a district-level, inquiry-based science strategic plan, themes that emerge include

- prerequisite information, such as needs of staff, school, and student, are needed before developing the plan;
- student learning only comes from teacher learning and effective teacher implementation;
- sustained and supported professional development from the school administrative level; and
- professional development and change in practice takes time.

For the goal of creating standards-based curricula, themes that emerged were:

- what good instruction looks like,
- understanding of the nature of science and how to handle discussions of it, and
- comfort with inquiry learning and PBL.

For the goal of developing effective teachers and leadership capacity through science communities of practice, emergent themes include:

- Professional Learning Communities (PLCs) are part of current district practice,
- Lesson Study could be an important strategy for use in PLCs, and
- sharing of protocols at all levels in the district and professional development to improve protocol use is needed.

For the aim of using data to make program decisions and improve student achievement, emergent themes include:

- the usefulness of sessions,
- share with school leadership, and
- use data with administrators to understand their needs and the needs of teachers.

An examination of the themes identified from the participant responses allowed for answers to the research questions guiding this study. We used each question as the lens for reviewing and selecting themes. The questions guiding the study of the impact of NSCA are:

1) To what extent do the science coordinators gain knowledge about each of the NSCA goals during the five day NSCA?;

2) Which goals of the NSCA were viewed as most beneficial to the science coordinators?;

3) What needs do the science coordinators express to facilitators that are not met by the NSCA?; and

4) To what extent do the science coordinators use the new knowledge in their district work?

For question 1, the extent to which the coordinators gained new knowledge about each of the goals, it is important to remember that the coordinators came to the NSCA with a wide range of prior experiences. Their reflections, as shared in tables 1 through 5, indicate that they learned from the activities designed to match each aim/goal of the NSCA. The insights took many forms from new information gained to providing new perspectives to consider in the future. Overall, the science coordinators gained new knowledge from the NSCA.

For question 2, which goals were most beneficial, it is difficult to determine from this data whether one component was more beneficial than another component. The various backgrounds of the coordinators resulted in different components resonating more strongly with them. All of the aims/goals in some way improved their understanding or reminded them of the importance of considering all of the ideas or components presented as they build their programs.

For question 3 about needs not addressed by the facilitators, the science coordinators were very honest about areas in which they need help. These include "gaining the buy-in of principals," "building the capacity to deliver all of the needed professional development," " identifying the strengths and needs of teachers to develop appropriate professional development for teachers," "more examples of PBL in K-5," "how other divisions implement professional development," and "longitudinal planning for professional develop to expand on what VISTA is doing within our counties."

Question 4, about the extent of participant learning used by them back in their district, remains an open question as data will be collected later this spring by the research team. However, in conversations with the coordinators at the VSELA and VAST conferences, the coordinators reiterated that the NSCA was beneficial because they have colleagues statewide that they can call upon, a better understanding of statewide efforts, and new tools to use in their districts.

Discussion and Limitations

Research on the learning of science coordinators and its' impact on the teaching and learning of science by teachers in their districts is very limited. This is unfortunate as they can play a critical role in how the district views the teaching of science, how science instructional materials are developed or selected and implemented, and the instructional practices related to teaching science that teachers learn about, are encouraged to use, and feel supported in their efforts to implement.

This study adds to this research area by examining the impact of a five-day academy on new science coordinators. The goals of this NSCA are ones identified to meet the needs of new science contacts/liaisons/coordinators and to support the work of VISTA. These goals and aims

also match those identified by research on supporting policy implementation and instructional reform conducted by Marsh and colleagues (2002, 2005).

This first NSCA provided an opportunity for participants to build a network with other science leaders across the state, build a common vision for science instruction, and obtain tools to support their work back in their districts. Participant reflections provided insights into their learning and intentions to use their new knowledge. Overall, the reflections indicate that the NSCA successfully addressed its five aims/goals and met the needs of the participants. The reflections also indicate that all participants believe the tools and support of the group of importance to their work.

With a diverse group of participants, it is not surprising that their reflections focused upon different key components and their needs were for different types of information. The Academy included several key components that allowed participants to enter from different places and develop new understandings and skills for use in their positions. The simulation, *The Building Systems for Science Literacy Simulation*, provided an important common experience allowing participants to consider their current understanding and to learn other participant strengths. The model PBL activity provided a common experience for the participants to discuss best instructional practices and consider their role in working with teachers to improve hands-on inquiry-based science instruction. The development of an administrators "look-for" tool also allowed for discussion and consensus building toward best instructional practices. The development of individual strategic plans allowed participants to meet their needs and the needs of their district. These different components support the needs of these learners as they provide multiple entry points and opportunities to grow (Bransford et al., 2000; Stiles & Mundry, 2002; Thompson and Zeuli, 1999).

This study does face several limitations. First, the sample size is small (N=11). The data available for analysis (Participant Reflections) is limited but does provide insight into participant perceptions. Also, additional data is needed and will be collected later this spring to ascertain whether participant learning carried forward into their work this year.

The ability to track these individuals is essential, as it will provide science educators insight into the impact of the Academy on their role as district leaders and the impact they have on student learning. The overall purpose of this Academy, as identified in the grant proposal, is to support the development of the state infrastructure necessary to bring improvement to classroom instruction and student achievement. The data shared in this paper supports this purpose as the academy provided learning opportunities for new science coordinators and they left with new insights matching their needs as science coordinators. Future study will consider their impact on classroom instruction and student achievement.

References

Anderson, S.E. (2003). The School District in Educational Change: A Review of the Literature. ICEC Working Paper #2.

Banilower, E. R., Boyd, S. E., Pasley, J. D., and Weiss, I. R. (2006). *Lessons from a decade of mathematics and science reform: A Capstone Report for the Local Systemic Change through Teacher Enhancement Initiative.* Unpublished manuscript, Horizon Research, Inc.

Bransford, J. D., Brown, A. L., and Cocking, R. R., eds. (2000). *How People Learn: Brain, Mind, Experience, and School: Expanded Edition*. Washington, DC: The National Academies Press.

Bell, R.L., Konold, T., Maeng, J.L.,& Heinecke, W.F. (2011). *VISTA research and evaluation annual report: Year 1*. Unpublished Report for George Mason University.

Copland, M. A., & Knapp, M. S. (2006). *Connecting leadership with learning: A framework for reflection, planning and action.* Alexandria, VA: Association for Supervision and Curriculum Development.

Honig, M. I. (2006). Street-level bureaucracy revisited: Frontline district central office administrators as boundary spanners in education policy implementation. *Educational Evaluation and Policy Analysis, 28*(4), 357–383.

Honig, M.I., Copland, M.A., Rainey, L., Lorton, J.A., & Newton, M. (2010). *School district central office transformation for teaching and learning improvement. A report to the Wallace Foundation*. Seattle, WA: The Center for the Study of Teaching and Policy.

Glaser, B. G., & Strauss, A. (1967) *Discovery of Grounded Theory. Strategies for Qualitative Research*. Mill Valley, CA: Sociology Press.

Levy, A., Pasquale, M., & Marco, L. (2008). Models of providing science instruction in the elementary grades: A research agenda to inform decision makers. *Science Educator*, 17(2), 1-18.

Loucks-Horsley, S., Stiles, K. E. , Mundry, S., Love, N., & Hewson, P. W. (2009). *Designing Professional Development for Teachers of Science and Mathematics.* Thousand Oaks, CA: Corwin Press, Inc.

Marsh, J. (2002). How districts relate to states, schools, and communities: A review of emerging literature. In A. Hightower, M., Knapp, M. J. Marsh, & M. McLaughlin (Eds.), *School districts and instructional renewal* (pp. 25-40). New York, NY: Teachers College.

Marsh, J.A., Kerr, K.A. Ikemoto, G., Darilek, H., Suttorp, M.J., Zimmer, R.W., & Barney, H. (2005). *Advancing System-wide Instructional Reform: Lessons from Three Urban Districts Partnered with the Institute for Learning*. Rand Education Press.

Mac Iver, M., & Farley, E. (2003). *Bringing the district back in: The role of the central office in improving instruction and student achievement.* CRESPAR Report #65. Baltimore, MD and Washington, DC: Center for Research on the Education of Students Placed at Risk.

McLaughlin, M.W. & Talbert, J.E. (2003). Reforming districts: How districts support school reform. Seattle, WA: Center for the Study of Teaching and Policy.

Miller, C.L. (2010). District Leadership for Science Education: Using K-12 Departments to Support Elementary Science Education under NCLB. *Science Educator*, 19:2, 22-30.

Playing for Real: How a Simulation Game Can Improve Professional Development. (2009). *WestEd's R&D Alert*, 10:2, 18-20.

Rorrer, A.K. & Skrla, L. 2005. Leaders as policy mediators: The reconceptualization of accountability. *Theory into Practice*, 44, 1, 53-62.

Rorrer, A. K., Skrla, L. & Scheurich, J. J. (2008). Districts as institutional actors in educational reform. *Educational Administration Quarterly*, 44:3, 307-358.

Spillane, J.P. & Callahan, K.A. (1999). Implementing state standards for science education: What district policy makers make of the hoopla. *Journal of Research in Science Teaching*, 37, 5, 401-425.

Spillane, J. P. (2000) *District leaders' perceptions of teacher learning*. Philadelphia: Consortium for Policy Research in Education.

Stiles, K. & Mundry, S. (2002). Professional Development and How Teachers Learn: Developing Expert Science Teachers. In R. Bybee, (Ed.), *Learning Science and the Science of Learning* (pp. 137 -151). Arlington: NSTA Press.

Thompson, C. L. & Zeuli, J. S. (1999). The frame and the tapestry. In L. Darling-Hammond and G Sykes, eds., *Teaching as the learning profession: Handbook of policy and practice*. San Francisco: Jossey-Bass.

Togneri, W. & Anderson, S.E. (2003). *Beyond islands of excellence: What districts can do to improve instruction and achievement in all schools*. Washington, D.C.: Learning First Alliance.

Appendix

Agenda for Each Day

Day 1	Day 2	Day 3
Introduction of Staff Program Overview and Goals Brief introduction of VISTA New Science Coordinator Academy Norms (10 - 20 minutes) The Building Systems for Science Literacy Simulation Part 1 The Building Systems for Science Literacy Simulation Part 2 The Building Systems Debrief Wrap up 3-2-1 Reflections Impacts for your role as district leader	Goals for the Day Facets of an Effective Science Program Effective Teaching Curriculum Development Professional Learning The Intersection of Inquiry, PBL, and the Nature of Science: What it looks like in the classroom? Brainstorm: How can we identify effective teaching? What structures do we need to have in place? Who do we need to get on board? How do we sustain change in practice? Create an observation protocol/evaluation to support effective science teaching and learning Group Discussion: How do we develop curriculum? Curriculum Panel: Developing a Standards-Based Curriculum Wrap up Reflections Impacts for your role as district leader How might you apply what you have learned?	Reflections and Goals for the Day Group Discussion: What data sources do you typically utilize to determine the success of your science program? Data Analysis: What Data is Available and Relevant ▪ EIMS ▪ Student Achievement Data ▪ Class enrollment Data ▪ Schedules (especially at the elementary) ▪ AP/IB Data (enrollment and achievement) Assessing Your Science Program Strategic Planning and Road Mapping Where do we go from here?

Day 4	Day 5
VISTA Update Review Norms and Issues from March Strategic Planning Reports Program Evaluation How do you create professional learning communities (PLCs) in your school divisions? Utilizing Professional Development Protocols Exit Slip	Reflections Focusing on Effective Science Instruction: Inquiry and PBL Professional Goals to Support Your Science Program Staying Connected Parting Thoughts and Survey