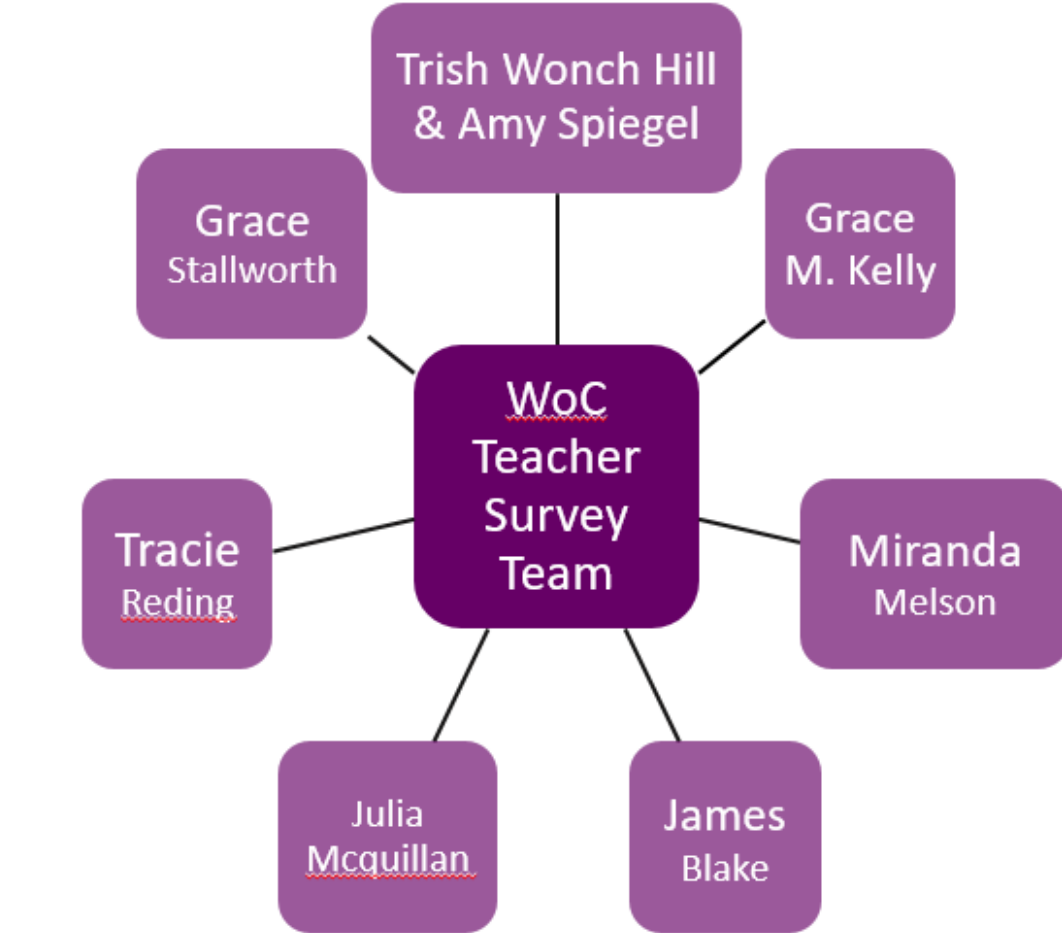




# Teacher Professionalization & Inquiry Based Pedagogy: A Social Network Analysis of District Science Teachers' Advice Networks



**Research Question:**  
Are there characteristics associated with which teachers' peers seek advice from?

**Characteristics:**  
\*School level \*Leadership role \*Years of experience  
\*Participation in professional associations (PAs)

**Prior Research:**  
Teachers are more likely to develop relationships with those considered affable, rather than knowledgeable in STEM, resulting in some isolation of 'expert' teachers.<sup>1</sup>

Coaching shaped frequency, closeness and depth of teacher interaction. Coach attendance of professional development mattered.<sup>2</sup>

**Study Design:**  
We invited all 149 middle and high school science teachers to complete a web survey over the summer. Over half (91 of the 149 teachers from 22 science programs) completed the brief survey; 139 teachers were selected by at least one participant and therefore some networks almost completely represent the district.

- Network data merged with district data.
- Network energized using ForceAtlas2 layout in Gephi.

**Science Teacher Survey:**

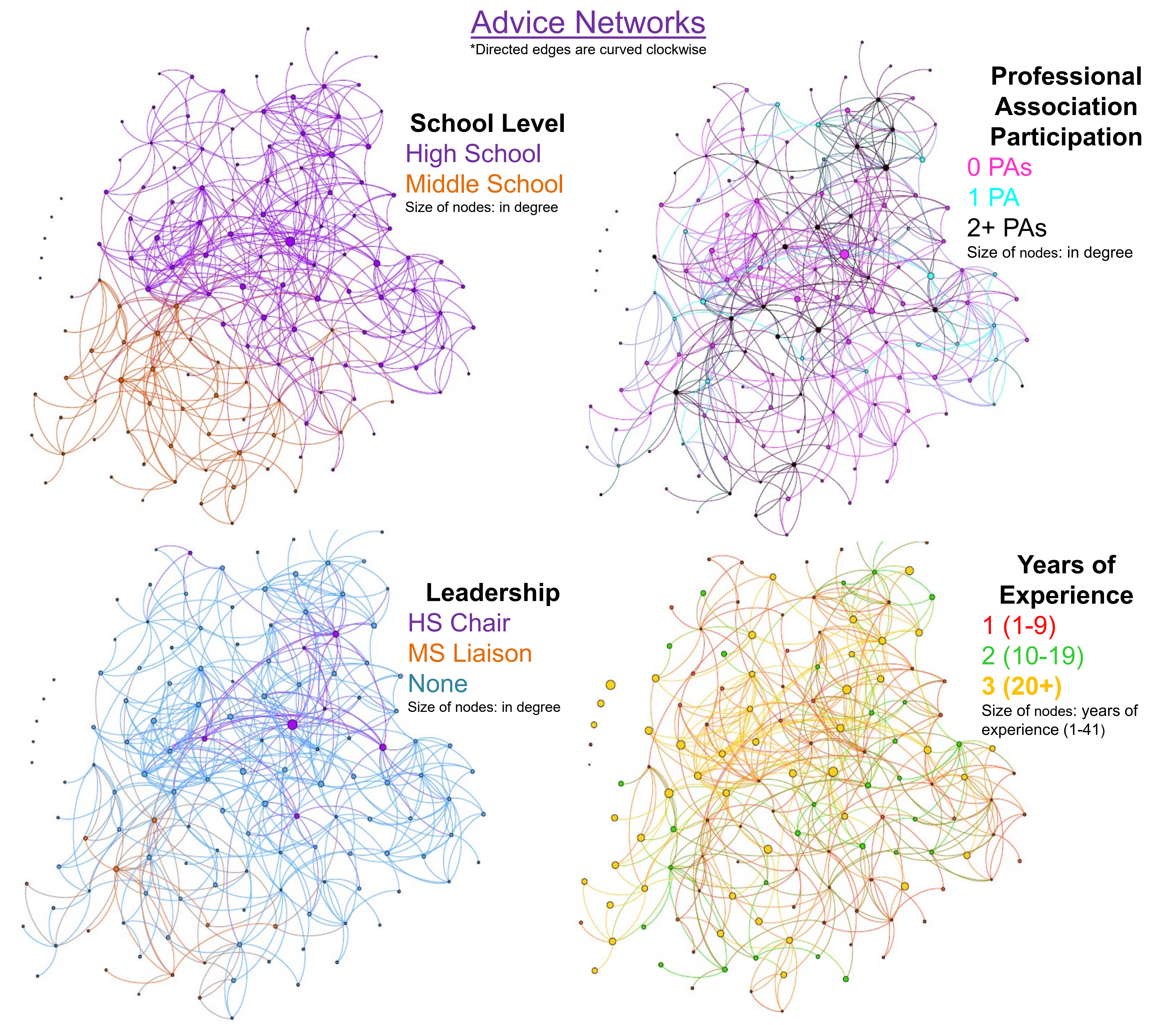
**Advice Network:** In the box below, please list all the teachers who you have gone to for professional or personal advice about your teaching. You can list as many as 15 teachers.

**Inquiry Comfort\*:** "How comfortable are you implementing inquiry-based lessons?"

**Inquiry Efficacy\*:** "How effective do you think inquiry-based lessons are for student learning?"

**Level of Professional Associations (PAs):** Please mark all of the professional associations of which you are a member. (NSTA, NATS, ASTE, Other)

**District data: School level, Leadership, Years of Experience**



**Table 2: Means and Standard Deviations for Network and Teacher Characteristics**

Advice Networks by	In Degree	Out Degree	Years of Experience	Inquiry Comfort*	Inquiry Efficacy*
<b>School Level</b>					
Middle School (N=42)	2.6 (2.1)	3.9 (4.5)	15.9 (11.1)	3.1 (.6)	3.2 (.7)
High School (N=96)	4.3 (3.2)	3.9 (.5)	13.7 (10.6)	3.1 (.7)	3.1 (.7)
<b>Level of Professional Associations</b>					
0 (N=89)	3.3 (2.4)	6 (.5)	14.2 (10.5)	2.9 (.7)	3.1 (.7)
1 (N=23)	3.8 (2.9)	4.8 (3.9)	13.6 (11.4)	3.2 (.7)	3.1 (.7)
2+ (N=26)	4.5 (3.1)	7.2 (.5)	13.9 (11.1)	3.4 (.6)	3.4 (.6)
<b>Leadership Role</b>					
None (N=130)	3.4 (2.5)	3.7 (4.8)	13.9 (10.8)	3.1 (.7)	3.1 (.7)
Middle School Liaison (N=11)	3.1 (2.6)	3.3 (4.3)	8.8 (2.7)	3 (.6)	3.3 (.8)
High School Chair (N=8)	8.3 (6.3)	5.5 (4.9)	8.7 (3.1)	3.3 (.5)	3.3 (.5)
<b>Years of Experience (1-41)</b>					
1-9 (N=63)	2.7 (2.1)	3.8 (4.7)	4.8 (2.5)	3 (.6)	3.2 (.7)
9-19 (N=29)	3.9 (2.8)	2.9 (3.8)	14.6 (3.3)	3.1 (.7)	3.1 (.6)
20+ (N=46)	5.1 (3.6)	4.5 (5.4)	27.6 (5.3)	3.1 (.8)	3.1 (.6)

**Table 1: Network Characteristics for Advice Networks**

Network Characteristics	Professional & Personal Teaching Advice
Nodes (teachers)	138
Total Edges*	494
Reciprocity	.22
Connected Components	1
Maximum Geodesic Distance	7
Average Geodesic Distance	3.16
Graph Density	.03

\*Advice network could name up to 15, inquiry 5

**In-Degree Trends:** On average, who receives more nominations from other teachers seeking advice?

- Teachers with **more years of experience**.
- Teachers who belong to **more PAs**.
- **High school teachers compared to middle school teachers**.

**Out Degree Trends:** On average, who nominates more teachers they go to for advice?

- Teachers who **taught at more schools**.
- Teachers who **belong to more PAs**
- Teachers with **1-5 years experience** ask more teachers for advice than teachers with 6-10 years experience (but not more than those with 11+ years).

**Findings/Discussion:**

- More people seek advice from more HS than MS teachers. MS and HS teachers seek advice from similar numbers of teachers.
- Similar proportions of MS and HS teachers have PA+.
- More people seek high PA than lower PA teachers for advice.
- Higher PA teachers seek advice from more other teachers than lower PA teachers.
- PA engagement varies little by years of experience.
- Higher PA teachers are more comfortable with inquiry and see inquiry as more efficacious than lower PA teachers.
- HS Chairs have more others seek them out for advice and they seek out more others for advice than non-chairs. Chairs and Liaisons do not differ regarding inquiry.
- Teachers with more experience seek more advice and others come to them more (but no difference in inquiry-based education). Inquiry does not differ by experience level.