
Are MSP Participants Really Collaborating? An Exploratory Study

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EXECUTIVE SUMMARY

The purpose of this study was to examine the current status of relationships among participants in the National Science Foundation's (NSF) Mathematics and Science Partnership (MSP) program and how those relationships change. The data were collected from a convenience sample of MSP participants who attended the MSP Learning Network Conference held on January 25, 2010.

The purpose of our study was to apply Social Network Analysis (SNA) and other statistical means available to us to determine if changes over time are evident among the participants. The study was designed to explore the following:

- Comparative analysis of NSF MSP initiatives. Is there a difference among the suite of NSF MSP-funded projects? Are some more effective at creating collaborations than others?
- Relationship management. Is there a change among MSP educators with regard to their dealings with institutions of higher education (IHE) faculty as opposed to their interactions with other professionals such as IHE administrators or NSF program officers?
- Funding program legacy. Is there change over time when comparing different cohort years in a particular funded project?

The study explored relationships from three viewpoints: (1) change over time, (2) areas of conflict, and (3) current status of interactions.

A two-page survey form was developed and information collected using it was catalogued into a database. Questions regarding past and present thinking were tabulated. We also compared the responses of those who had participated in an MSP for one year or less, whom we labeled as “newbies,”¹ to those with longer participation experiences, whom we labeled as “veterans.” Our goal was to gain some preliminary insight regarding the current condition and the rate of change (if any) that may have stemmed from NSF's fostering MSP projects over time.

¹ This includes both individuals who are new to an older project and those involved in a new project.

Findings

- **Cultural Shift or Drift.** In examining changes over time with regard to interactions among MSP participants, we discovered significant differences in the Comprehensive and Targeted versus the Institute projects for veteran participants. While in the aggregate there is no significant change in interactions, i.e., frequency of interactions with other participants—over time for either group, significance was found for certain cohorts. When cohort-level differences were found, they indicated an increase in interaction rates for Comprehensive and Targeted MSPs and a decrease for Institute MSPs. When newbies’ and veterans’ data were compared, new Institute MSPs appeared to be drawing more interactive participants, while new Comprehensive and Targeted MSPs drew fewer interactive participants.
- **Areas of Conflict.** In examining groups that pose barriers to MSP operations, we found two significant areas of conflict. First, within the MSP community, administrators present the greatest barrier to collaborative working. Second, outside the MSP, the external community presents the greatest areas of conflict.
- **Who and What Matters.** Examination of current interaction rates for veteran participants indicates substantial interactions across groups, including STEM to Education faculty, and each of these IHE groups to K–12. The highest interaction rates were reported for innovation and research and preparation of articles and presentations between STEM and Education faculty. Discussions regarding pedagogy and professional development were the most frequent when relationships between IHE faculty and K–12 teachers were reported.

Discussion

Overall, the finding of little change over time might be disappointing news to those who hope that change can be engineered from an educational policy or MSP agenda. The convenience sample might be representative of a collective “group think” of the conference participants, all of whom value educational change, and that would mask any underlying change that may exist. More pernicious than masking is the potential leveling effect of existing institutional culture, which can discourage change initiatives, especially ones that ask faculty to work and behave in different ways. Research supports the general notion that most change initiatives undergo “cultural drift,” whereby heroic efforts to swim against the conventional current start strong only to weaken and eventually be set adrift in a larger, steadier cultural current. This notion is supported by Dr. Spresser’s persuasive argument for a more incremental approach to change

(reference Dr. Spresser’s open remarks conference speech at the Innovation through Institutional Integration (I-3) meeting on November 9–10, 2010).

Secondly, the biggest sources of conflict are reported to be administrators within the MSP. Yes, they could be points of light for an MSP change initiative, but more realistically they are points of traditional authority trying to be points of light. The outside community is another identified point of conflict for the conference participants. This is not a surprising finding as the MSP change initiative does not exist in a vacuum but rather is embedded in local community politics and policies. Here, the MSP initiative may be swimming against the tide of current community initiatives.

Finally, the MSP change initiative of building collaborative working relationships is supported as IHEs and K–12 institutions do interact with each other and collaborate to conduct innovative research and consolidate their findings into articles and presentations. The message here is that MSP collaborative work does occur in alignment with promotion and tenure performance metrics that reward such activities as research and publication. A closer look at how and on what MSP participants are actually measured by their host institutions will help inform how well the MSP mission can be sustained over time. For example, any innovative “push” in MSP mission goals may experience temporary success but could drift back to traditional forms of institutional partnering because that is what traditional performance matrices currently measure. If a systematic analysis of MSP participants were put in place, any backwards “drift” could potentially be detected and assessed. Proactive rather than reactive intervention could stem the tide of cultural drift and ensure sustainable reform.

As with many studies, our work here raises more questions than it answers. However, it is our belief that the data are valuable in that they make an important contribution to understanding the role of MSP in creating a professional learning community. An unanswered question is how representative our findings are of the MSP community and, furthermore, what might be needed to establish an important translational norm such as collaboration across institutional and disciplinary boundaries throughout all of education on a national level.

Equally important, this work provides evidence of the utility of Social Network Analysis principles as both a methodology and a tool for research and evaluation. We continue to believe that establishing more widespread adoption of SNA should be encouraged. This is especially important as NSF and other funding agencies are supporting work that involves partnership and collaborations. Both the strengths and the weaknesses of SNA need to be more fully understood.



BACKGROUND

Rationale for the Learning Network Conference Study

This report summarizes the descriptive statistical analysis deployed to understand how relationships are formed and sustained over time among participants in the National Science Foundation's (NSF) Mathematics and Science Partnership (MSP) program. The data were collected from a convenience sample of MSP participants who attended the MSP Learning Network Conference (LNC) held on January 25, 2010. The purpose of our study was to apply Social Network Analysis (SNA) and other statistical means available to us to determine if changes over time are evident among the participants. The study was designed to explore the following:

- Comparative analysis of NSF MSP initiatives. Is there a difference among the suite of NSF MSP-funded projects? Are some more effective at creating collaborations than others?
- Relationship management. Is there a change among MSP educators with regard to their dealings with institutions of higher education (IHE) faculty as opposed to their interactions with other professionals such as IHE administrators or NSF program officers?
- Funding program legacy. Is there change over time when comparing different cohort years in a particular funded project?

A two-page survey form was developed (see Appendix A) and information collected using it was catalogued into a database. Questions regarding past and present thinking were tabulated. Detailed information collected, by survey question, is presented in Appendix B. Our goal was to gain some preliminary insight regarding the state of and change in collaboration stemming from these relationships fostered by NSF's funding of MSP projects over time.

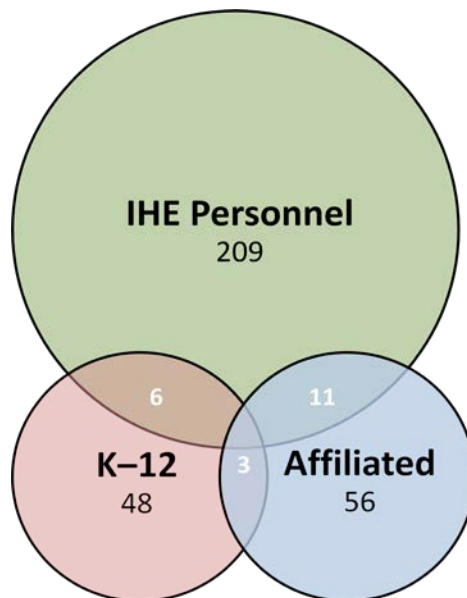
A description of the population is followed by a discussion of the methods used to analyze the data.

Sample Demographics

Figures 1 and 2 present the demographics of the respondent population, based on self-reported data from the survey (questions 4, 5, and 8). Several things should be noted about the information provided in the figures:

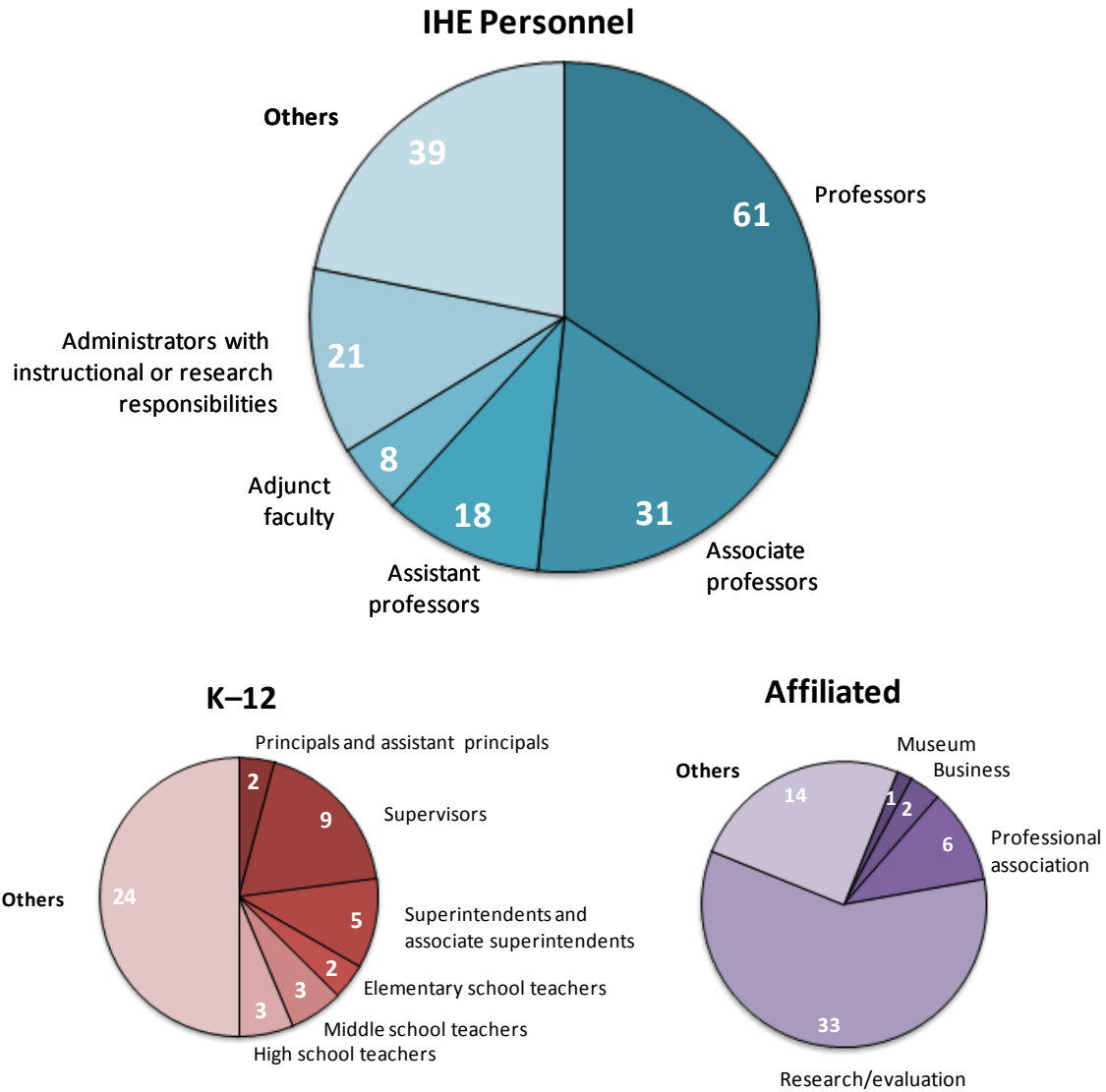
- The largest group of respondents self-classified as being associated with an IHE (n=209).
- Among those who classified themselves as being part of an IHE, 39 classified themselves as “other” and felt they did not fit into the categories of professor, assistant or associate professor, adjunct faculty, or administrator with/without instructional or research responsibility.
- Half of those identifying themselves as being at the K–12 level also identified themselves as “other,” meaning they were not superintendents, principals or assistant principals, supervisors, or teachers.

Figure 1. Demographic profile overview



NOTE: Participants were categorized based upon their responses to questions 4, 5, and 8. Although it appears that the survey was written with the intent that participants only respond to one of these three questions, one participant responded to all three questions and two did not respond to any of them. The figure shows the total counts for responses to the three questions.

Figure 2. Demographic breakdowns



NOTE: This figure further details the specific answers given to questions 4, 5, and 8. It is important to note the considerable number of participants who filled in the **Others** option.

Analytic Methods

Descriptive statistics (Fisher's exact test) are often used on small samples in practical applications. However, the burden of proof regarding the demonstration of change over time remains a thorny one. Descriptive statistics of observed effects (changes in responses rates to questions about types of interactions) may be either a correlation or a cause. Either way, a nonrandom relationship is suggested with regard to policy decisions, e.g., as the life cycle of a funding program (read: cohort) or the tenure of individuals within a program (read: a veteran versus a "newbie," that is, someone who has participated in an MSP for one year or less)². By analyzing the variance in participant responses to certain roles in the MSP community, inferences about human behavior and/or external factors such as funding programs may be made.

Another analytic approach is provided by Social Network Analysis,³ but the method requires unique IDs connected to each other, and what we have are 300+ unique participants connected to 12 roles. While SNA reveals a network map, the map itself is not as informative as performing the Fisher's exact test on the network of reported role relationships. By testing for significance in upward or downward trends among veterans in particular funding programs in a particular funding year (cohort), we are statistically "describing" the density of the network without the need to actually map the network. In this case, a path analysis approach may be considered as a form of secondary analysis and follow-up to the descriptive statistics contained herein.

We began the analytical exercise by categorizing participants into 12 roles, and then analyzed their responses to nine questions over two points in time—"current" and "past" recalled events—as follows.

The 12 participant roles

- STEM faculty within my MSP grant

² This includes individuals who are both new to an older project and involved in a new project.

³ What is SNA? SNA allows researchers to take a "snapshot" of the human network in flux or several snapshots over discrete points in time. By a simple count and weighting schema, links between a sampled set of nodes are revealed and changes in the pattern of connection can be correlated to changes brought about by external factors. A number of metrics have been developed to describe networks within and between organizations. Some key metrics include density, centrality, and number of ties. For example, studies of density changes over time describe whether there is increased cohesion (e.g., quantitatively more and qualitatively stronger ties) that could be hypothesized to indicate greater collegiality, or likewise, decreased cohesion, hypothesized to indicate potential conflict or disengagement. Studies of ties inform who are the persons linking clusters or cliques within the overall system and, depending on the number of ties found, indicate the strength or fragility of those relationships.

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- STEM faculty from other MSP grants
 - Education faculty within my MSP grant
 - Education faculty from other MSP grants
 - District-level administrators within my MSP
 - School-level administrators within my MSP
 - Teachers from within my MSP grant
 - Others within my MSP community
 - Administrators/teachers from districts in other MSPs
 - NSF program officers
 - Individuals outside the MSP community
 - Not involved in this activity

The nine interaction questions

- With whom do (did) you discuss innovative research?
 - With whom do (did) you collaborate on MSP-related research?
 - With whom do (did) you collaborate on articles or presentations?
 - To whom do (did) you go to plan professional development for MSP participants?
 - With whom do (did) you work to revise pedagogy?
 - With whom do (did) you consult regarding making changes to curriculum design?
 - With who do (did) you discuss MSP-related assessment/evaluation issues?
 - With whom do (did) you discuss the roles and responsibilities of a partnership?
 - Which workplace roles posed barriers to you in various aspects of your MSP work?
-
-

There was one data collection point—the actual conference itself. As our analyses continued, we also disaggregated the data, considering type of program and funding cohort. Table 1 describes the respondent sample with regard to these variables.

These nine questions were asked of veterans who have a past and current perspective, as well as participants in newly funded projects (newbies) from whom we can also get a fresh and current perspective. We recognize that some telescoping of past events with the present may occur with the veterans; nevertheless, we believe it was worth the exploratory effort in order to tease apart any variation in collaboration over time.

Table 1. The project/grant classifications

Project/program types	
<u>Start</u> projects are planning grants and represent an opportunity to develop a plan that could become a “target” project.	
<u>Comprehensive</u> and <u>Targeted</u> projects include enhancing curriculum and increasing teacher quality, as well promoting policy change that works in support.	
<u>Institute</u> projects have as their primary aim the creation of a more effective teacher. This includes improving teachers’ content knowledge and pedagogical skills, as well as preparing them to tackle a range of leadership responsibilities in the schools and districts.	
Program/project cohort years	Number of participants
Comprehensive and Targeted Cohort 1: Award numbers that start with 2 (funded in 2002).....	29
Comprehensive and Targeted Cohort 2: Award numbers that start with 3 (funded in 2003).....	31
Comprehensive and Targeted Cohort 3: Award numbers that start with 4 (funded in 2004).....	25
Comprehensive and Targeted Cohort 4: Award numbers that start with 8 (funded in 2008).....	35
Comprehensive and Targeted Cohort 5: Award numbers that start with 9 (funded in 2009).....	0
Institute Cohort 1: Award numbers that start with 3 or 4 (funded in 2003 and 2004)	26
Institute Cohort 2: Award numbers that start with 6 (funded in 2006).....	17
Institute Cohort 3: Award numbers that start with 8 (funded in 2008).....	15
Institute Cohort 4: Award numbers that start with 9 (funded in 2009).....	31
MSP Start, RETA, and Phase II projects are also part of the mix (non-cohort).....	82

RETA = Research, Evaluation and Technical Assistance projects.

The remainder of this report is devoted to a presentation of the findings. It is divided into three sections. In the first section, we present the bigger picture in broad brush strokes regarding how the interaction rates of different funding programs compare and vary over time and what that may imply. In the second section, we pinpoint two areas of potential barriers for participants and discuss those implications. The third section explores and tabulates the many different types of relationships and how they compare to one another within and outside of the MSP.

FINDINGS

Summary

Our discussion of findings is divided into three sections. Additional aggregate-level analyses are presented in Appendix C. High-level conclusions are presented in here, with detailed findings laid out in each designated section.

- **Cultural Shift or Drift.** In examining changes over time with regard to interactions among MSP participants, we discovered significant differences in the Comprehensive and Targeted versus the Institute projects for veteran participants. While in the aggregate there is no significant change in interactions over time for either group, significance was found for certain cohorts. When cohort-level differences were found they indicated an increase in interaction rates for Comprehensive and Targeted MSPs and a decrease for Institute MSPs. When newbie and veteran data were compared, new Institute MSPs appeared to be drawing more interactive participants, while new Comprehensive and Targeted MSPs drew less interactive participants.
- **Areas of Conflict.** In examining groups that pose barriers to MSP operations, we found two significant areas of conflict. First, within the MSP community, administrators present the greatest barrier to collaborative working. Second, outside the MSP, the external community presents the greatest areas of conflict.
- **Who and What Matters.** Examination of current interaction rates for veteran participants indicates substantial interactions across groups, including STEM to Education, and each of these IHE groups to K–12. The highest interaction rates were reported for innovation and research and preparation of articles and presentations between STEM and education faculty. Whereas discussions regarding pedagogy and professional development were the most frequent when relationships between IHE faculty and K–12 teachers were reported.

Cultural Shift or Drift?

This section addresses findings from the first eight of the nine questions presented above, those regarding interactions among participants with regard to various MSP activities. We set out to explore the interaction rates of participants involved in the different MSP funding programs (e.g.,

Comprehensive and Targeted and Institute MSPs⁴.) to see if these interaction rates vary over time, and if they do, what is their significance. We wanted to know if interaction rates increase (suggesting a more densely packed network) or decrease (the unpacking of a network) and why. Variation in interaction rates in either direction may stem from a variety of sources. For example, is there a relationship between change in interaction rates and the overall “success” of a funding program or does it derive from other environmental factors? Is a decline in interaction rates due to the sunsetting of a particular program, a course correction, or even a policy change in the national economy? We may not be able to definitely answer these questions, but we can suggest avenues for future inquiry. We explored change over time in two general ways—comparisons of current data with past data and comparisons of data by cohort over time.

Veterans’ Interaction Rates

We compared veterans’ present interaction rates to what they reported in the past using their past recalled data as the control group. We aggregated across (1) eight questions (excluding the conflict question), (2) all 11 roles, and (3) all cohort years for each of the two main funding sources—Comprehensive and Targeted, and Institute projects. This aggregation is captured in the first and middle rows of Table 2 (in boldface). There is no significance for either Comprehensive and Targeted or Institute MSP projects. Disaggregation by funding year does, however, reveal some significant differences.

- Comprehensive and Targeted breakdown by funding year. We separated participant interaction rates by funding year to see if certain years were unusual. We found that veterans reported a *higher* current interaction rate than past recalled data for veterans that were part of the Comprehensive and Targeted 2002 and 2004 cohorts (p-values shown in italics in Table 2).
- Institute breakdown by funding year. We separated participant interaction rates by funding year to see if certain years were unusual. We found that veterans reported a *lower* current interaction rate than past recalled data for the 2006 and 2009 funding years (p-values shown in italics).

⁴ Data from RETA and START projects are not included in this analysis.

Table 2. Comparison of current and past data for veteran MSP participants

Cohort	Veterans' current data			Veterans' past data (control; p-values)	
	Number of participants	Interaction rate	P-value	Number of participants	Interaction rate
All Comprehensive and Targeted	99	33.3%	0.1749	95	34.3%
Comprehensive and Targeted 1 (2002)	26	31.9	0.0005	24	26.1
Comprehensive and Targeted 2 (2003)	31	30.2	0.1693	31	31.9
Comprehensive and Targeted 3 (2004)	21	37.2	0.0253	21	27.3
Comprehensive and Targeted 4 (2008)	21	35.6	0.9438	19	32.1
All Institute	48	28.5	0.1851	46	27.2
Institute 1 (2003–04)	20	30.4	0.9704	19	26.1
Institute 2 (2006)	16	28.8	0.0192	16	36.4
Institute 3 (2008)	10	27.6	0.3312	10	26.7
Institute 4 (2009)	2	10.8	0.0854	1	37.8

Newbies' Interaction Rates

We compared newbies' present interaction rates to what veterans reported in the past using veteran past recalled data as the control group. We aggregated across (1) eight questions (excluding the conflict question), (2) all 11 roles, and (3) all cohort years for each of the two main funding sources—Comprehensive and Targeted and Institute projects. This aggregation is captured in the first and middle rows of Table 3 (in boldface). There is significance for both Comprehensive and Targeted and Institute projects. This finding is driven by the most recent funding year for each type of project, as the number of newbies in earlier cohorts is too small to justify disaggregation.

Table 3. Comparison of current data for newbie MSP participants with past data for veteran participants

Cohort	Newbies' current data			Veterans 'past data (control; p-values)	
	Number of participants	Interaction rate	P-value	Number of participants	Interaction rate
All Comprehensive and Targeted	21	30.2%	0.0032	95	34.3%
Comprehensive and Targeted 1 (2002)	3	26.1	0.0042	24	36.9
Comprehensive and Targeted 2 (2003)	0	NA	1.0000	31	31.9
Comprehensive and Targeted 3 (2004)	4	27.3	0.0279	21	33.6
Comprehensive and Targeted 4 (2008)	14	32.1	0.0968	19	35.4
All Institute	40	35.2	0.0001	46	27.2
Institute 1 (2003–04)	5	26.1	0.1620	19	30.5
Institute 2 (2006)	1	36.4	0.3104	16	24.8
Institute 3 (2008)	5	26.7	0.6691	10	25.5
Institute 4 (2009)	29	37.7	0.0003	1	19.3

NA = not applicable.

Conclusion

These data are somewhat perplexing. While the differences between Comprehensive and Targeted and Institute are provocative, we do not have a ready explanation for the differences that emerge. We cannot help but wonder whether or not the mixed findings are a result of problems related to faulty recall, sample size, and/or our particular disaggregation strategy. That is, disaggregation by cohort may be masking a deeper significance that exists. And potential confounding factors, such as policy changes, course correction, or historical factors that might be affecting the data have not been taken into account. We look forward to a conversation with NSF program officers as to how they might interpret these data.

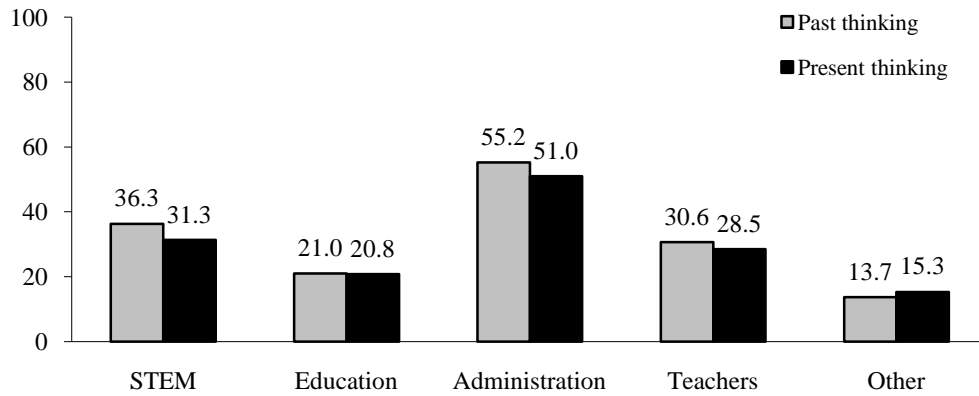
Areas of Conflict

We examined conflicts both within and outside of the MSP and found two different groups posed the greatest conflict in the two environments. Within the MSP administrators were the most frequently cited source of conflict; outside the MSP the external community was the most frequently cited source of conflicts.

Within the MSP

Our findings show that within the MSP, administrators are identified as the most significant barrier to achieve the goals of the MSP program (Figure 3).

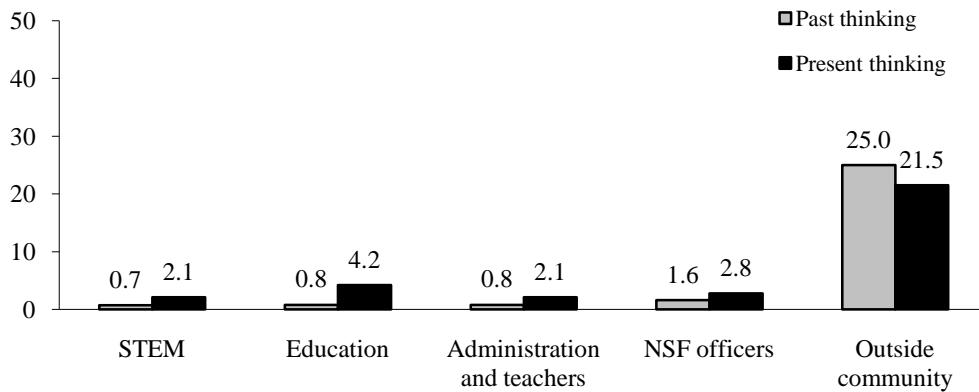
Figure 3. Internal conflict: Scores showing how much participants are met with barriers within their MSP



Outside the MSP

Outside the MSP program, the community poses the greatest barrier to achieving the goals of the MSP (Figure 4).

Figure 4. External conflict: Scores showing how much participants are met with barriers from outside their MSP



Conclusion

There are several ways to interpret the findings regarding internal sources of conflict. Administrators may willingly respond to the increased demands placed on them by the MSP initiative but may do so in a manner familiar to them, that is, they “do more” in terms of traditional hierarchical ways of working. This well-intentioned response may actually produce the unintended consequence of conflict, as hierarchical management may be counterproductive to more collaborative ways of working. Additionally, administrators are not immune to the “selfish gene.” They work in a pressurized environment with increasing demands stemming from local community and school boards. Add to this the increasing demands made by the MSP initiative, and there is competition for the administrator’s attention and valuable time. We conjecture that in some instances, administrators passively retreat from MSP programmatic demands to focus on more transactional, short-term, and selfish goals such as managing their workload, reputation, or status and job security. This conjecture would have to be supported by follow-up interviews.

The findings with regard to external conflict have a slightly different interpretation. With declining student completion rates, the educational profession has been the subject of much debate and the target of a number of government and civic policies. Criticism is at its sharpest at the local community level where everyone knows everyone else and where a lack of success is keenly felt by parents, businesses, teachers, and students. Here, teachers and administrators could use the skill set of a politician in order to solicit support from a disengaged, cynical, or even angry public. The demands of a successful MSP initiative ask not only more of educators, school boards, and parents, but also ask them to work in different, collaborative ways, which have historically been lacking and take more time. With the environment as politicized as it is, one can see why it might be difficult to garner the needed resources, consensus, and commitment from the community.

This situation has policy implications for funding programs that impact established processes or beliefs in education, such as the STEM mission for educational reform. Research supports the notion that innovative initiatives generally require the backdrop of established cultural conventions, thus setting the conditions for conflict and chronic resistance. A pre-assessment of the trusted relationships and connectors as well as points of resistance within IHE and MSP school communities may provide insight into how funding agencies like NSF can more effectively and lastingly shift internal cultural beliefs.

Who and What Matters

This section describes the relationships that existed at the time our data were collected, January 2010, for the veteran group. We use these data to address two questions:

- With whom do the MSP participants interact?
- Around which issues do these interactions take place?

Examination of current interaction rates for veteran participants indicates substantial interactions across groups, including STEM to Education faculty, and each of these IHE groups to K–12. The highest interaction rates were reported for innovation and research and preparation of articles and presentations between STEM and Education faculty. Discussions regarding pedagogy and professional development were the most frequent when relationships between IHE faculty and K–12 teachers were reported.

With Whom do the MSP Participants Interact?

IHE Faculty

IHE STEM faculty report extensive interaction with other STEM faculty in their MSP—with 80.9 percent reporting interacting along one of more of the networks described above. In addition, 66.5 percent of IHE STEM faculty report interacting with IHE Education faculty in their MSP. Interactions with faculty outside of their MSP are more modest, with 17.7 percent reporting interactions with STEM faculty and 13.9 reporting interactions with Education faculty not in their MSP (Table 4).

Table 4. Interactions of IHE STEM faculty with other IHE faculty around MSP-related issues: 2010

Participant type	Percent of STEM faculty interacting with other faculty (n=54)
STEM faculty within MSP	80.9
STEM faculty of other MSPs	17.7
Education faculty within MSP	66.5
Education faculty of other MSPs	13.9

IHE Education faculty report similarly strong patterns of interaction with other faculty in their MSP. Specifically, 83.5 percent report interactions with STEM faculty within their MSPs and 79.5 report interactions with Education faculty in their MSP. Again, interactions with faculty outside their MSP is more modest, with 20.5 percent reporting interaction with STEM faculty outside of their MSP and 23.5 percent reporting interactions with external Education faculty (Table 5).

Table 5. Interactions of IHE Education faculty with other IHE faculty around MSP-related issues: 2010

Participant type	Percent of Education faculty interacting with other faculty (n=25)
STEM faculty within MSP	83.5
STEM faculty of other MSPs	20.5
Education faculty within MSP	79.5
Education faculty of other MSPs	23.5

While reports of interactions with K–12 participants are less extensive, the percentages who do report such interactions are impressive. Nearly half (46.7 percent) of the IHE faculty (STEM and Education combined) report interacting with teachers in their MSP, and 36.2 percent report interactions with administrators in the MSP (Table 6).

Table 6. Interactions of IHE faculty with K–12 participants around MSP-related issues: 2010

Participant type	Percent of IHE faculty interacting with K–12 participants (n=144)
Administrators in MSP.....	36.2
Teachers in MSP.....	46.7
Administrators and teachers in other MSPs.....	5.5

Additionally, 11.8 percent of IHE faculty report interactions with NSF program officers and 27.7 percent report interactions with individuals outside the MSP community (Table 7).

Table 7. Interactions of IHE faculty with NSF program officers and individuals outside of the MSP community around MSP-related issues: 2010

Participant type	Percent of IHE faculty interacting with other individuals (n=144)
NSF program officers.....	11.8
Outside MSP community.....	27.7

K–12 Participants

When the responses of K–12 participants are examined, we see that somewhat more than half of the respondents (57.3 percent) report that they are interacting with STEM and Education faculty in their MSP (Table 8).

Table 8. Interactions of K–12 participants around MSP-related issues: 2010

Participant type	Percent of K–12 participants interacting with various groups (n=25)
STEM and Education in MSP.....	57.3
STEM and Education in other MSPs.....	6.0
NSF program officers.....	3.5
Outside MSP community.....	22.5

Around Which Issues do These Interactions Take Place?

IHE Faculty

Turning now to the data for the various types of interactions we find that research is an important magnet for cross-group interaction within the MSP. For example, 90.7 percent of STEM faculty discuss innovative research with other STEM faculty and 74.1 percent report discussions with Education faculty (Table 9). Among Education faculty, 92.0 percent report such discussion both with STEM and other Education faculty.

Interestingly, we also find that many IHE faculty discuss innovative research with others outside of the IHE environment. Approximately 50 percent of faculty report discussing innovative research with administrators and teachers in their MSP, as well as with others outside the MSP environment.

Table 9. Interactions among MSP IHE faculty with regard to discussing innovative research: 2010

Participant type	Percent of IHE faculty interacting with others ¹
STEM faculty with other STEM faculty within MSP	90.7
STEM faculty with Education faculty within MSP	74.1
Education faculty with STEM faculty within MSP	92.0
Education faculty with other Education faculty within MSP	92.0
IHE faculty with administrators in MSP	44.6
IHE faculty with teachers in MSP	54.7
IHE faculty with NSF program officers	28.8
IHE faculty with the community outside MSP	51.1

¹ Number varies depending on the reference group.

Respondents also reported extensive collaboration with regard to preparing articles or presentations. While it is not surprising that the percentages are highest among IHE faculty, the extent of collaboration is larger than might have been anticipated. Between 72.3 and 89.4 percent of the respondents report engaging in such collaborations (Table 10).

Again, while the percentages are lower for collaborations outside of the IHE context, slightly over a third (35.3 percent) of the IHE respondents report collaborating on a presentation or publication with teachers in their MSP.

Table 10. Interactions among MSP IHE faculty with regard to collaborations on articles or presentations: 2010

Participant type	Percent of IHE faculty interacting with others ¹
STEM faculty with other STEM faculty within MSP	89.4
STEM faculty with Education faculty within MSP	72.3
Education faculty with STEM faculty within MSP	76.0
Education faculty with other Education faculty within MSP	84.0
IHE faculty with administration in MSP	18.0
IHE faculty with teachers in MSP	35.3
IHE faculty with NSF program officers	6.8
IHE faculty with the community outside MSP	23.3

¹ Number varies depending on the reference group.

The responses show that professional development is an area around which broad-based collaboration is reported. STEM faculty are reported to be collaborators by 83.3 percent of STEM faculty respondents and 95.5 percent Education faculty respondents (Table 11). Education faculty are reported to be collaborators by 70.8 percent of the STEM respondents and 81.8 percent of the education respondents. A full 69.7 percent of STEM faculty report collaborating with teachers regarding professional development.

Table 11. Interactions among MSP IHE faculty with regard to professional development: 2010

Participant type	Percent of IHE faculty interacting with others ¹
STEM faculty with other STEM faculty within MSP	83.3
STEM faculty with Education faculty within MSP	70.8
Education faculty with STEM faculty within MSP	95.5
Education faculty with other Education faculty within MSP	81.8
IHE faculty with administrators in MSP	45.9
IHE faculty with teachers in MSP	69.7
IHE faculty with NSF program officers	8.2
IHE faculty with the community outside MSP	27.0

¹ Number varies depending on the reference group.

About three-fourths of STEM faculty report working with other STEM faculty or Education faculty to revise pedagogy (Table 12). A similar percentage of Education faculty report working with STEM faculty. However, 86.4 percent of Education faculty report working with other Education faculty. Interestingly, taken together, 64.1 percent of IHE faculty report working with teachers.

Table 12. Interactions among MSP IHE faculty with regard to revising pedagogy: 2010

Participant type	Percent of IHE faculty interacting with others ¹
STEM faculty with other STEM faculty within MSP	75.5
STEM faculty with Education faculty within MSP	67.3
Education faculty with STEM faculty within MSP	77.3
Education faculty with other Education faculty within MSP	86.4
IHE faculty with administrators in MSP	33.3
IHE faculty with teachers in MSP	64.1
IHE faculty with NSF program officers	1.7
IHE faculty with the community outside MSP	27.4

¹ Number varies depending on the reference group.

As shown in Table 13, 86 percent of STEM faculty report discussing curriculum design with other STEM faculty and 64.0 percent report such discussions with Education faculty. Education faculty responses indicate similar involvement, with 85.7 percent reporting such discussions with STEM faculty and 81.0 percent reporting such discussion with other Education faculty. Over half of the IHE faculty responding (57.6 percent) indicated that they were discussing curriculum design with teachers in their MSP.

Table 13. Interactions among MSP IHE faculty with regard to curriculum design: 2010

Participant type	Percent of IHE faculty interacting with others ¹
STEM faculty with other STEM faculty within MSP	86.0
STEM faculty with Education faculty within MSP	64.0
Education faculty with STEM faculty within MSP	85.7
Education faculty with other Education faculty within MSP	81.0
IHE faculty with administration in MSP	36.9
IHE faculty with teachers in MSP	57.6
IHE faculty with NSF program officers	1.7
IHE faculty with the community outside MSP	28.0

¹ Number varies depending on the reference group.

As shown in Table 14, 73.6 percent of STEM faculty discuss assessment and evaluation with other STEM faculty and 67.9 percent have such discussions with Education faculty. Among Education faculty, 91.7 percent report that they discuss these issues with STEM faculty and 83.3 percent do so with other Education faculty. Discussions with K–12 participants are less frequent, with 31.7 of the IHE faculty reporting they discuss assessment and evaluation with administrators and 26.6 percent doing so with teachers.

Table 14. Interactions among MSP IHE faculty with regard to assessment and evaluation: 2010

Participant type	Percent of IHE faculty interacting with others ¹
STEM faculty with other STEM faculty within MSP	73.6
STEM faculty with Education faculty within MSP	67.9
Education faculty with STEM faculty within MSP	91.7
Education faculty with other Education faculty within MSP	83.3
IHE faculty with administration in MSP.....	31.7
IHE faculty with teachers in MSP	26.6
IHE faculty with NSF program officers	17.3
IHE faculty with the community outside MSP.....	26.6

¹ Number varies depending on the reference group.

A substantial proportion of STEM and Education faculty report discussing the responsibilities of partnership with each other. As shown in Table 15, 85.4 percent of STEM faculty report such discussions with other STEM faculty and 60.4 percent report similar discussion with Education faculty. Responses from Education faculty indicate even larger percentages engaging in such discussions, with 95.8 reporting discussing the role and responsibilities of a partnership with STEM faculty and 79.2 percent doing so with other Education faculty. Nearly half of the IHE faculty report discussing these issues with teachers and administrators in their MSP.

Table 15. Interactions among MSP IHE faculty with regard to roles and responsibilities of a partnership: 2010

Participant type	Percent of IHE faculty interacting with others ¹
STEM faculty with other STEM faculty within MSP	85.4
STEM faculty with Education faculty within MSP	60.4
Education faculty with STEM faculty within MSP	95.8
Education faculty with other Education faculty within MSP	79.2
IHE faculty with administration in MSP.....	46.2
IHE faculty with teachers in MSP	42.7
IHE faculty with NSF program officers	25.2
IHE faculty with the community outside MSP	16.0

¹ Number varies depending on the reference group.

K–12 Participants

The number of respondents at the K–12 level was relatively limited, averaging around 20. Therefore, data at this level are not disaggregated by respondent type. Additionally, because most of the interactions between K–12 participants and others are interactions with IHE faculty, our presentation of data focuses on the broad IHE group.

Table 16 shows that the K–12 participants report discussing a variety of topics with IHE STEM and Education faculty. The areas that received the highest percentages were discussing innovative research and professional development. However, given the limited number of respondents, differences in percentages should be viewed cautiously.

Table 16. Interactions among K–12 and IHE STEM and Education faculty with regard to a variety of topics: 2010.

Participant type	Percent of K–12 participants interacting with IHE STEM and Education faculty ¹
Discussing innovative research.....	72.7
Collaborations on articles or presentations	59.4
Professional development.....	71.1
Revising pedagogy.....	62.5
Curriculum design	50.0
Assessment and evaluation	61.9
Responsibilities of a partnership	68.0

¹ Number varies depending on the reference group.

Conclusion

Examination of current interaction rates for veteran participants indicates substantial interactions across groups, including STEM to Education, and each of these IHE groups to K–12. The highest interaction rates were reported for innovation and research and preparation of articles and presentations between STEM and education faculty. Whereas discussions regarding pedagogy and professional development were the most frequent when relationships between IHE faculty and K–12 teachers were reported. The data show substantial interactions among participants which is aligned with the MSP mission and values. The fact that interactions are frequently reported to occur both among faculty within the IHE environment and across IHE/K–12 boundaries is very important. Even if the data are influenced by the particular sample that attended the Learning Network Conference, the findings should be celebrated.



CONCLUSIONS

As with many studies, our work here raises more questions than it answers. However, it is our belief that the data are valuable in that they make an important contribution to understanding the role of MSP in creating a professional learning community. An unanswered question is how representative our findings are of the MSP community and, furthermore, what might be needed to establish an important translational norm of collaboration across institutional and disciplinary boundaries throughout all of education on a national level.

Equally important, this work provides evidence of the utility of Social Network Analysis as both a methodology and a tool for research and evaluation. We continue to believe that establishing more widespread adoption of SNA should be encouraged. This is especially important as NSF and other funding agencies are supporting work that involves partnership and collaborations. Both the strengths and the weaknesses of SNA need to be more fully understood.



Appendix A. Survey

SURVEY OF THE MSP LEARNING COMMUNITY



IDENTIFICATION INFORMATION

MSP Project Name: _____

NSF Award No. (see badge) _____

DEMOGRAPHIC PROFILE INFORMATION

1 How many years have you been involved with the project?

- 0 to 1 years
 2 to 3 years
 More than 3 years

2 Have you been involved with any other MSP project?

Yes No ...if Yes, then which project? _____

3 Are you a PI or co-PI?

Yes No

4 If you are from an IHE, please indicate your primary position (A) and your tenure status (B)
(If you work at a school district, skip to Question 5; if you are not at an IHE or a school district, skip to Question 7)

A. Position (Please select one)

- | | |
|--|--|
| <input type="checkbox"/> Professor | <input type="checkbox"/> Adjunct Faculty, Lecturer, Instructor |
| <input type="checkbox"/> Associate Professor | <input type="checkbox"/> Administrator with instructional and/or research responsibilities |
| <input type="checkbox"/> Assistant Professor | <input type="checkbox"/> Administrator with no instructional or research responsibilities |

Other (please specify) _____

B. Tenure Status (Please select one)

- Tenured
 On tenure track, but not tenured
 Not on tenure track

(Skip to Question 6)

5 If you work in a school district, please indicate your position (Please select one)

- | | |
|---|--|
| <input type="checkbox"/> Principal or Assistant Principal | <input type="checkbox"/> Elementary School Teacher |
| <input type="checkbox"/> Supervisor | <input type="checkbox"/> Middle School Teacher |
| <input type="checkbox"/> Superintendent or Associate Superintendent | <input type="checkbox"/> High School Teacher |

Other (please specify) _____

6 What discipline do you teach? (Please select the SINGLE option that best applies)

- Science Education (IHE faculty only)
 Mathematics Engineering

Other (please specify) _____

7 If you work in another type of organization, please fill in your position:

8 If you are not at an IHE or K-12 school system, please indicate your affiliation

- Museum Professional Association
 Business Research / Evaluation
 Other (please specify) _____

9 Network Questions

The rest of this survey asks you some questions about your network of colleagues and how you interact with them. Listed in the tables below are a range of different types of colleagues with whom you might engage. For each of the questions (A-I) below, please put a check in the box beside the individuals with whom you interact in *substantial* ways.

	WORKPLACE ROLES											
	STEM faculty within my MSP	STEM faculty from other MSPs	Education faculty within my MSP	Education faculty from other MSPs	District level Administrators within my MSP	School level Administrators within my MSP	Teachers from within my MSP	Others in my MSP community	Admins / Teachers from districts in other MSPs	NSF Program Officers	Individuals outside the MSP community	Not involved in this activity
A. With whom do you discuss innovative research?												
B. With whom do you collaborate on MSP-related research?												
C. With whom do you collaborate on articles or presentations?												
D. To whom do you go to plan professional development for MSP participants?												
E. With whom do you work to revise pedagogy?												
F. With whom do you consult regarding making changes to curriculum design?												
G. With whom do you discuss MSP-related assessment/evaluation issues?												
H. With whom do you discuss the roles and responsibilities of a partnership?												
I. Which workplace roles pose barriers to you in various aspects of your MSP work?												

This first set of questions asks about your current interactions

	WORKPLACE ROLES											
	STEM faculty within my MSP	STEM faculty from other MSPs	Education faculty within my MSP	Education faculty from other MSPs	District level Administrators within my MSP	School level Administrators within my MSP	Teachers from within my MSP	Others in my MSP community	Admins / Teachers from districts in other MSPs	NSF Program Officers	Individuals outside the MSP community	Not involved in this activity
A. With whom did you discuss innovative research?												
B. With whom did you collaborate on MSP-related research?												
C. With whom did you collaborate on articles or presentations?												
D. To whom did you go to plan professional development for MSP participants?												
E. With whom did you work to revise pedagogy?												
F. With whom did you consult regarding making changes to curriculum design?												
G. With whom did you discuss MSP-related assessment/evaluation issues?												
H. With whom did you discuss the roles and responsibilities of a partnership?												
I. Which workplace roles posed barriers to you in various aspects of your MSP work?												

For projects in their second year and thereafter, this second set of questions asks about your past interactions

Thank you for completing the survey

Appendix B. Correlations and Significance

Appendix B tabulates response rates for given populations of interest for given workplace roles, with nonparticipants being excluded. Veterans' past data percent is a measure of how many veteran participants marked a specific checkbox regarding the past interactions part of question 9. There were two different population segments in question: newbies' current responses and veterans' current responses (newbies' are persons who marked 0–1 years experience on their survey, and veterans are all other participants). Veterans' past data was used as the control for both of these segments.



All Networks: An Aggregation

Present vs. Past: IHE Participants

Table B-1. To what extent do IHE STEM faculty interact, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=54)	Veterans' past data ² (n=48)	p-value
STEM faculty within MSP.....	80.9%	80.5%	0.9289
STEM faculty of other MSPs.....	17.7	16.1	0.7122
Education faculty within MSP.....	66.5	62.0	0.1862
Education faculty of other MSPs.....	13.9	14.6	0.8403

¹Population of interest: Veteran IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-2. To what extent do IHE Education faculty interact, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=25)	Veterans' past data ² (n=24)	p-value
STEM faculty within MSP.....	83.5%	82.8%	0.8931
STEM faculty of other MSPs.....	20.5	22.4	0.7122
Education faculty within MSP.....	79.5	80.7	0.8009
Education faculty of other MSPs.....	23.5	19.3	0.3266

¹Population of interest: Veteran IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-3. To what extent do IHE participants interact outside their IHE circles, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=144)	Veterans' past data ² (n=136)	p-value
Administrators in MSP.....	36.2%	33.9%	0.0971
Teachers in MSP.....	46.7	44.3	0.2698
Administrators and teachers other MSPs.....	5.5	5.0	0.6352
NSF program officers.....	11.8	10.0	0.1981
Outside MSP community.....	27.7	25.4	0.2315

¹Population of interest: All IHE veterans' current data.

²Control population: All IHE veterans' past data.

Present vs. Past: K–12 Participants

Table B-4. To what extent do K–12 teachers interact, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=5)	Veterans' past data ² (n=5)	p-value
STEM and Education in MSP.....	33.8%	31.3%	0.8661
STEM and Education other MSPs	0.0	3.8	0.2453
Teachers in MSP	52.5	50.0	1.0000

¹Population of interest: Veteran K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-5. To what extent do K–12 administrators interact, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=9)	Veterans' past data ² (n=8)	p-value
STEM and Education in MSP.....	54.2%	71.9%	0.0027
STEM and Education other MSPs	4.9	9.4	0.1600
Teachers in MSP	44.4	46.1	0.8080

¹Population of interest: Veteran K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-6. To what extent do K–12 administrators and teachers interact with other MSPs, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=14)	Veterans' past data ² (n=13)	p-value
Administrators and teachers other MSPs.....	7.1%	5.8%	0.7856

¹Population of interest: Veteran K–12 administrators and teachers' current data.

²Control population: Veteran K–12 administrators and teachers' past data.

Table B-7. To what extent do K–12 participants interact, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=25)	Veterans' past data ² (n=23)	p-value
STEM and Education in MSP.....	57.3%	64.9%	0.0319
STEM and Education other MSPs	6.0	10.1	0.0448
NSF program officers.....	3.5	6.5	0.2388
Outside MSP community	22.5	27.2	0.3437

¹Population of interest: All veteran K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Newbies' vs. Past: IHE Participants

Table B-8. To what extent do IHE STEM faculty interact, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=26)	Veterans' past data ² (n=48)	p-value
STEM faculty in MSP	73.6%	80.5%	0.0643
STEM faculty other MSPs.....	14.4	16.1	0.6386
Education faculty in MSP	57.9	62.0	0.3393
Education faculty other MSPs.....	6.0	14.6	0.0013

¹Population of interest: Newbie IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-9. To what extent do IHE Education faculty interact, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=10)	Veterans' past data ² (n=24)	p-value
STEM faculty in MSP	75.0%	82.8%	0.1782
STEM faculty other MSPs.....	5.0	22.4	0.0003
Education faculty in MSP	56.3	80.7	0.0001
Education faculty other MSPs.....	11.3	19.3	0.1144

¹Population of interest: Newbie IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-10. To what extent do IHE participants interact outside their IHE circles, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=62)	Veterans' past data ² (n=136)	p-value
Administrators in MSP	32.8%	33.9%	0.5724
Teachers in MSP	34.1	44.3	0.0001
Administrators and teachers other MSPs.....	6.3	5.0	0.2833
NSF program officers.....	5.4	10.0	0.0019
Outside MSP community	29.4	25.4	0.0999

¹Population of interest: All IHE newbies' current data.

²Control population: All IHE veterans' past data.

Newbies' vs. Past: K–12 Participants

Table B-11. To what extent do K–12 teachers interact, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=3)	Veterans' past data ² (n=5)	p-value
STEM and Education in MSP.....	33.3%	31.3%	0.8463
STEM and Education other MSPs	0.0	3.8	0.2913
Teachers in MSP	12.5	50.0	0.0030

¹Population of interest: Newbie K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-12. To what extent do K–12 administrators interact, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=9)	Veterans' past data ² (n=8)	p-value
STEM and Education in MSP.....	40.9%	71.9%	0.0001
STEM and Education other MSPs	3.4	9.4	0.0463
Administrators in MSP	39.2	46.1	0.2413

¹Population of interest: Newbie K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-13. To what extent do K–12 administrators and teachers interact with other MSPs, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=12)	Veterans' past data ² (n=13)	p-value
Administrators and teachers other MSPs.....	4.5%	5.8%	0.7618

¹Population of interest: Newbie K–12 administrators and teachers' current data.

²Control population: Veteran K–12 administrators and teachers' past data.

Table B-14. To what extent do K–12 participants interact, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=21)	Veterans' past data ² (n=23)	p-value
STEM and Education in MSP.....	41.8%	64.9%	0.0001
STEM and Education other MSPs	2.4	10.1	0.0001
NSF program officers.....	2.7	6.5	0.1341
Outside MSP community	19.0	27.2	0.0830

¹Population of interest: All newbie K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Network A: Innovative Research

Present vs. Past: IHE Participants

Table B-15. To what extent do IHE STEM faculty discuss innovative research, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=54)	Veterans' past data ² (n=48)	p-value
STEM faculty within MSP	90.7%	89.6%	0.5521
STEM faculty of other MSPs	35.2	33.3	0.5054
Education faculty within MSP	74.1	68.8	0.3534
Education faculty of other MSPs	22.2	22.9	0.5599

¹Population of interest: Veteran IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-16. To what extent do IHE Education faculty discuss innovative research, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=25)	Veterans' past data ² (n=23)	p-value
STEM faculty within MSP	92.0%	91.3%	0.6631
STEM faculty of other MSPs	28.0	30.4	0.5517
Education faculty within MSP	92.0	91.3	0.6631
Education faculty of other MSPs	36.0	34.8	0.5850

¹Population of interest: Veteran IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-17. To what extent do IHE participants discuss innovative research outside their IHE circles, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=139)	Veterans' past data ² (n=129)	p-value
Administrators in MSP	44.6%	40.7%	0.2788
Teachers in MSP	54.7	46.5	0.1124
Administrators and teachers other MSPs	8.6	9.3	0.5080
NSF program officers	28.8	26.4	0.3801
Outside MSP community	51.1	45.0	0.1897

¹Population of interest: All IHE veterans' current data.

²Control population: All IHE veterans' past data.

Present vs. Past: K–12 Participants

Table B-18. To what extent do K–12 teachers discuss innovative research, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=4)	Veterans' past data ² (n=5)	p-value
STEM and Education in MSP.....	37.5%	50.0%	0.6429
STEM and Education other MSPs	0.0	0.0	1.0000
Teachers in MSP	75.0	40.0	0.3571

¹Population of interest: Veteran K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-19. To what extent do K–12 administrators discuss innovative research, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=7)	Veterans' past data ² (n=7)	p-value
STEM and Education in MSP.....	71.4%	100.0%	0.2308
STEM and Education other MSPs	0.0	21.4	0.5000
Administrators in MSP	71.4	85.7	0.5000

¹Population of interest: Veteran K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-20. To what extent do K–12 administrators and teachers discuss innovative research with other MSPs, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=11)	Veterans' past data ² (n=12)	p-value
Administrators and teachers other MSPs.....	9.1%	8.3%	0.7391

¹Population of interest: Veteran K–12 administrators and teachers' current data.

²Control population: Veteran K–12 administrators and teachers' past data.

Table B-21. To what extent do K–12 participants discuss innovative research, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=22)	Veterans' past data ² (n=22)	p-value
STEM and Education in MSP.....	72.7%	81.8%	0.3603
STEM and Education other MSPs	15.9	22.7	0.6510
NSF program officers.....	4.5	13.6	0.3035
Outside MSP community	50.0	45.5	0.5000

¹Population of interest: All veteran K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Newbies' vs. Past: IHE Participants

Table B-22. To what extent do IHE STEM faculty discuss innovative research, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=26)	Veterans' past data ² (n=48)	p-value
STEM faculty in MSP	84.6%	89.6%	0.3909
STEM faculty other MSPs.....	26.9	33.3	0.3837
Education faculty in MSP	73.1	68.8	0.4557
Education faculty other MSPs.....	19.2	22.9	0.4783

¹Population of interest: Newbie IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-23. To what extent do IHE Education faculty discuss innovative research, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=10)	Veterans' past data ² (n=23)	p-value
STEM faculty in MSP	80.0%	91.3%	0.3508
STEM faculty other MSPs.....	10.0	30.4	0.2119
Education faculty in MSP	40.0	91.3	0.0040
Education faculty other MSPs.....	20.0	34.8	0.3390

¹Population of interest: Newbie IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-24. To what extent do IHE participants discuss innovative research outside their IHE circles, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=62)	Veterans' past data ² (n=129)	p-value
Administrators in MSP	37.1%	40.7%	0.3960
Teachers in MSP	43.5	46.5	0.4098
Administrators and teachers other MSPs.....	9.7	9.3	0.5618
NSF program officers.....	14.5	26.4	0.0469
Outside MSP community	46.8	45.0	0.4673

¹Population of interest: All IHE newbies' current data.

²Control population: All IHE veterans' past data.

Newbies' vs. Past: K–12 Participants

Table B-25. To what extent do K–12 teachers discuss innovative research, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=3)	Veterans' past data ² (n=5)	p-value
STEM and Education in MSP.....	66.7%	50.0%	0.5000
STEM and Education other MSPs	0.0	0.0	1.0000
Teachers in MSP	33.3	40.0	0.7143

¹Population of interest: Newbie K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-27. To what extent do K–12 administrators discuss innovative research, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=9)	Veterans' past data ² (n=7)	p-value
STEM and Education in MSP.....	55.6%	100.0%	0.0692
STEM and Education other MSPs	5.6	21.4	0.7000
Administrators in MSP	61.1	85.7	0.6346

¹Population of interest: Newbie K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-28. To what extent do K–12 administrators and teachers discuss innovative research with other MSPs, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=12)	Veterans' past data ² (n=12)	p-value
Administrators and teachers other MSPs.....	8.3%	8.3%	0.7609

¹Population of interest: Newbie K–12 administrators and teachers' current data.

²Control population: Veteran K–12 administrators and teachers' past data.

Table B-29. To what extent do K–12 participants discuss innovative research, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=21)	Veterans' past data ² (n=22)	p-value
STEM and Education in MSP.....	54.8%	81.8%	0.1395
STEM and Education other MSPs	0.0	22.7	0.0274
NSF program officers.....	4.8	13.6	0.3213
Outside MSP community	42.9	45.5	0.5540

¹Population of interest: All newbie K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Network B: MSP-Related Research

Present vs. Past: IHE Participants

Table B-30. To what extent do IHE STEM faculty discuss MSP-related research, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=50)	Veterans' past data ² (n=45)	p-value
STEM faculty in MSP	90.0%	93.3%	0.4182
STEM faculty other MSPs	20.0	15.6	0.3850
Education faculty in MSP	80.0	68.9	0.1568
Education faculty other MSPs	16.0	17.8	0.5159

¹Population of interest: Veteran IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-31. To what extent do IHE Education faculty discuss MSP-related research, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=25)	Veterans' past data ² (n=24)	p-value
STEM faculty in MSP	92.0%	87.5%	0.4800
STEM faculty other MSPs	28.0	25.0	0.5345
Education faculty in MSP	80.0	83.3	0.5275
Education faculty other MSPs	32.0	25.0	0.4113

¹Population of interest: Veteran IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-32. To what extent do IHE participants discuss MSP-related research outside their IHE circles, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=137)	Veterans' past data ² (n=128)	p-value
Administrators in MSP	32.8%	26.2%	0.1300
Teachers in MSP	53.3	44.5	0.0965
Administrators and teachers other MSPs	3.6	3.9	0.5823
NSF program officers	10.2	7.8	0.3209
Outside MSP community	27.7	25.0	0.3576

¹Population of interest: Veteran IHE veterans faculty's current data.

²Control population: Veteran IHE veterans faculty's past data.

Present vs. Past: K–12 Participants

Table B-33. To what extent do K–12 teachers discuss MSP-related research, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=4)	Veterans' past data ² (n=4)	p-value
STEM and Education in MSP.....	37.5%	37.5%	0.5000
STEM and Education other MSPs	0.0	0.0	1.0000
Teachers in MSP	75.0	100.0	0.5000

¹Population of interest: Veteran K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-34. To what extent do K–12 administrators discuss MSP-related research, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=9)	Veterans' past data ² (n=8)	p-value
STEM and Education in MSP.....	66.7%	75.0%	0.5633
STEM and Education other MSPs	11.1	18.8	0.7353
Administrators in MSP	50.0	50.0	0.3992

¹Population of interest: Veteran K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-35. To what extent do K–12 administrators and teachers discuss MSP-related research with other MSPs, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=13)	Veterans' past data ² (n=12)	p-value
Administrators and teachers other MSPs.....	15.4%	8.3%	0.5313

¹Population of interest: Veteran K–12 administrators and teachers' current data.

²Control population: Veteran K–12 administrators and teachers' past data.

Table B-36. To what extent do K–12 participants discuss MSP-related research, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=24)	Veterans' past data ² (n=22)	p-value
STEM and Education in MSP.....	70.8%	77.3%	0.4374
STEM and Education other MSPs	8.3	13.6	0.4574
NSF program officers.....	4.2	9.1	0.4667
Outside MSP community	12.5	27.3	0.1872

¹Population of interest: All veteran K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Newbies' vs. Past: IHE Participants

Table B-37. To what extent do IHE STEM faculty discuss MSP-related research, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=25)	Veterans' past data ² (n=45)	p-value
STEM faculty in MSP	88.0%	93.3%	0.3640
STEM faculty other MSPs	12.0	15.6	0.4900
Education faculty in MSP	68.0	68.9	0.5722
Education faculty other MSPs	4.0	17.8	0.0965

¹Population of interest: Newbie IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-38. To what extent do IHE Education faculty discuss MSP-related research, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=10)	Veterans' past data ² (n=24)	p-value
STEM faculty in MSP	70.0%	87.5%	0.2283
STEM faculty other MSPs	0.0	25.0	0.1001
Education faculty in MSP	50.0	83.3	0.0598
Education faculty other MSPs	10.0	25.0	0.3145

¹Population of interest: Newbie IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-39. To what extent do IHE participants discuss MSP-related research outside their IHE circles, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=59)	Veterans' past data ² (n=128)	p-value
Administrators in MSP	35.6%	26.2%	0.1153
Teachers in MSP	35.6	44.5	0.1605
Administrators and teachers other MSPs	8.5	3.9	0.1721
NSF program officers	5.1	7.8	0.3669
Outside MSP community	27.1	25.0	0.4449

¹Population of interest: All IHE newbies' current data.

²Control population: All IHE veterans' past data.

Newbies' vs. Past: K–12 Participants

Table B-40. To what extent do K–12 teachers discuss MSP-related research, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=2)	Veterans' past data ² (n=4)	p-value
STEM and Education in MSP.....	100.0%	37.5%	0.2000
STEM and Education other MSPs	0.0	0.0	1.0000
Teachers in MSP	50.0	100.0	0.3333

¹Population of interest: Newbie K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-41. To what extent do K–12 administrators discuss MSP-related research, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=8)	Veterans' past data ² (n=8)	p-value
STEM and Education in MSP.....	56.3%	75.0%	0.6958
STEM and Education other MSPs	0.0	18.8	0.5000
Administrators in MSP	37.5	50.0	0.5000

¹Population of interest: Newbie K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-42. To what extent do K–12 administrators and teachers discuss MSP-related research with other MSPs, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=10)	Veterans' past data ² (n=12)	p-value
Administrators and teachers other MSPs.....	0.0%	8.3%	0.5455

¹Population of interest: Newbie K–12 administrators and teachers' current data.

²Control population: Veteran K–12 administrators and teachers' past data.

Table B-43. To what extent do K–12 participants discuss MSP-related research, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=19)	Veterans' past data ² (n=22)	p-value
STEM and Education in MSP.....	60.5%	77.3%	0.3738
STEM and Education other MSPs	0.0	13.6	0.1445
NSF program officers.....	10.5	9.1	0.6388
Outside MSP community	15.8	27.3	0.3084

¹Population of interest: All newbie K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Network C: Collaboration on Articles and Presentations

Present vs. Past: IHE Participants

Table B-44. To what extent do IHE STEM faculty collaborate on articles or presentations, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=47)	Veterans' past data ² (n=44)	p-value
STEM faculty in MSP	89.4%	79.5%	0.1572
STEM faculty other MSPs.....	14.9	13.6	0.5518
Education faculty in MSP	72.3	61.4	0.1868
Education faculty other MSPs.....	14.9	13.6	0.5518

¹Population of interest: Veteran IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-45. To what extent do IHE Education faculty collaborate on articles or presentations, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=25)	Veterans' past data ² (n=23)	p-value
STEM faculty in MSP	76.0%	78.3%	0.5633
STEM faculty other MSPs.....	16.0	21.7	0.4439
Education faculty in MSP	84.0	82.6	0.5997
Education faculty other MSPs.....	24.0	17.4	0.4194

¹Population of interest: Veteran IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-46. To what extent do IHE participants collaborate on articles or presentations outside their IHE circles, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=133)	Veterans' past data ² (n=122)	p-value
Administrators in MSP	18.0%	15.2%	0.2956
Teachers in MSP	35.3	35.2	0.5463
Administrators and teachers other MSPs.....	3.0	4.1	0.4462
NSF program officers.....	6.8	5.7	0.4696
Outside MSP community	23.3	21.3	0.4088

¹Population of interest: Veteran IHE veterans' faculty's current data.

²Control population: Veteran IHE veterans' faculty's past data.

Present vs. Past: K–12 Participants

Table B-47. To what extent do K–12 teachers collaborate on articles or presentations, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=4)	Veterans' past data ² (n=3)	p-value
STEM and Education in MSP.....	62.5%	50.0%	0.3714
STEM and Education other MSPs	0.0	0.0	1.0000
Teachers in MSP	75.0	100.0	0.5714

¹Population of interest: Veteran K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-48. To what extent do K–12 administrators collaborate on articles or presentations, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=5)	Veterans' past data ² (n=6)	p-value
STEM and Education in MSP.....	40.0%	58.3%	0.6082
STEM and Education other MSPs	0.0	0.0	1.0000
Administrators in MSP	70.0	58.3	0.3485

¹Population of interest: Veteran K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-49. To what extent do K–12 administrators and teachers collaborate on articles or presentations with other MSPs, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=9)	Veterans' past data ² (n=9)	p-value
Administrators and teachers other MSPs.....	15.4%	0.0%	1.0000

¹Population of interest: Veteran K–12 administrators and teachers' current data.

²Control population: Veteran K–12 administrators and teachers' past data.

Table B-50. To what extent do K–12 participants collaborate on articles or presentations, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=16)	Veterans' past data ² (n=16)	p-value
STEM and Education in MSP.....	59.4%	62.5%	0.5000
STEM and Education other MSPs	0.0	0.0	1.0000
NSF program officers.....	6.3	6.3	0.7581
Outside MSP community	18.8	31.3	0.3425

¹Population of interest: All veteran K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Newbies' vs. Past: IHE Participants

Table B-51. To what extent do IHE STEM faculty collaborate on articles or presentations, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=24)	Veterans' past data ² (n=44)	p-value
STEM faculty in MSP	70.8%	79.5%	0.3013
STEM faculty other MSPs	4.2	13.6	0.2143
Education faculty in MSP	45.8	61.4	0.1643
Education faculty other MSPs	0.0	13.6	0.0645

¹Population of interest: Newbie IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-52. To what extent do IHE Education faculty collaborate on articles or presentations, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=10)	Veterans' past data ² (n=23)	p-value
STEM faculty in MSP	60.0%	78.3%	0.2515
STEM faculty other MSPs	0.0	21.7	0.1418
Education faculty in MSP	50.0	82.6	0.0683
Education faculty other MSPs	10.0	17.4	0.5149

¹Population of interest: Newbie IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-53. To what extent do IHE participants collaborate on articles or presentations outside their IHE circles, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=56)	Veterans' past data ² (n=122)	p-value
Administrators in MSP	21.4%	15.2%	0.1860
Teachers in MSP	32.1	35.2	0.4097
Administrators and teachers other MSPs	3.6	4.1	0.6145
NSF program officers	1.8	5.7	0.2212
Outside MSP community	42.9	21.3	0.0030

¹Population of interest: All IHE newbies' current data.

²Control population: All IHE veterans' past data.

Newbies' vs. Past: K–12 Participants

Table B-54. To what extent do K–12 teachers collaborate on articles or presentations, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=2)	Veterans' past data ² (n=3)	p-value
STEM and Education in MSP.....	75.0%	50.0%	0.3000
STEM and Education other MSPs	0.0	0.0	1.0000
Teachers in MSP	0.0	100.0	0.1000

¹Population of interest: Newbie K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-55. To what extent do K–12 administrators collaborate on articles or presentations, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=7)	Veterans' past data ² (n=6)	p-value
STEM and Education in MSP.....	50.0%	58.3%	0.6166
STEM and Education other MSPs	7.1	0.0	0.0000
Administrators in MSP	28.6	58.3	0.4126

¹Population of interest: Newbie K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-56. To what extent do K–12 administrators and teachers collaborate on articles or presentations with other MSPs, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=9)	Veterans' past data ² (n=9)	p-value
Administrators and teachers other MSPs.....	0.0%	0.0%	1.0000

¹Population of interest: Newbie K–12 administrators and teachers' current data.

²Control population: Veteran K–12 administrators and teachers' past data.

Table B-57. To what extent do K–12 participants collaborate on articles or presentations, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=18)	Veterans' past data ² (n=16)	p-value
STEM and Education in MSP.....	50.0%	62.5%	0.3502
STEM and Education other MSPs	5.6	0.0	0.5294
NSF program officers.....	11.1	6.3	0.5455
Outside MSP community	22.2	31.3	0.4174

¹Population of interest: All newbie K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Network D: Planning for Professional Development for MSP Participants

Present vs. Past: IHE Participants

Table B-58. To what extent do IHE STEM faculty plan professional development, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=48)	Veterans' past data ² (n=45)	p-value
STEM faculty in MSP	83.3%	82.2%	0.5519
STEM faculty other MSPs.....	16.7	15.6	0.5549
Education faculty in MSP	70.8	66.7	0.4168
Education faculty other MSPs.....	16.7	17.8	0.5519

¹Population of interest: Veteran IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-59. To what extent do IHE Education faculty plan professional development, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=22)	Veterans' past data ² (n=21)	p-value
STEM faculty in MSP	95.5%	95.2%	0.7442
STEM faculty other MSPs.....	18.2	19.0	0.6235
Education faculty in MSP	81.8	90.5	0.3549
Education faculty other MSPs.....	18.2	19.0	0.6235

¹Population of interest: Veteran IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-60. To what extent do IHE participants plan professional development outside their IHE circles, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=122)	Veterans' past data ² (n=116)	p-value
Administrators in MSP	45.9%	44.4%	0.4327
Teachers in MSP	69.7	61.2	0.1080
Administrators and teachers other MSPs.....	9.0	4.3	0.1165
NSF program officers.....	8.2	6.0	0.3473
Outside MSP community	27.0	23.3	0.3015

¹Population of interest: All IHE veterans' current data.

²Control population: All IHE veterans' past data.

Present vs. Past: K–12 Participants

Table B-61. To what extent do K–12 teachers plan professional development, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=2)	Veterans' past data ² (n=1)	p-value
STEM and Education in MSP.....	25.0%	50.0%	0.6667
STEM and Education other MSPs	0.0	0.0	1.0000
Teachers in MSP	50.0	0.0	0.6667

¹Population of interest: Veteran K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-62. To what extent do K–12 administrators plan professional development, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=8)	Veterans' past data ² (n=7)	p-value
STEM and Education in MSP.....	75.0%	85.7%	0.5538
STEM and Education other MSPs	0.0	0.0	1.0000
Administrators in MSP	31.3	14.3	0.1231

¹Population of interest: Veteran K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-63. To what extent do K–12 administrators and teachers plan professional development with other MSPs, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=10)	Veterans' past data ² (n=8)	p-value
Administrators and teachers other MSPs.....	0.0%	0.0%	1.0000

¹Population of interest: Veteran K–12 administrators and teachers' current data.

²Control population: Veteran K–12 administrators and teachers' past data.

Table B-64. To what extent do K–12 participants plan professional development, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=19)	Veterans' past data ² (n=16)	p-value
STEM and Education in MSP.....	71.1%	84.4%	0.4525
STEM and Education other MSPs	10.5	15.6	0.6299
NSF program officers.....	5.3	6.3	0.7126
Outside MSP community	26.3	31.3	0.5193

¹Population of interest: All veteran K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Newbies' vs. Past: IHE Participants

Table B-65. To what extent do IHE STEM faculty plan professional development, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=23)	Veterans' past data ² (n=45)	p-value
STEM faculty in MSP	87.0%	82.2%	0.4497
STEM faculty other MSPs.....	17.4	15.6	0.5503
Education faculty in MSP	60.9	66.7	0.4157
Education faculty other MSPs.....	8.7	17.8	0.2686

¹Population of interest: Newbie IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-66. To what extent do IHE Education faculty plan professional development, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=9)	Veterans' past data ² (n=21)	p-value
STEM faculty in MSP	88.9%	95.2%	0.5172
STEM faculty other MSPs.....	0.0	19.0	0.2184
Education faculty in MSP	55.6	90.5	0.0492
Education faculty other MSPs.....	11.1	19.0	0.5208

¹Population of interest: Newbie IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-67. To what extent do IHE participants plan professional development outside their IHE circles, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=55)	Veterans' past data ² (n=116)	p-value
Administrators in MSP	48.2%	44.4%	0.3209
Teachers in MSP	49.1	61.2	0.0919
Administrators and teachers other MSPs.....	9.1	4.3	0.1833
NSF program officers.....	5.5	6.0	0.5921
Outside MSP community	29.1	23.3	0.2623

¹Population of interest: All IHE newbies' current data.

²Control population: All IHE veterans' past data.

Newbies' vs. Past: K–12 Participants

Table B-68. To what extent do K–12 teachers plan professional development, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=1)	Veterans' past data ² (n=1)	p-value
STEM and Education in MSP.....	50.0%	50.0%	0.5000
STEM and Education other MSPs	0.0	0.0	1.0000
Teachers in MSP	0.0	0.0	1.0000

¹Population of interest: Newbie K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-69. To what extent do K–12 administrators plan professional development, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=7)	Veterans' past data ² (n=7)	p-value
STEM and Education in MSP.....	71.4%	85.7%	0.5000
STEM and Education other MSPs	7.1	0.0	0.0000
Administrators in MSP	35.7	14.3	0.0962

¹Population of interest: Newbie K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-70. To what extent do K–12 administrators and teachers plan professional development with other MSPs, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=8)	Veterans' past data ² (n=8)	p-value
Administrators and teachers other MSPs.....	12.5%	0.0%	0.5000

¹Population of interest: Newbie K–12 participants' current data.

²Control population: Veteran K–12 participants' current data.

Table B-71. To what extent do K–12 participants plan professional development, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=17)	Veterans' past data ² (n=16)	p-value
STEM and Education in MSP.....	58.8%	84.4%	0.1536
STEM and Education other MSPs	0.0	15.6	0.2273
NSF program officers.....	0.0	6.3	0.4848
Outside MSP community	23.5	31.3	0.4571

¹Population of interest: All newbie K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Network E: Pedagogy

Present vs. Past: IHE Participants

Table B-72. To what extent do IHE STEM faculty work to revise pedagogy, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=49)	Veterans' past data ² (n=44)	p-value
STEM faculty in MSP	75.5%	72.7%	0.4718
STEM faculty other MSPs.....	8.2	9.1	0.5806
Education faculty in MSP	67.3	65.9	0.5287
Education faculty other MSPs.....	8.2	9.1	0.5806

¹Population of interest: Veteran IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-73. To what extent do IHE Education faculty work to revise pedagogy, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=22)	Veterans' past data ² (n=22)	p-value
STEM faculty in MSP	77.3%	77.3%	0.6397
STEM faculty other MSPs.....	13.6	18.2	0.5000
Education faculty in MSP	86.4	81.8	0.5000
Education faculty other MSPs.....	13.6	9.1	0.5000

¹Population of interest: Veteran IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-74. To what extent do IHE participants work to revise pedagogy outside their IHE circles, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=117)	Veterans' past data ² (n=110)	p-value
Administrators in MSP	33.3%	33.2%	0.5178
Teachers in MSP	64.1	63.6	0.5258
Administrators and teachers other MSPs.....	5.1	3.6	0.4134
NSF program officers.....	1.7	0.9	0.5232
Outside MSP community	27.4	26.4	0.4932

¹Population of interest: All IHE veterans' current data.

²Control population: All IHE veterans' past data.

Present vs. Past: K–12 Participants

Table B-75. To what extent do K–12 teachers work to revise pedagogy, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=5)	Veterans' past data ² (n=4)	p-value
STEM and Education in MSP.....	50.0%	50.0%	0.3571
STEM and Education other MSPs	0.0	0.0	1.0000
Teachers in MSP	60.0	100.0	0.2778

¹Population of interest: Veteran K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-76. To what extent do K–12 administrators work to revise pedagogy, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=6)	Veterans' past data ² (n=6)	p-value
STEM and Education in MSP.....	75.0%	83.3%	0.5000
STEM and Education other MSPs	0.0	0.0	1.0000
Administrators in MSP	50.0	41.7	0.5000

¹Population of interest: Veteran K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-77. To what extent do K–12 administrators and teachers work to revise pedagogy with other MSPs, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=11)	Veterans' past data ² (n=10)	p-value
Administrators and teachers other MSPs.....	9.1%	10.0%	0.7381

¹Population of interest: Veteran K–12 administrators and teachers' current data.

²Control population: Veteran K–12 administrators and teachers' past data.

Table B-78. To what extent do K–12 participants work to revise pedagogy, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=20)	Veterans' past data ² (n=18)	p-value
STEM and Education in MSP.....	62.5%	69.4%	0.5930
STEM and Education other MSPs	0.0	0.0	1.0000
NSF program officers.....	0.0	0.0	1.0000
Outside MSP community	35.0	33.3	0.5930

¹Population of interest: All veteran K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Newbies' vs. Past: IHE Participants

Table B-79. To what extent do IHE STEM faculty work to revise pedagogy, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=24)	Veterans' past data ² (n=44)	p-value
STEM faculty in MSP	75.0%	72.7%	0.5390
STEM faculty other MSPs.....	16.7	9.1	0.2907
Education faculty in MSP	62.5	65.9	0.4906
Education faculty other MSPs.....	4.2	9.1	0.4167

¹Population of interest: Newbie IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-80. To what extent do IHE Education faculty work to revise pedagogy, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=10)	Veterans' past data ² (n=22)	p-value
STEM faculty in MSP	60.0%	77.3%	0.2754
STEM faculty other MSPs.....	0.0	18.2	0.2034
Education faculty in MSP	60.0	81.8	0.1878
Education faculty other MSPs.....	10.0	9.1	0.6895

¹Population of interest: Newbie IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-81. To what extent do IHE participants work to revise pedagogy outside their IHE circles, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=52)	Veterans' past data ² (n=110)	p-value
Administrators in MSP	29.8%	33.2%	0.4756
Teachers in MSP	36.5	63.6	0.0011
Administrators and teachers other MSPs.....	5.8	3.6	0.4004
NSF program officers.....	1.9	0.9	0.5403
Outside MSP community	34.6	26.4	0.1849

¹Population of interest: All IHE newbies' current data.

²Control population: All IHE veterans' past data.

Newbies' vs. Past: K–12 Participants

Table B-82. To what extent do K–12 teachers work to revise pedagogy, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=2)	Veterans' past data ² (n=4)	p-value
STEM and Education in MSP.....	0.0%	50.0%	0.4000
STEM and Education other MSPs	0.0	0.0	1.0000
Teachers in MSP	0.0	100.0	0.0667

¹Population of interest: Newbie K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-83. To what extent do K–12 administrators work to revise pedagogy, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=9)	Veterans' past data ² (n=6)	p-value
STEM and Education in MSP.....	33.3%	83.3%	0.0839
STEM and Education other MSPs	0.0	0.0	1.0000
Administrators in MSP	66.7	41.7	0.2308

¹Population of interest: Newbie K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-84. To what extent do K–12 administrators and teachers work to revise pedagogy with other MSPs, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=11)	Veterans' past data ² (n=10)	p-value
Administrators and teachers other MSPs.....	9.1%	10.0%	0.7381

¹Population of interest: Newbie K–12 administrators and teachers' current data.

²Control population: Veteran K–12 administrators and teachers' past data.

Table B-85. To what extent do K–12 participants work to revise pedagogy, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=20)	Veterans' past data ² (n=18)	p-value
STEM and Education in MSP.....	25.0%	69.4%	0.0116
STEM and Education other MSPs	0.0	0.0	1.0000
NSF program officers.....	0.0	0.0	1.0000
Outside MSP community	25.0	33.3	0.4172

¹Population of interest: All newbie K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Network F: Curriculum Design

Present vs. Past: IHE Participants

Table B-86. To what extent do IHE STEM faculty consult regarding changes to curriculum design, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=50)	Veterans' past data ² (n=40)	p-value
STEM faculty in MSP	86.0%	92.5%	0.2650
STEM faculty other MSPs.....	16.0	17.5	0.5348
Education faculty in MSP	64.0	65.0	0.5499
Education faculty other MSPs.....	8.0	12.5	0.3593

¹Population of interest: Veteran IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-87. To what extent do IHE Education faculty consult regarding changes to curriculum design, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=21)	Veterans' past data ² (n=20)	p-value
STEM faculty in MSP	85.7%	85.0%	0.6445
STEM faculty other MSPs.....	19.0	20.0	0.6228
Education faculty in MSP	81.0	80.0	0.6228
Education faculty other MSPs.....	14.3	10.0	0.5241

¹Population of interest: Veteran IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-88. To what extent do IHE participants consult regarding changes to curriculum design outside their IHE circles, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=118)	Veterans' past data ² (n=104)	p-value
Administrators in MSP	36.9%	37.0%	0.5098
Teachers in MSP	57.6	55.8	0.4430
Administrators and teachers other MSPs.....	5.9	3.8	0.3457
NSF program officers.....	1.7	1.9	0.6402
Outside MSP community	28.0	24.0	0.3050

¹Population of interest: All IHE veterans' current data.

²Control population: All IHE veterans' past data.

Present vs. Past: K–12 Participants

Table B-89. To what extent do K–12 teachers consult regarding changes to curriculum design, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=5)	Veterans' past data ² (n=4)	p-value
STEM and Education in MSP.....	30.0%	25.0%	0.2778
STEM and Education other MSPs	0.0	0.0	1.0000
Teachers in MSP	40.0	25.0	0.5952

¹Population of interest: Veteran K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-90. To what extent do K–12 administrators consult regarding changes to curriculum design, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=8)	Veterans' past data ² (n=6)	p-value
STEM and Education in MSP.....	37.5%	75.0%	0.2960
STEM and Education other MSPs	0.0	0.0	1.0000
Administrators in MSP	56.3	58.3	0.5291

¹Population of interest: Veteran K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-91. To what extent do K–12 administrators and teachers consult regarding changes to curriculum design with other MSPs, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=13)	Veterans' past data ² (n=10)	p-value
Administrators and teachers other MSPs.....	7.7%	10.0%	0.6917

¹Population of interest: Veteran K–12 administrators and teachers' current data.

²Control population: Veteran K–12 administrators and teachers' past data.

Table B-92. To what extent do K–12 participants consult regarding changes to curriculum design, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=22)	Veterans' past data ² (n=18)	p-value
STEM and Education in MSP.....	50.0%	61.1%	0.3514
STEM and Education other MSPs	0.0	0.0	1.0000
NSF program officers.....	0.0	0.0	1.0000
Outside MSP community	36.4	38.9	0.5639

¹Population of interest: All veteran K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Newbies' vs. Past: IHE Participants

Table B-93. To what extent do IHE STEM faculty consult regarding changes to curriculum design, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=23)	Veterans' past data ² (n=40)	p-value
STEM faculty in MSP	73.9%	92.5%	0.0511%
STEM faculty other MSPs.....	13.0	17.5	0.4664
Education faculty in MSP	60.9	65.0	0.4750
Education faculty other MSPs.....	8.7	12.5	0.4942

¹Population of interest: Newbie IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-94. To what extent do IHE Education faculty consult regarding changes to curriculum design, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=10)	Veterans' past data ² (n=20)	p-value
STEM faculty in MSP	80.0%	85.0%	0.5512
STEM faculty other MSPs.....	20.0	20.0	0.6736
Education faculty in MSP	50.0	80.0	0.1037
Education faculty other MSPs.....	10.0	10.0	0.7192

¹Population of interest: Newbie IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-95. To what extent do IHE participants consult regarding changes to curriculum design outside their IHE circles, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=50)	Veterans' past data ² (n=104)	p-value
Administrators in MSP	32.0%	37.0%	0.3570
Teachers in MSP	42.0	55.8	0.0765
Administrators and teachers other MSPs.....	8.0	3.8	0.2363
NSF program officers.....	4.0	1.9	0.3919
Outside MSP community	34.0	24.0	0.1346

¹Population of interest: All IHE newbies' current data (59 participants)

²Control population: All IHE veterans' past data (128 participants)

Newbies' vs. Past: K–12 Participants

Table B-96. To what extent do K–12 teachers consult regarding changes to curriculum design, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=2)	Veterans' past data ² (n=4)	p-value
STEM and Education in MSP.....	0.0%	25.0%	0.6667
STEM and Education other MSPs	0.0	0.0	1.0000
Teachers in MSP	50.0	25.0	0.6000

¹Population of interest: Newbie K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-97. To what extent do K–12 administrators consult regarding changes to curriculum design, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=10)	Veterans' past data ² (n=6)	p-value
STEM and Education in MSP.....	35.0%	75.0%	0.3042
STEM and Education other MSPs	0.0	0.0	1.0000
Administrators in MSP	65.0	58.3	0.3916

¹Population of interest: Newbie K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-98. To what extent do K–12 administrators and teachers consult regarding changes to curriculum design with other MSPs, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=12)	Veterans' past data ² (n=10)	p-value
Administrators and teachers other MSPs.....	8.3%	10.0%	0.7143

¹Population of interest: Newbie K–12 administrators and teachers' current data.

²Control population: Veteran K–12 administrators and teachers' past data.

Table B-99. To what extent do K–12 participants consult regarding changes to curriculum design, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=21)	Veterans' past data ² (n=18)	p-value
STEM and Education in MSP.....	33.3%	61.1%	0.0786
STEM and Education other MSPs	0.0	0.0	1.0000
NSF program officers.....	0.0	0.0	1.0000
Outside MSP community	19.0	38.9	0.1550

¹Population of interest: All newbie K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Network G: MSP-Related Assessment/Evaluation Issues

Present vs. Past: IHE Participants

Table B-100. To what extent do IHE STEM faculty discuss MSP-related assessment/evaluation issues, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=53)	Veterans' past data ² (n=45)	p-value
STEM faculty in MSP	73.6%	75.6%	0.5050
STEM faculty other MSPs.....	17.0	13.3	0.4160
Education faculty in MSP	67.9	66.7	0.5325
Education faculty other MSPs.....	15.1	13.3	0.5187

¹Population of interest: Veteran IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-101. To what extent do IHE Education faculty discuss MSP-related assessment/evaluation issues, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=24)	Veterans' past data ² (n=23)	p-value
STEM faculty in MSP	91.7%	91.3%	0.6794
STEM faculty other MSPs.....	29.2	30.4	0.5880
Education faculty in MSP	83.3	82.6	0.6247
Education faculty other MSPs.....	29.2	26.1	0.5362

¹Population of interest: Veteran IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-102. To what extent do IHE participants discuss MSP-related assessment/evaluation issues outside their IHE circles, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=139)	Veterans' past data ² (n=125)	p-value
Administrators in MSP	31.7%	28.8%	0.3561
Teachers in MSP	26.6	30.4	0.2932
Administrators and teachers other MSPs.....	5.8	6.4	0.5139
NSF program officers.....	17.3	16.0	0.4569
Outside MSP community	26.6	24.0	0.3650

¹Population of interest: All IHE veterans' faculty's current data.

²Control population: All IHE veterans' faculty's past data.

Present vs. Past: K–12 Participants

Table B-103. To what extent do K–12 teachers discuss MSP-related assessment/evaluation issues, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=3)	Veterans' past data ² (n=4)	p-value
STEM and Education in MSP.....	33.3%	50.0%	0.6286
STEM and Education other MSPs	0.0	0.0	1.0000
Teachers in MSP	100.0	25.0	0.1143

¹Population of interest: Veteran K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-104. To what extent do K–12 administrators discuss MSP-related assessment/evaluation issues, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=9)	Veterans' past data ² (n=7)	p-value
STEM and Education in MSP.....	55.6%	71.4%	0.4510
STEM and Education other MSPs	0.0	14.3	0.4375
Administrators in MSP	16.7	28.6	0.6000

¹Population of interest: Veteran K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-105. To what extent do K–12 administrators and teachers discuss MSP-related assessment/evaluation issues with other MSPs, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=12)	Veterans' past data ² (n=11)	p-value
Administrators and teachers other MSPs.....	8.3%	0.0%	0.5217

¹Population of interest: Veteran K–12 administrators and teachers' current data.

²Control population: Veteran K–12 administrators and teachers' past data.

Table B-106. To what extent do K–12 participants discuss MSP-related assessment/evaluation issues, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=21)	Veterans' past data ² (n=21)	p-value
STEM and Education in MSP.....	61.9%	76.2%	0.2527
STEM and Education other MSPs	4.8	14.3	0.3030
NSF program officers.....	4.8	14.3	0.3030
Outside MSP community	14.3	14.3	0.6686

¹Population of interest: All veteran K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Newbies' vs. Past: IHE Participants

Table B-107. To what extent do IHE STEM faculty discuss MSP-related assessment/evaluation issues, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=25)	Veterans' past data ² (n=45)	p-value
STEM faculty in MSP	80.0%	75.6%	0.4558
STEM faculty other MSPs.....	16.0	13.3	0.5100
Education faculty in MSP	60.0	66.7	0.3808
Education faculty other MSPs.....	4.0	13.3	0.2077

¹Population of interest: Newbie IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-108. To what extent do IHE Education faculty discuss MSP-related assessment/evaluation issues, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=10)	Veterans' past data ² (n=23)	p-value
STEM faculty in MSP	80.0%	91.3%	0.3508
STEM faculty other MSPs.....	10.0	30.4	0.2119
Education faculty in MSP	80.0	82.6	0.6050
Education faculty other MSPs.....	10.0	26.1	0.2937

¹Population of interest: Newbie IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-109. To what extent do IHE participants discuss MSP-related assessment/evaluation issues outside their IHE circles, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=60)	Veterans' past data ² (n=125)	p-value
Administrators in MSP	26.7%	28.8%	0.4529
Teachers in MSP	21.7	30.4	0.1423
Administrators and teachers other MSPs.....	5.0	6.4	0.4965
NSF program officers.....	3.3	16.0	0.0082
Outside MSP community	18.3	24.0	0.2507

¹Population of interest: All IHE newbies' current data.

²Control population: All IHE veterans' past data.

Newbies' vs. Past: K–12 Participants

Table B-110. To what extent do K–12 teachers discuss MSP-related assessment/evaluation issues, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=1)	Veterans' past data ² (n=4)	p-value
STEM and Education in MSP.....	100.0%	50.0%	0.6000
STEM and Education other MSPs	0.0	0.0	1.0000
Teachers in MSP	0.0	25.0	0.8000

¹Population of interest: Newbie K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-111. To what extent do K–12 administrators discuss MSP-related assessment/evaluation issues, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=8)	Veterans' past data ² (n=7)	p-value
STEM and Education in MSP.....	56.3%	71.4%	0.7692
STEM and Education other MSPs	0.0	14.3	0.4667
Administrators in MSP	43.8	28.6	0.1818

¹Population of interest: Newbie K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-112. To what extent do K–12 administrators and teachers discuss MSP-related assessment/evaluation issues with other MSPs, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=9)	Veterans' past data ² (n=11)	p-value
Administrators and teachers other MSPs.....	11.1%	0.0%	0.4500

¹Population of interest: Newbie K–12 administrators and teachers' current data.

²Control population: Veteran K–12 administrators and teachers' past data.

Table B-113. To what extent do K–12 participants discuss MSP-related assessment/evaluation issues, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=18)	Veterans' past data ² (n=21)	p-value
STEM and Education in MSP.....	52.8%	76.2%	0.2434
STEM and Education other MSPs	0.0	14.3	0.1455
NSF program officers.....	0.0	14.3	0.1455
Outside MSP community	11.1	14.3	0.5759

¹Population of interest: All newbie K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Network H: Roles and Responsibilities of a Partnership

Present vs. Past: IHE Participants

Table B-114. To what extent do IHE STEM faculty discuss the roles and responsibilities of a partnership, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=48)	Veterans' past data ² (n=45)	p-value
STEM faculty in MSP	85.4%	93.3%	0.1857
STEM faculty other MSPs.....	20.8	20.0	0.5631
Education faculty in MSP	60.4	60.0	0.5676
Education faculty other MSPs.....	14.6	17.8	0.4451

¹Population of interest: Veteran IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-115. To what extent do IHE Education faculty discuss the roles and responsibilities of a partnership, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=24)	Veterans' past data ² (n=23)	p-value
STEM faculty in MSP	95.8%	91.3%	0.4837
STEM faculty other MSPs.....	20.8	26.1	0.4675
Education faculty in MSP	79.2	82.6	0.5288
Education faculty other MSPs.....	25.0	21.7	0.5325

¹Population of interest: Veteran IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-116. To what extent do IHE participants discuss the roles and responsibilities of a partnership outside their IHE circles, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=131)	Veterans' past data ² (n=125)	p-value
Administrators in MSP	46.2%	44.0%	0.3390
Teachers in MSP	42.7	48.0	0.2363
Administrators and teachers other MSPs.....	6.1	8.0	0.3640
NSF program officers.....	25.2	22.4	0.3533
Outside MSP community	16.0	19.2	0.3079

¹Population of interest: All IHE veterans' current data.

²Control population: All IHE veterans' past data.

Present vs. Past: K–12 Participants

Table B-117. To what extent do K–12 teachers discuss the roles and responsibilities of a partnership, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=5)	Veterans' past data ² (n=5)	p-value
STEM and Education in MSP.....	50.0%	30.0%	0.2619
STEM and Education other MSPs	0.0	0.0	1.0000
Teachers in MSP	60.0	100.0	0.2222

¹Population of interest: Veteran K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-118. To what extent do K–12 administrators discuss the roles and responsibilities of a partnership, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=9)	Veterans' past data ² (n=7)	p-value
STEM and Education in MSP.....	66.7%	92.9%	0.3923
STEM and Education other MSPs	0.0	21.4	0.4375
Administrators in MSP	44.4	35.7	0.4510

¹Population of interest: Veteran K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-119. To what extent do K–12 administrators and teachers discuss the roles and responsibilities of a partnership with other MSPs, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=14)	Veterans' past data ² (n=12)	p-value
Administrators and teachers other MSPs.....	7.1%	8.3%	0.7200

¹Population of interest: Veteran K–12 administrators and teachers' current data.

²Control population: Veteran K–12 administrators and teachers' past data.

Table B-120. To what extent do K–12 participants discuss the roles and responsibilities of a partnership, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=25)	Veterans' past data ² (n=21)	p-value
STEM and Education in MSP.....	68.0%	71.4%	0.5293
STEM and Education other MSPs	6.0	14.3	0.6265
NSF program officers.....	8.0	9.5	0.6265
Outside MSP community	16.0	23.8	0.3835

¹Population of interest: All veteran K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Newbies' vs. Past: IHE Participants

Table B-121. To what extent do IHE STEM faculty discuss the roles and responsibilities of a partnership, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=26)	Veterans' past data ² (n=45)	p-value
STEM faculty in MSP	88.5%	93.3%	0.3832
STEM faculty other MSPs.....	19.2	20.0	0.5973
Education faculty in MSP	65.4	60.0	0.4243
Education faculty other MSPs.....	3.8	17.8	0.0872

¹Population of interest: Newbie IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-122. To what extent do IHE Education faculty discuss the roles and responsibilities of a partnership, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=10)	Veterans' past data ² (n=23)	p-value
STEM faculty in MSP	80.0%	91.3%	0.3508
STEM faculty other MSPs.....	0.0	26.1	0.0911
Education faculty in MSP	60.0	82.6	0.1701
Education faculty other MSPs.....	10.0	21.7	0.3950

¹Population of interest: Newbie IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-123. To what extent do IHE participants discuss the roles and responsibilities of a partnership outside their IHE circles, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=58)	Veterans' past data ² (n=125)	p-value
Administrators in MSP	41.4%	44.0%	0.4325
Teachers in MSP	37.9	48.0	0.1324
Administrators and teachers other MSPs.....	5.2	8.0	0.3624
NSF program officers.....	10.3	22.4	0.0367
Outside MSP community	17.2	19.2	0.4615

¹Population of interest: All IHE newbies' current data (59 participants)

²Control population: All IHE veterans' past data (128 participants)

Newbies' vs. Past: K–12 Participants

Table B-124. To what extent do K–12 teachers discuss the roles and responsibilities of a partnership, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=2)	Veterans' past data ² (n=5)	p-value
STEM and Education in MSP.....	25.0%	30.0%	0.5238
STEM and Education other MSPs	0.0	0.0	1.0000
Teachers in MSP	0.0	100.0	0.0476

¹Population of interest: Newbie K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-125. To what extent do K–12 administrators discuss the roles and responsibilities of a partnership, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=10)	Veterans' past data ² (n=7)	p-value
STEM and Education in MSP.....	60.0%	92.9%	0.2783
STEM and Education other MSPs	5.0	21.4	0.6691
Administrators in MSP	40.0	35.7	0.5158

¹Population of interest: Newbie K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-126. To what extent do K–12 administrators and teachers discuss the roles and responsibilities of a partnership with other MSPs, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=12)	Veterans' past data ² (n=12)	p-value
Administrators and teachers other MSPs.....	0.0%	8.3%	0.5000

¹Population of interest: Newbie K–12 participants' current data.

²Control population: Veteran K–12 participants' current data.

Table B-127. To what extent do K–12 participants discuss the roles and responsibilities of a partnership, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=21)	Veterans' past data ² (n=21)	p-value
STEM and Education in MSP.....	57.1%	71.4%	0.2602
STEM and Education other MSPs	0.0	14.3	0.1159
NSF program officers.....	0.0	9.5	0.2439
Outside MSP community	19.0	23.8	0.5000

¹Population of interest: All newbie K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Network I: Workplace Roles that Pose Barriers

Present vs. Past: IHE Participants

Table B-128. To what extent do IHE STEM faculty report conflict, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=33)	Veterans' past data ² (n=31)	p-value
STEM faculty in MSP	24.2%	22.6%	0.5555
STEM faculty other MSPs.....	0.0	0.0	1.0000
Education faculty in MSP	12.1	16.1	0.4589
Education faculty other MSPs.....	3.0	0.0	0.5156

¹Population of interest: Veteran IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-129. To what extent do IHE Education faculty report conflict, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=11)	Veterans' past data ² (n=13)	p-value
STEM faculty in MSP	9.1%	23.1%	0.3634
STEM faculty other MSPs.....	0.0	0.0	1.0000
Education faculty in MSP	18.2	30.8	0.4101
Education faculty other MSPs.....	9.1	0.0	0.4583

¹Population of interest: Veteran IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-130. To what extent do IHE participants report conflict outside their IHE circles, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=81)	Veterans' past data ² (n=84)	p-value
Administrators in MSP	53.7%	55.4%	0.5396
Teachers in MSP	25.9	29.8	0.3538
Administrators and teachers other MSPs.....	2.5	1.2	0.4863
NSF program officers.....	2.5	0.0	0.2395
Outside MSP community	28.4	29.8	0.4915

¹Population of interest: All IHE veterans' current data.

²Control population: All IHE veterans' past data.

Present vs. Past: K–12 Participants

Table B-131. To what extent do K–12 teachers report conflict, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=1)	Veterans' past data ² (n=2)	p-value
STEM and Education in MSP.....	0.0%	0.0%	1.0000
STEM and Education other MSPs	0.0	0.0	1.0000
Teachers in MSP	0.0	0.0	1.0000

¹Population of interest: Veteran K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-132. To what extent do K–12 administrators report conflict, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=7)	Veterans' past data ² (n=8)	p-value
STEM and Education in MSP.....	0.0%	31.3%	0.2667
STEM and Education other MSPs	0.0	0.0	1.0000
Administrators in MSP	50.0	56.3	0.5952

¹Population of interest: Veteran K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-133. To what extent do K–12 administrators and teachers report conflict with other MSPs, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=8)	Veterans' past data ² (n=10)	p-value
Administrators and teachers other MSPs.....	12.5%	10.0%	0.7059

¹Population of interest: Veteran K–12 administrators and teachers' current data.

²Control population: Veteran K–12 administrators and teachers' past data.

Table B-134. To what extent do K–12 participants report conflict, and does that change over time as an MSP?

Participant type	Veterans' current data ¹ (n=15)	Veterans' past data ² (n=17)	p-value
STEM and Education in MSP.....	33.3%	38.2%	0.6017
STEM and Education other MSPs	0.0	0.0	1.0000
NSF program officers.....	0.0	0.0	1.0000
Outside MSP community	6.7	17.6	0.3498

¹Population of interest: All veteran K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Newbies' vs. Past – IHE Participants

Table B-135. To what extent do IHE STEM faculty report conflict, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=14)	Veterans' past data ² (n=31)	p-value
STEM faculty in MSP	0.0%	22.6%	0.0579
STEM faculty other MSPs.....	0.0	0.0	1.0000
Education faculty in MSP	21.4	16.1	0.4818
Education faculty other MSPs.....	0.0	0.0	1.0000

¹Population of interest: Newbie IHE STEM faculty's current data.

²Control population: Veteran IHE STEM faculty's past data.

Table B-136. To what extent do IHE Education faculty report conflict, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=4)	Veterans' past data ² (n=13)	p-value
STEM faculty in MSP	25.0%	23.1%	0.6996
STEM faculty other MSPs.....	0.0	0.0	1.0000
Education faculty in MSP	25.0	30.8	0.6702
Education faculty other MSPs.....	0.0	0.0	1.0000

¹Population of interest: Newbie IHE Education faculty's current data.

²Control population: Veteran IHE Education faculty's past data.

Table B-137. To what extent do IHE participants report conflict outside their IHE circles, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=29)	Veterans' past data ² (n=84)	p-value
Administrators in MSP	39.7%	55.4%	0.1521
Teachers in MSP	13.8	29.8	0.0695
Administrators and teachers other MSPs.....	3.4	1.2	0.4491
NSF program officers.....	0.0	0.0	1.0000
Outside MSP community	24.1	29.8	0.3728

¹Population of interest: All IHE newbies' current data.

²Control population: All IHE veterans' past data.

Newbies' vs. Past: K–12 Participants

Table B-138. To what extent do K–12 teachers report conflict, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=0)	Veterans' past data ² (n=2)	p-value
STEM and Education in MSP.....	0.0%	0.0%	1.0000
STEM and Education other MSPs	0.0	0.0	1.0000
Teachers in MSP	0.0	0.0	1.0000

¹Population of interest: Newbie K–12 teachers' current data.

²Control population: Veteran K–12 teachers' past data.

Table B-139. To what extent do K–12 administrators report conflict, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=4)	Veterans' past data ² (n=8)	p-value
STEM and Education in MSP.....	25.0%	31.3%	0.7636
STEM and Education other MSPs	25.0	0.0	0.3333
Administrators in MSP	37.5	56.3	0.7273

¹Population of interest: Newbie K–12 administrators' current data.

²Control population: Veteran K–12 administrators' past data.

Table B-140. To what extent do K–12 administrators and teachers report conflict with other MSPs, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=4)	Veterans' past data ² (n=10)	p-value
Administrators and teachers other MSPs.....	0.0%	10.0%	0.7143

¹Population of interest: Newbie K–12 administrators and teachers' current data.

²Control population: Veteran K–12 administrators and teachers' past data.

Table B-141. To what extent do K–12 participants report conflict, and does that change over time as an MSP?

Participant type	Newbies' current data ¹ (n=7)	Veterans' past data ² (n=17)	p-value
STEM and Education in MSP.....	21.4%	38.2%	0.5715
STEM and Education other MSPs	14.3	0.0	0.2917
NSF program officers.....	0.0	0.0	1.0000
Outside MSP community	25.0	33.3	0.4172

¹Population of interest: All newbie K–12 participants' current data.

²Control population: All veteran K–12 participants' current data.

Appendix C. Comparison Against All Others

An alternative approach for examining changes over time is to compare a funding program cohort year against a control group comprising all other funding years in that same program (Tables C-1 and C-2). For example, Comprehensive and Targeted cohort 1 (2002) interaction rates would be contrasted against Comprehensive and Targeted cohort 2 (2003), cohort 3 (2004), and cohort 4 (2008) rates. This approach, called “all others,” is shown as Table C-1. We found significance in the veterans’ data in both the Comprehensive and Targeted and Institute projects. We also found significance in the newbies’ data for both programs, but because the population is so small (<10), we dismiss the findings as not relevant. Nevertheless, we list them here for completeness.

Comprehensive and Targeted Projects

For Comprehensive and Targeted projects, we found significance for veterans’ current data in three funding years, veterans’ past data in two funding years, and newbies’ current data for one funding year (highlighted in boldface) in Table C-1. Variation was nonrandom.

- Veterans’ current data. The significance in current data occurred in three of the four funding years (the first funding year being the exception) and may be due to the general upward trend in interaction rates over the funding life of the Comprehensive and Targeted projects (see boldface highlights in the far left column).
- Veterans’ past data. We found significance in past data in the first two funding years. The first year had the highest interaction rate and the second year had the lowest interaction rate of the four funding years (see boldface highlights in the middle column). We are not certain if the ends of the distribution are driving these findings.
- Newbies’ current data. We found significance in current data in the last funding year (see boldface highlights in the far right column), but the data set is small (<10). We believe this significance to not be relevant.

Institute Projects

For the Institute projects, we found significance for veterans’ current data in two funding years, veterans’ past data in two funding years, and newbies’ current data for two funding years (highlighted in boldface). Variation was nonrandom.

- Veterans’ current data. We found significance in the veterans’ current data in the first and last funding years in Table 4 (highlighted in boldface). The first funding year is the largest data set and the last funding year is the smallest data set (see highlighted boldface in the far

left column). We believe the last funding year, which is also the smallest data set, to not be relevant. There is a general downward trend in the interaction rate in the veterans' current data in the Institute program.

- Veterans' past data. We found significance in the veterans' past data in the first and second funding years (see highlighted areas in the middle column). Again, we notice a general downward trend in the interaction rate in the Institute projects.
- Newbies' current data. We found significance in the first and last funding years (see highlighted areas in the far right column). The data set is too small (<10), and we consider this significance to not be relevant.

Table C-1. Comparison of data for individual participant groups against all others

Cohort	Veterans' current data			Veterans' past data			Newbies' current data		
	People	Inter-action rate	P-value	People	Inter-action rate	P-value	People	Inter-action rate	P-value
Comprehensive and Targeted 1 (2002).....	26	31.9%	0.1093	24	36.9%	0.0030	3	26.1%	0.2196
Comprehensive and Targeted 2 (2003).....	31	30.2	0.0001	31	31.9	0.0018	0	NA	1.0000
Comprehensive and Targeted 3 (2004).....	21	37.2	0.0001	21	33.6	0.5053	4	27.3	0.2111
Comprehensive and Targeted 4 (2008).....	21	35.6	0.0195	19	35.4	0.2737	14	32.1	0.0441
Institute 1 (2003–04).....	20	30.4	0.0187	19	30.5	0.0001	5	26.1	0.0014
Institute 2 (2006).....	16	28.8	0.7449	16	24.8	0.0130	1	36.4	0.7564
Institute 3 (2008).....	10	27.6	0.5567	10	25.5	0.1991	5	26.7	0.0002
Institute 4 (2009).....	2	10.8	0.0001	1	19.3	0.1145	29	37.8	0.0001

NA = not applicable.

Cohort Neighbors

Finally, a third alternative approach for examining changes over time is to compare a funding program cohort year against its nearest neighbors.

Comprehensive and Targeted Projects

For Comprehensive and Targeted cohort 1 (2002), interaction rates would be contrasted against Comprehensive and Targeted cohort 2 (2003) only. However, Comprehensive and Targeted cohort 2 (2003) would be contrasted against Comprehensive and Targeted cohort 1 (2002) and Comprehensive and

Targeted cohort 3 (2004) because the funding year in question is sandwiched between two cohort years. This is called “nearest neighbor,” and is shown as Table C-2. There is significance; variation is nonrandom.

- Veterans’ current data. The significance in veterans’ current data occurred in the second and third of the four funding years and may be due to the general upward trend in interaction rates over the funding life of the Comprehensive and Targeted program (see boldface highlighted area in the far left column).
- Veterans’ past data. We found significance in veterans’ past data in the first two funding years. The first year had the highest interaction rate and the second year had the lowest interaction rate of the four funding years (see boldface highlighted area in the middle column). We are not certain if the “top and tail” interaction rates may be contributing to the significance finding here.
- Newbies’ current data. We found no significance in newbies’ current data in any funding year.

Institute Projects

For the Institute projects, we found significance for veterans’ current data in one funding year, veterans’ past data in two funding years, and newbies’ current data for two funding years (boldface highlights). Variation was nonrandom.

- Veterans’ current data. We found significance in the veterans’ current data in the last funding year shown in Table C-2. The last funding year is the smallest data set (see highlighted area in the far left column). We believe the significant to not be relevant. There is a general downward trend in the interaction rate in the veterans’ current data in the Institute projects.
- Veterans’ past data. We found significance in the veterans’ past data in the first and second funding years (see highlighted areas in the middle column). Again, we notice a general downward trend in the interaction rate in the Institute projects.
- Newbies’ current data. We found significance in the last two funding years (see highlighted areas in the far right column). The data set is small (<10), and we dismiss this significance as not relevant.

Table C-2. Comparison of data for individual participant groups against nearest neighbors

Cohort	Veterans' current data			Veterans' past data			Newbies' current data		
	People	Inter-action rate	P-value	People	Inter-action rate	P-value	People	Inter-action rate	P-value
Comprehensive and Targeted 1 (2002).....	26	31.9%	0.1980	24	36.9%	0.0003	3	26.1%	1.0000
Comprehensive and Targeted 2 (2003).....	31	30.2	0.0005	31	31.9	0.0035	0	NA	1.0000
Comprehensive and Targeted 3 (2004).....	21	37.2	0.0002	21	33.6	0.7914	4	27.3	0.1201
Comprehensive and Targeted 4 (2008).....	21	35.6	0.3214	19	35.4	0.2710	14	32.1	0.1201
Institute 1 (2003–04).....	20	30.4	0.3280	19	30.5	0.0004	5	26.1	0.4891
Institute 2 (2006).....	16	28.8	0.6373	16	24.8	0.0073	1	36.4	0.4891
Institute 3 (2008).....	10	27.6	0.6703	10	25.5	0.5552	5	26.7	0.0001
Institute 4 (2009).....	2	10.8	0.0001	1	19.3	0.2446	29	37.8	0.0001

NA = not applicable.