



# Beliefs, perception, and change: A study of ego network influence on first-year teachers

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## Abstract

This study examined the influence of ego networks on first-year teachers (1YTs) regarding belief persistence, formation, and change. The study employed a mixed methodology of interviews, survey questionnaires, and an ego-centric social network analysis of 1YTs. Findings suggest that 1YTs' beliefs can be influenced by ego networks, with some individuals showing greater influence than others in a network. The ego networks of 1YTs showed varying degrees of stability over the first year, with many networks undergoing structural changes during the first few months of 1YTs' careers. Implications for this research include structuring formal teacher induction programs that encourage interactions between diverse individuals and 1YTs, monitoring structural changes of ego networks during early-career years, and empowering administrators to increase their visibility and interactions with 1YTs.

**Keywords** New teachers · Teacher beliefs · Ego networks · Early-career teachers · Teacher induction

## Introduction

The first year of teaching can be a tumultuous time. New teachers are expected to teach students, appease parents, comply with administrative requests, and manage countless state and federal policies, including many that undermine their own professional capacity (Simon & Johnson, 2015). New teachers are also more likely to be

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placed in challenging classrooms compared to their more experienced peers (Bruno et al., 2020). Under these conditions, it is no surprise that one in ten teachers will quit by the end of their first year (Ingersoll et al., 2012) or experience uncertainty in what to do in their own classrooms, even after undergoing years of teacher preparation and training (Toom et al., 2017). First-year teachers (1YTs) are often emotionally exhausted and experience vulnerability unlike any other group of teachers (Elden, 2013; Hultell et al., 2013).

This unique vulnerability leaves 1YTs susceptible to the influence of others as they struggle to make sense of their own pedagogy and defend philosophical truths like equity in a classroom. Because of these difficulties, demands, and uncertainties, 1YTs often turn to others for advice and insight (French, 2019). Sometimes this advice comes from a formal mentor (Mena et al., 2016), and other times, it comes from more informal sources, such as a friend, family member, or something interesting on the internet (Desimone et al., 2014; Hu et al., 2018). How this advice compounds over time and influences the beliefs of novice teachers is still relatively unknown and under researched. We know that formal mentors play a powerful role in the development of 1YTs (Wexler, 2020). Research into early-career teachers has shown that local networks are influential for new teachers, through both formal and informal relationships, impacting, for example, both the level of ambitious math instruction as well as teacher retention for new teachers (Frank et al., 2020; Miller et al., 2020).

Some experts argue that teacher beliefs stem from teacher preparation programs, familial upbringing, or personal experiences (Alger, 2009), while others have credited more informal social relationships as the origin of teacher beliefs (Spillane et al., 2012). In either case, the origins and sources of 1YTs' beliefs and implicit biases are important because they have the potential to impact teaching practice.

While researchers have suggested that the beliefs of teachers are more important to study than the implementation of policy and resources (Tam, 2015) or what happens during teacher training (Van der Linden et al., 2015), Yuan and Lee (2014) called for research that addresses “the possible change in beliefs in their first few years of teaching” and how “different institutional and socio-cultural factors” impact teachers' beliefs (p. 11).

From other disciplines, we know that beliefs can impact behavior (Christakis & Fowler, 2013). We also know that social relationships can influence what people believe and how they behave, especially when there is an abundance of relational trust (Christakis & Fowler, 2013; Cranston, 2011). There is also evidence to suggest that teachers with varied levels of experience might change their practice under a persuasive social influence (French, 2018).

One study examining the impact of professional learning communities (PLCs) on teacher change (Tam, 2015) found that teachers are more likely to change their beliefs and practices about curriculum, teaching, learning, the roles of a teacher, and how teachers learn to teach when they belong to a PLC. Specifically, Tam (2015) argues that “deeply rooted prior beliefs can be altered by an effective PLC across time” (p. 35). Because PLCs are inherently social organizations of teacher collaborators, it is likely that more informal social networks may have similar effects on teachers' beliefs and practices over time.

Given the uncertainty that 1YTs face in making decisions in their classrooms, teachers may look to their social networks of informal and formal mentors for advice and insight. As teachers learn from these new sources, they may experience changes in their beliefs. By mapping the ego networks of 1YTs, we can better understand how this process unfolds and who 1YTs are relying on for advice. We may also learn how teachers perceive their learning networks interacting with and/or influencing their own teaching practices and beliefs.

This paper addresses an important gap in the literature about how 1YTs process their beliefs about teaching and how various factors play a role in influencing these beliefs. It explores how 1YTs construct their ego networks and investigates how these networks influence beliefs. Specifically, this paper aims to address the following questions:

- (1) What do the ego networks of 1YTs look like at the start of their first year, and how do they change over the course of 12 months?
- (2) How similar or dissimilar are beliefs about teaching between 1YTs and members of their ego networks?
- (3) How do 1YTs perceive the influence of ego networks on their beliefs and practices?

## Beliefs and teaching practice

Beliefs play a strong role in the identity formation, professional development, career outlook, and job satisfaction of new teachers. Beliefs can influence teachers' expectations for students (Jussim & Harber, 2005), their own self-efficacy (Tschannen-Moran & Woolfolk Hoy, 2001), and decision-making on reform efforts and policy implementation (Stenberg, 2011). Earlier research has argued that beliefs are static (Roehler et al., 1988), but more recent research suggests that teachers' beliefs can shift or change during their career (Tam, 2015). Adopting a new set of beliefs may cause a shift in teaching practice (Hopkins & Spillane, 2014) and often is the result of replacing one belief for another (Wall, 2018).

1YTs commonly enter the profession with a set of beliefs acquired through various experiences such as field experiences, personal experiences, and familial upbringing (Levin & He, 2008). These early-career beliefs about education can be closely associated with university coursework or other various encounters (Alger, 2009). When teachers first enter the classroom, their understanding of teaching is highly dependent on what they perceive from people and/or sources they trust. This is also a time when 1YTs are more confident and optimistic about the school year ahead (Moir & Gless, 2001). Yet even with increased confidence, 1YTs are more likely than any other group of teachers to question themselves and their ability to perform (Brock & Grady, 2007). This vulnerability makes 1YTs especially susceptible to influence and change. While a change in beliefs can be positive, it can also have negative implications for students and their well-being (Jahan & Mehrafzoon, 2019). By understanding 1YTs beliefs adapt, persist, or change over time,

we can start to understand what influences this process of belief change (or lack of change). Understanding how, or by whom, beliefs are impacted helps schools generate healthy working environments that best support 1YTs during their vulnerable first year. This study seeks to understand 1YT ego networks, with a broad emphasis on who 1YTs turn to for support.

## Network effects on teacher beliefs

In social network theory, patterns of social interactions between people in a social network are investigated (Scott, 2012). These interactions, or ties, are the foundational elements of influence. Ties amongst actors create patterns and define an overall social structure that “can support and constrain the access, variety, and use of resources” (Daly, 2012, p. 4). Some even argue that teacher burnout stems from these interactions (Meredith et al., 2020). Both individual attributes and social structural attributes play a role in social network theory, but the social structure emerging from the interactions among individuals is key to understanding the foundational importance of social network analysis (Carrasco et al., 2008).

This shift from an individual focus to an understanding of more dynamic supports and limitations of the greater social infrastructure allowed researchers to understand and analyze the nuances and patterns amongst and between actors’ interactions (Borgatti & Foster, 2003). These interactions lead to flows of tangible and intangible resources between actors in a social network (Daly, 2012). For instance, a tangible resource flow is a teacher sharing assessments, rubrics, agendas, or lesson plans, while intangible resource flow is a teacher sharing beliefs, knowledge, and interpretations of policy and procedures. This flow of beliefs stems from the interactions amongst teachers and may also influence the beliefs of actors within a given social network.

## Egocentric network analysis and first-year teachers

We chose to examine egocentric networks because it allowed us to inclusively study the relationships of all alters named in a year by 1YTs as opposed to only those alters in a particular network—as one might see done in a traditional social network analysis. A study of ego-networks allowed for an investigation of 1YTs beliefs, as well as helping to understand the shifts over time in a 1YT’s network (Coleman, 1990; Maroulis & Gomez, 2008). In the case of this study, the 1YTs serve as the individual actor or ego in the network. Egocentric-network studies examine “specific actors or egos, and those who have relationships with them, called alters” (Carrasco et al., 2008, p. 965). Egocentric-network methodology centralizes the primary ego (in this case a 1YT) and closely examines the ego’s characteristics (such as beliefs). The ego-alter level characteristics of each alter and the alter-ego ties are also examined. This method can monitor and record the evolution of an egocentric-network over time, including the change in the ego’s characteristics or the change in alters’ characteristics and compositions. Unlike the bounded network approach,

the “egocentric network approach considers only the linkages of a given person and operationally relies on an ego’s self-reports,” (Friedman & Aral, 2001, p. 412). For that reason, we chose to focus on the unbounded egos of 1YTs as they occurred in their new teaching environments.

## Theoretical framework

Ajzen’s (1991) theory of planned behavior (TPB) and social contagion theory (Christakis & Fowler, 2013) acted as the theoretical frameworks and guides for this study. We chose both frameworks as structures to support our research because they spoke to preconceived assumptions about the relationship between behavior and beliefs and the impact of social influence on beliefs. Christakis and Fowler’s (2013) theory is important because it expands the previous definition of social contagion theory to include the spread of beliefs. Previously defined, social contagion theory was thought of as “the spread of affect or behavior from one crowd participant to another; one person serves as the stimulus for the imitative actions of another” (Berscheid et al., 1985). Christakis and Fowler (2013) built on this definition to include social networks and interactions with other individuals as a significant component in a person’s every-day and long-term decision making. This theory encompasses the phenomenon of alters simply exposing 1YT to new beliefs in addition to reinforcing existing beliefs or posing conflicts to them.

Similarly, TPB speaks to the prejudged assumptions that beliefs and behavior are decoupled concepts. According to TPB, beliefs directly impact behaviors and behavioral intentions. TPB is unique and slightly different from the Theory of Reasoned Action (TRA) because it considers how individuals either explicitly or implicitly perceive their intentions (Fishbein & Ajzen, 1977). Ajzen (1991) developed this theory as an extension of the TRA by adding the component of behavioral intention, arguing that people either knowingly or unknowingly use beliefs to impact behavior (Madden et al., 1992). Applying this theory to the world of education and teachers, Ajzen’s theory suggests that some teachers may be aware and others unaware of how beliefs impact their behaviors in the classroom.

We chose to use both theories to direct our research design and analysis. TBD challenged us to notice that 1YTs may be unaware of their beliefs changing. Therefore, we structured our data collection to occur longitudinally over one academic year so we could monitor belief change, even if it was unbeknownst to the 1YT that their beliefs were changing. Social contagion theory guided our decision to create and monitor ego networks for each 1YT. It also helped us acknowledge that alters could expose 1YT to new beliefs (possibly reinforcing existing beliefs) or encourage 1YTs to change their beliefs to something more closely resembling alters’ beliefs. Monitoring these ego network structures over time allowed us to compare data from 1YT and alter surveys and measure belief similarity or belief change. Additionally, we analyzed all 1YT initial ego networks collectively and analyzed subsequent changes over time.

Combined, social contagion theory and TPB allowed us to situate our study in an appropriate context by providing a structure for how beliefs impact classroom

practice and how the beliefs of other teachers and/or school personnel could spread to new teachers. Social contagion theory depends on examining the social networks of 1YTs to identify individuals with whom 1YTs are frequently turning to for help in their first days and months of teaching. By analyzing 1YTs' ego networks, we can draw inferences about the impact of the network on an individual's beliefs and behaviors (Penuel et al., 2009), but to understand the more implicit ways in which social networks can impact 1YT beliefs remains unclear and an aim of this study. If 1YTs are developing networks that include individuals who support their own beliefs, they may continue to teach as they had during their time in an education preparation program. However, if 1YTs are developing networks with individuals who are in direct conflict with their current beliefs, will 1YT beliefs change moving forward to look more like the beliefs of their network?

### **Beliefs, values, and attitudes**

We chose to study “beliefs” because this terminology best represents a cognitive premise that is held to be true by the individual holding that premise. “Values” and “attitudes” were also considered as potential terminology to reflect this phenomenon because (1) values are often defined by what someone thinks is important, and (2) attitudes are defined by the way an individual expresses his or her thoughts because of their values and/or beliefs (Rokeach, 2008). Ultimately, the term “belief” best encapsulated the origin of what individuals hold true and base decisions on, whether spontaneous or deliberate.

Applied in an educational context, beliefs are what teachers hold true about what happens in their classroom and can include constructs such as teaching and learning, instruction and pedagogy, student actions and aptitude, parent and community involvement, and the greater role of school in society. Teachers' values and attitudes are also important and can play a role in the decision-making process (Richardson, 1996), but because beliefs play a more foundational, elemental role in a teacher's actions in the classroom, we felt they were most important to consider for the focus of this study. For example, if a teacher believes that the learning theory of constructivism best explains how people acquire knowledge and learn, then she will value constructivist-style teaching practices and hold a positive attitude about implementing constructivist-style teaching practices into her classroom. In this example, the origin of her values, attitudes, and actions are derived from her belief in constructivism as the superior learning theory.

### **Methods**

This study employed a sequential explanatory mixed methods approach (Ivankova et al., 2006). This approach was most advantageous for this study because it allowed us to combine qualitative and quantitative analysis methods to assess our survey and interview data. We surveyed 1YTs to determine their beliefs and their alters, and we surveyed alters about their beliefs. We intentionally surveyed 1YTs and alters at

specific intervals to track any statistically significant changes in these beliefs over the course of the study. We also used survey data to inform future interview questions. We describe these methods in detail below.

## Context of the study

The context of the study is a large, suburban county that borders a major metropolitan urban core in the midwestern United States. This county includes 28 school districts and approximately 208,000 public and public charter PK-12 students, spread over many urban, suburban, exurban, and rural communities. Through a new teacher induction program (NTIP) offered by the county's intermediate school district (ISD), local school districts were invited to participate by nominating new teachers to the program. Districts were invited to participate in NTIP by a team of ISD consultants based on how well service to the district met the ISD's Continuous Improvement Plan (CIP) goals of equity, excellence, well-being, and operations, among other demographic and achievement factors. Consultants at the ISD provided, in partnership with the districts, multiple professional development experiences for early career teachers that also met the state requirements for new teacher professional development hours.

In total, twenty-six 1YTs from three districts in the county voluntarily participated in this study throughout the entire school year (i.e., completed three surveys and two interviews). All the 1YTs taught in public PK-12 schools and represented various grade levels and content areas. Roughly half of our sample worked in elementary schools while the other half taught at the secondary level. The sample of 1YTs was overwhelmingly homogenous in terms of gender and racial/ethnic identity (Table 1), but their districts were noticeably more racially and ethnically diverse (Table 2).

During the 2018–19 school year, during which time the data was collected, the project was in its third and final year of pilot status. Each year of the pilot program included an iterative process of program refinement based on consultants' own reflections on the program deliverables and feedback from both administrators and new teachers in participating districts.

**Table 1** Demographics of first-year teacher identities

Characteristics ( $n=26$ )	
Gender identity	
Female	25
Male	1
Racial/ethnic identity	
White/Caucasian	26
Middle Eastern	1
East Asian	1

The sum of the categories in "Racial/Ethnic Identity" ( $n=28$ ) is greater than total participants in the study ( $n=26$ ) because some participants selected multiple racial/ethnic identities

**Table 2** Demographics of first-year teacher school districts

School district	Rigel (n = 11) (%)	Cambria (n = 10) (%)	Alpha (n = 5) (%)
Student demographics			
White/Caucasian	75	87	57
Asian	12	2	11
Hispanic	5	6	8
African American	4	3	20
Multiracial	3	2	3
Other	1	<1	1
% free and reduced lunch	10	19	35

This district demographic data is self-reported to the midwestern U.S. state in which the study takes place. That data is then made public on the state's Department of Education website

The alters of the study were named in an open-ended fashion by each of the 26 1YTs. Occasionally 1YTs named the same alter, but the overwhelming majority listed unique names for alters in the September 2018 survey (time 1). Because 1YTs were given the opportunity to list alters at three separate points in time, we saw extensive variety and some repetition amongst 1YTs' named alters. For example, in total, 115 alters were listed by 1YT participants in the September 2018 survey, of which 105 alters were asked to participate in the November 2018 (time 1.5) survey via email. The November 2018 alter survey response rate was 25.7%.

### Data collection

We chose to use a sequential explanatory mixed methodology (Ivankova et al., 2006) because our research questions addressed issues that occurred over time. We collected survey data to understand who 1YTs learned from regarding any topic of professional concern. Additionally, the questionnaire asked teachers to use a Likert scale as a way of expressing their beliefs about pedagogy and instruction; the purposes of schooling; and equity and privilege. Then, 1YTs named individuals that were sources of professional learning; these individuals are defined as “alters” and were used to construct 1YTs' ego networks.

We collected data longitudinally over the course of one academic year in an effort to monitor change. Because all study participants were new to the profession, we used the Moir (1990) First Year Phases of Teaching Model as a timeline for our data collection. The Moir (1990) theory states that 1YTs undergo six consecutive attitudinal phases as they experience their first year in the classroom (as the official teacher of record). We used these phases to inform our data collection process, which occurred over the course of one academic year (August to June). This process helped us to intentionally identify any changes that occurred in 1YTs' ego networks or beliefs. We also collected survey data from alters at key points of the course of the year following the same process to identify any change in alter beliefs.



More specifically, as a part of our data collection, 1YTs completed three waves of surveys (September, January, and May). Surveys during these months gave us data about their social networks and their beliefs. Regarding 1YTs' social networks, respondents were asked, "In the last 12 months, which colleagues have you learned from regarding any topic of professional concern?" which was then followed by "How would you describe [ALTER'S NAME]'s position as it relates to your professional learning?" and "In the last 12 months, how often did you learn from [ALTER'S NAME] regarding any topic of professional concern?" We surveyed 1YTs about their beliefs by assigning a Likert scale to 25 belief statements that represented beliefs about pedagogy and instruction (e.g. "A quiet classroom is generally needed for effective learning.") (von Oppell et al., 2021); purposes of schooling (e.g. "School is for democratic equality and should concentrate on preparing students to be active citizens in society.") (Labaree, 1997); and equity and privilege (e.g. "Students are unsuccessful in school because of a lack of effort.") (French, 2017). In November (time 1.5) and April (time 2.5), we surveyed the alters that 1YTs had named as sources of professional learning. In this survey, we asked alters to identify their level of agreement or disagreement with the same 25 belief statements that were given to 1YTs in September (time 1), January (time 2), and May (time 3). We attempted to reduce social desirability bias (SDB) in these belief items by allowing for the "self-administration of the questionnaire" by both 1YTs and alters (Nederhof, 1985) and assuring respondents of data confidentiality.

Additionally, we interviewed all 1YTs immediately following the September survey (time 1) to gain a fuller understanding of their social networks, their beliefs, and the relationship between their social networks and their beliefs. Results from this survey were used to inform and structure future interview questions for each participant. As an example, if a 1YT said that Mr. Gordon informed their thinking on where they placed students in the classroom, we would follow-up with questions such as, "Why does Mr. Gordon inform your thinking about this topic?" These follow-up interviews provided us with in-depth accounts of how 1YTs formed their networks and how they perceived these networks were impacting their beliefs about teaching and learning.

## Analysis

Our study focused on 1YT social networks and the beliefs of 1YTs and their alters. We mapped each 1YT's social network following an ego network protocol. Distinctly different from a classic socio-centric analysis, an ego-centric analysis allowed us to compare ego networks across 1YTs and identify similarities and differences in structure and influence. This process resulted in 26 separate ego networks that we monitored for change (in beliefs, alters, or both) over the course of the academic year. We then noted these times of change (or no change) as they occurred and compared them to the other ego networks. We also monitored any change in beliefs for alters over time to better understand the directionality of change (i.e., did the 1YT's beliefs change to more closely align with their alters or vice versa).

Specifically, we created ego networks by mapping alters and the frequency of interactions between alters and the 1YT. We then noted any differences in beliefs that existed between an alter and a 1YT. We looked closely at all the changes that took place over the course of the year for each alter and then generalized these trends across the entire dataset. In particular, we used data from the first survey of 1YTs (time 1) to control for unobserved differences amongst study participants by tracking all changes in alters named, including previously named alters who were subsequently excluded. As a check for robustness, we examined interview data across all three data collection points to examine if the same conclusion (i.e., ego network structure) was supported under systematically different conditions.

While we could calculate the reliability and validity of our quantitative results mathematically, assessing the rigor and trustworthiness of our qualitative results was more challenging and complex. To address this, and the credibility of our data, we relied on its transferability, confirmability, and dependability (Kyngäs et al., 2020). Specifically, we interviewed each of our 26 1YTs two times over the course of the study and deliberately situated these interviews after the completion of the time 1 and time 3 surveys so that 1YTs could accurately describe, discuss, and disclose any changes that occurred in ego network structures or beliefs. We transcribed all our interview data and then coded it using a thematic analysis (Glesne, 2016). We followed the Saldaña (2015) method for a priori coding by first structurally coding the text of five randomly selected interviews to create an initial codebook. Once our codebook was created, we moved toward eclectic coding methods to “refine our first-cycle choices.” (Saldaña, 2015, p. 64). We then used this codebook to code all our interview data. We also systematically based our data collection timeline on the Moir (1990) theory to gather data from 1YT when they were most likely to undergo change. We then used NVIVO software to integrate survey data and interview transcripts and examined all data for trends in change—and, in some cases, no change—across ego networks over time. Considering this process, we were able to confirm timely inferences generated from interview data with prior survey data and vice versa. To check for inter-rater consistency, we relied on NVIVO software to identify any inconsistencies amongst raters. In similar fashion to our a priori method for coding, we identified specific themes that emerged and corroborated these themes with our overarching research questions.

This enabled us to generate lists of common understandings, behavior, rationalizations, and ego-network structures amongst 1YTs. This context provided sufficient evidence for ongoing memo-writing, which acted as a culminating factor in analysis.

While the small sample size ( $n=26$ ) of 1YTs makes the quantitative part of our analysis less definitive, all 1YT completed two interviews and three surveys. Collectively, the analysis of this study incorporated data from 52 interview sources and 78 surveys. Additionally, alters completed surveys in November 2018 (time 1.5) and April 2019 (time 2.5) which provided supplemental data to describe possible changes in 1YT beliefs and ego networks. Due to the small sample size, however, the risk is greater for committing the type II error and failing to detect statistically significant differences in the network composition. By incorporating alter data and qualitative interview data from 1YTs over time, we were able to generate a more

compelling narrative and more accurately describe changes in ego network structure and 1YT beliefs.

## Results

As an ongoing contribution to our broader research around teacher induction, these data begin to answer important questions about 1YTs' learning networks and the role of beliefs in shaping and responding to those networks. Results are addressed by research questions.

### Structure of first-year teachers' learning networks

In terms of ego network configurations, we examined the number of nodes in each ego network (number of alters), the named roles of each of those alters, and the frequency of interactions with those alters. In this way, we captured the quantity and types of interactions for each of the egos in our sample.

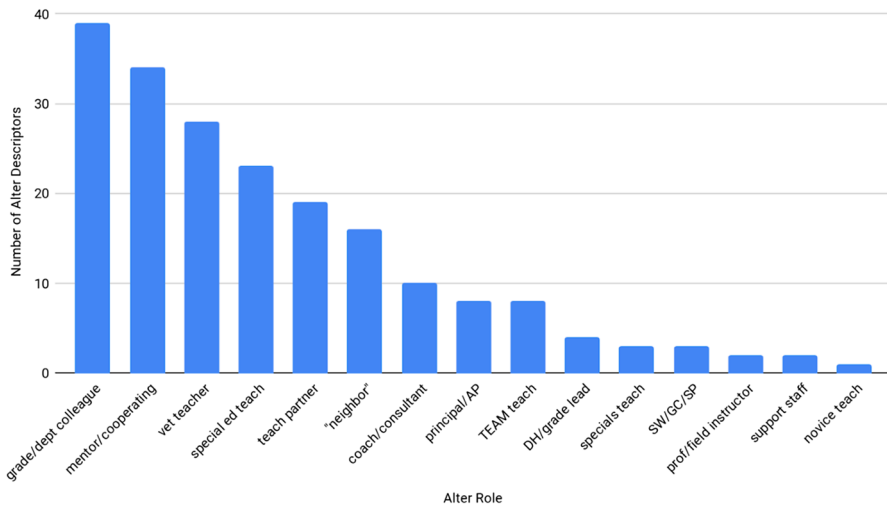
1YTs' time 1 (September) learning networks ranged from two to 10 alters. In the survey, the maximum number of allowable alters was 10. The mean number of alters was 4.33, with a standard deviation of 2.47. The modal number of alters was three (in eight 1YT ego networks), followed by two (in six 1YT ego networks), four (in four 1YT ego networks), and five (in three 1YT ego networks). The mean number of alters was skewed higher than the mode due to the low  $n$  and the two responses with 10 alters.

Alters' roles at time 1 were characterized by 1YTs with a variety of descriptors (Fig. 1). 66 alters were described by 1YTs with a single role descriptor. 32 alters had two role descriptors, followed by 12 with three role descriptors and seven with four or more role descriptors. Of the 200 total role descriptors, almost one-fifth (39) were grade level/academic department colleagues. Mentors/cooperating teachers (individuals who supervised a 1YT during student-teaching) comprised 17% (34) of the total, and veteran teachers were 14% (28). "Special education teacher" was used to describe 23 alters. Teaching partners (19) and "neighbor" teachers (16) each comprised slightly less than 10% of the total role descriptors. Also of note, principals/assistant principals were only mentioned eight times, academic department heads/grade level leads four times, and professors/field instructors twice.

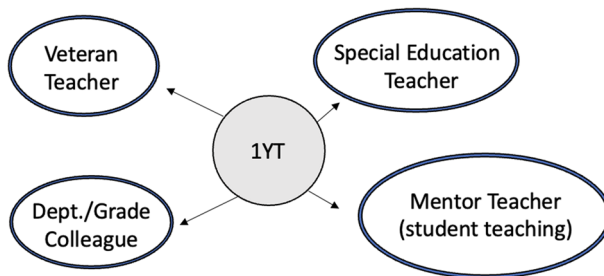
The modal/mean ego network configuration of these 1YTs at time 1 was characterized by the following:

- Three to four alters;
- Alters as grade-level or academic department colleagues, mentors or cooperating teachers, veteran teachers, and special education teachers; and
- Learning from alters three to five days per week

These characterizations of 1YTs' time 1 ego networks are visualized below (Fig. 2).



**Fig. 1** Number of alter descriptors, by role (Time 1). *Note* This graph shows the frequency of alter roles at time 1. The x-axis is labeled with the descriptors 1YT's chose when identifying who they learned from in the last 12 months. The list included: grade/department colleague; mentor/cooperating teacher; veteran teacher; special education teacher, teaching partner, "neighbor" teacher (i.e., a colleague who taught physically near the 1YT); instructional coach/consultant; department head or grade-level lead teacher; "specials" teacher (i.e., physical education, art, music teacher); social worker (SW), guidance counselor (GC), or school psychologist (SC); teacher education professor or field instructor; building support staff, and "novice" teacher (i.e., an teacher within the first 5 years of their career)



**Fig. 2** Modal/mean ego network configuration of 1YT's (time 1). *Note* This is an example of a 1YT's ego network with the alters labeled as to their role. This particular teacher represents the mean number of nodes that were nominated when asked to name and describe who they learned from in the last 12 months. In this case, the 1YT is regularly approaching a Grade Level or Department head, their cooperating teacher, a veteran teacher, and a Special Education teacher for help. These alters were then surveyed about their own beliefs

This modal/mean ego network configuration is challenged by the amount of instability in 1YT's networks from time 1 to time 2. Only 40.9% of total alters from time 1 were present in 1YT's networks at time 2 (1YT's mean alter carryover from time 1 to time 2 was 47.1%). Although the average number of alters remained relatively stable from time 1 to time 2 (an additional 0.08 alters per

1YT), the standard deviation (2.97) highlights the wide variability in changes, just in terms of sheer numbers, of 1YTs' learning networks.

The quantitative and qualitative analyses supported one another. 1YTs preferred to form new relationships (and build learning networks) with individuals who had more teaching experience and expertise in a similar subject area/grade-level. The quantitative data showed that 1YTs are most likely to form relationships with veteran teachers at their school, particularly with experienced teachers, but not necessarily those individuals with supervisory roles.

The qualitative data mirrored this finding. One 1YT, Ms. Dominion shared, "I go to people that I've known who have been teaching in the district for a while." Another 1YT, Mr. Tomalio shared, "...people that have been in the profession the longest definitely are able to share more." Both quotes illustrate how 1YTs look to individuals with more experience for advice. Another theme that emerged from the qualitative data was trust. 1YTs were more likely to seek advice from individuals that made them feel at ease and in whom they could trust. In reflecting on how important it was to find someone she could confide in, Ms. Lafayette shared that she likes to, "have that connection with somebody" and "feel welcomed." Ms. Lafayette went on to state that "it doesn't necessarily depend on their status in terms of like a principal or a colleague. It's really just if they make me feel open to asking questions" and that she would "continue to go to see that person." This quote illustrates how 1YTs chose sources of influence based on factors like amiability as opposed to more objective measures. The example of Ms. Lafayette deliberately seeking connection with someone less intimidating than a principal or someone who could view her in an evaluative capacity bolsters the survey data that shows 1YTs seeking advice from more experienced individuals who share a similar professional status.

Most 1YTs went to those individuals who were both welcoming and experienced. In interviews, 1YTs also mentioned their formal mentor teachers who supervised their student teaching more often than any descriptor. Most teachers shared that this mentor teacher who worked with them during student teaching was still the most influential source in their present social network.

One teacher, Ms. Jackson, exemplified this source of support: "When it comes to instructional ideas and things like that, I still have contact with my CT [cooperating teacher] from student teaching." She went on to elaborate that she would "bounce ideas back and forth" and "come up with different concepts and things when planning units and ideas for [her] class." Many other teachers shared that their mentor teachers were most influential in their decision-making and still active in their current lives as 1YTs, further emphasizing the role that mentor teachers play in 1YTs' professional networks.

Lastly, the quantitative survey data and qualitative interview data suggested that 1YTs interact with and learn frequently from special education teachers. One teacher, Ms. Rambeau said, "In my room, I had quite a few students with IEPs [Individualized Education Programs], or who were in the process of getting IEPs, so [the special education teacher] Carol was there and helped me with a few individual cases." Additionally, other teachers shared how special education teachers often handled situations differently than general education teachers. Ms. Grant shared that the special education teacher in her building "has a different teaching style," which

she “really liked.” Ms. Grant would, “bounce ideas past her” and think, “How can I take what [she is] doing here and implement it with this program instead?” Like many of the other teachers interviewed, Ms. Grant deeply trusted the special education teachers by noting, “They’ve been there a long time, they know the process, they know what they’re doing and how things flow.”

Ms. Grant thought it was “much easier being able to take the initial idea or concept” and “bounce it past them to make sure [she was] on the right track.” Like many of the other 1YTs, Ms. Grant would vet her ideas through the special education teachers and look to them for more appropriate ways to approach teaching when she struggled with a lesson or in addressing student behaviors. The quantitative data revealed that special education teachers were the fourth most popular alter for whom 1YTs said they learned from over the past 12 months, and the qualitative data supported this finding of frequent interaction with special education teachers by showcasing how and when 1YTs from all content areas relied on special education teachers for advice.

In response to the question, “In the last 12 months, how often did you learn from [ALTER’S NAME] regarding any topic of professional concern?”, the mean professional learning frequency at time 1 was 105.33 days per year ( $SD=75.98$ ). The modal frequency for all alters was “daily” (180 days per year). Additionally, “daily” was the modal frequency response for the alters listed first, second, third, and fourth. This frequency of interactions around professional learning was confirmed in the interview data. One 1YT, Ms. Danielson noted, “I worked with her daily. We were in the classroom together. We really worked as team teachers, and so I went to her for everything.” Ms. Danielson also shared, “she guided me through my lead teaching, classroom management, basically everything”. This example illustrates how many 1YTs interact with their alters on a daily basis, further compounding the exposure of the alter to the 1YT.

The findings from this study emphasize the importance of (1) colleagues that are directly tied to 1YTs’ own grade level or academic department; (2) the experience of being mentored by a colleague or by a cooperating teacher (the latter during student teaching); (3) years of experience as an educator when engaging in professional learning opportunities with 1YTs; (4) specialized knowledge and experience with special student populations; and (5) lack of interaction between 1YTs and building-level administrators.

### **Similarities and differences among first-year teachers and alters**

1YTs and alters reported their agreement with belief statements. The four-point Likert scale used for these items ranged from zero to three, zero being “strongly disagree” and three being “strongly agree.” 1YTs responded to these items in September (time 1), January (time 2), and May (time 3). Alters reported their agreement with the items in November (time 1.5) and April (time 2.5). 1YTs’ beliefs were stable from time 1 to time 2. The following table (Table 3) includes items that elicited responses that showed statistically significant differences between mean 1YT and alter responses. Even though these items met the traditional p-value thresholds for

**Table 3** Statistically significant T-test comparisons between time 1 IYTs, time 1.5 alters, and time 2 IYTs, by belief statement

Belief	Time 1 (IYT)		Time 1.5 (Alter)		Time 2 (IYT)		T-test z-score
	M	SD	M	SD	M	SD	
	Time 1 to time 1.5	Time 1.5 to time 2	Time 1 to time 1.5	Time 1.5 to time 2			
Systems of privilege impact students' opportunities for social and economic mobility	2.07	0.38	2.37	0.63	2.15	0.46	-2.05*
Teachers should follow a textbook or workbook	1.22	0.58	0.85	0.72	1.31	0.55	2.11*
Students learn best when there is a fixed schedule	1.81	0.40	1.48	0.70	1.96	0.60	2.09*
Textbooks and other published materials are the best sources for creating curriculum	1.33	0.62	0.93	0.62	1.35	0.56	2.25*
Teachers should cluster students' desks or use tables so they can work together	2.52	0.58	2.04	0.65	2.35	0.49	2.73**
Teachers should assess students informally through observations and conferences	2.38	0.50	2.26	0.53	2.58	0.50	0.90

p value \* < 0.05; \*\* < 0.01

social science, the z-scores illustrate the relatively tentative nature of these findings and highlight the need for more cases to confirm or disconfirm the findings.

This table confirms that 1YTs showed significant disagreement on topics such as social inequality and pedagogical strategy. In some cases, 1YTs changed their beliefs to align more closely with what their alters were reporting. The quantitative survey data supported qualitative themes and provided evidence that 1YTs were strongly considering the advice of their most trusted (and frequently visited) alters.

However, as a collective, most of the belief statements fostered similar results between 1YTs and their alters. Of the 25 items, only six elicited statistically significant differences in either comparison. Both groups indicated that their pedagogical approach is more student-centered than traditional (i.e., directive). They also agreed that one purpose of education is social mobility. Within the equity and privilege set of items, 1YTs and alters shared a sense of ambiguity. Both groups, on average, were split about their agreement with statements related to the effect of external forces on one's financial and educational success. They both strongly agreed on the pedagogical benefits of a diverse student population, and they disagreed with the idea that they have "concerns about working with diverse populations and/or communities." Finally, they both shared mild agreement about the importance of "maintain[ing] a level of neutrality" in schools, which may support their beliefs about diverse student populations and their lack of concern about working with diverse student populations.

As mentioned, and illustrated in Table 3, belief statements that fostered statistically significant differences between 1YTs and alters centered on the use of instructional resources, a specific collaborative design choice, the relationship between privilege and socioeconomic mobility, and the role of informal assessment. 1YTs and their alters both expressed disagreements, on average, with statements that privileged textbooks, workbooks, or other published materials during instructional planning and curriculum creation processes. Even so, the difference in responses of 1YTs and alters to these two items were statistically significant, and their difference increased from time 1 to time 2, with 1YTs leaning closer to agreement with these statements than the alters reported. In other words, compared to their alters, 1YTs tended to rely more heavily on textbooks, workbooks, and other published materials during instructional planning and curriculum creation processes, and this reliance increased by midyear.

In terms of design choices, 1YTs believed more strongly than their alters that teachers should cluster students' desks and tables for the purpose of collaborative work. This item fostered the largest difference in opinion between 1YTs and alters, but by midyear, this item did not show statistically significant differences between 1YTs and alters. This finding was particularly noteworthy as we saw 1YTs abdicating their initial preference for learning environments for what most alters had preferred during time 1.5. As an example, Ms. Randolph shared her experience trying flexible seating after she had learned about it from a close alter. In explaining why she chose to use this alter's approach to classroom seating arrangements, she shared that this "was something I hadn't really learned about in school, but something new and a new belief, kind of a new view." She went on to state that she was now "trying to implement [this practice] in [her] own classroom." In defending her decision to



incorporate this new learning design, Ms. Randolph shared, “A lot of teachers have tested it, and I heard their results and a lot of positive things from it, so I wanted to try it for myself.” In explaining why one 1YT incorporated what her alters were suggesting she do in the classroom, Ms. Polko shared, “just ‘cause they’ve been around longer so at that point I would just trust their experience and knowledge in the profession.” These results illustrate how 1YTs strongly considered, and in some cases acted on, the advice from their trusted alters.

When asked about issues of inequity, alters indicated their agreement with the belief that students’ opportunities for social and economic mobility are affected by systems of privilege, more so than 1YTs. By January, 1YTs’ and alters’ responses were not significantly different. One item (“Teachers should assess students informally through observations and conferences.”) produced statistically different results at time 2, but not at time 1. Both alters and 1YTs agreed with this item, but 1YTs more strongly agreed with the sentiment that teachers should informally assess students, emphasizing a need to assess students while the learning occurs rather than at the end of learning.

### **First-year teachers’ perceptions of and interactions with learning networks**

While the results of the belief portion of the survey illustrate a general alignment between the beliefs of 1YTs and individuals in their social network, there was less consensus on how teachers perceived their networks to impact their beliefs. Some teachers felt that their network had no effect on their beliefs, with 1YTs sharing statements such as, “I think my beliefs are always still going to be the same...but I would listen to anything that they would have to say, but overall I think the beliefs would just be my own” and “...for me as a new teacher, I think I will develop my opinions and beliefs and I would take what they have said into consideration but I still think that my decision would be mine alone.” Many 1YTs were adamant about their beliefs staying the same, while others felt that their networks could impact their beliefs and teaching practices in one way or another. One teacher, Ms. Zachary, felt that her position as a 1YT came with some naiveté. She shared, “I’m so young, I’m so new to this, and I’m not going to pretend that I know exactly everything... I think once I get out there, especially after my first year, my beliefs, I’m sure, will change about different things.” Similarly, another 1YT, Ms. Keffy, felt that differences of opinion might be context-specific, sharing that, “In my network, the people that I’m working with have worked in different contexts, in different situations, different schools, and not only that, maybe come from different backgrounds than my own... Everyone views [teaching] differently, in regard to what they’ve experienced as a teacher.” Ms. Keffy also valued the beliefs of others and shared how she “liked to understand different perspectives” and the “reasoning behind [others’] ideas of pedagogy and instruction.” In reflecting on how she formed her own beliefs, she shared that she would “kind of mesh together a number of ideas.” Unlike some of the 1YTs who held firm in their beliefs, Ms. Keffy exemplifies 1YTs who entered the teaching profession with an awareness that their beliefs about teaching may change and also a willingness to let these changes take place.

While there were no definitive stances on belief change or lack of change amongst our sample of 1YTs, most teachers felt that their own beliefs could be impacted by other individuals in their network, even if those individuals held different opinions. However, all 1YTs perceived their own beliefs to match that of their named alters during time 1. This finding is particularly noteworthy as it draws into question whether or not teachers are approaching alters whom they perceive as like-minded in the first place or approaching alters for other reasons. 1YTs also felt that they shared more common interests and common backgrounds with individuals in their learning network.

## Discussion

1YTs experienced emotional turbulence as they progressed through each phase of the Moir (1990) model. Many teachers cited the early phases of this model as a time of uncertainty and as a time when they questioned their own knowledge and capabilities most. While all 1YTs named at least two people as a part of their ego network (and 80.8% of 1YTs in the study named three or more), one alter in these networks was typically more influential than anyone else. These influential members were often veteran teachers with whom 1YTs developed strong relationships over the course of the year. They were also likely to be a “neighbor” teacher or in a geographically close or convenient location. Just as we hypothesized with social contagion theory, the strongest influencers (as defined by the alters that 1YTs interacted with the most) were also the most likely to impact 1YTs’ everyday decision-making. As anticipated with Ajzen’s (1991) theory of planned behavior (TPB), we also saw 1YTs beliefs impacting classroom behaviors.

While 1YTs were likely to face numerous challenges in managing their classroom and navigating the cultural and academic terrain of their new school community, findings from this study align with what we expect from social contagion theory: many 1YTs acted and made decisions based on the guidance and expertise of more experienced colleagues. Previous educational research has suggested that new teachers act in isolation and make decisions based on their own beliefs (Ingersoll & Strong, 2011), but this study supports emerging work that suggests teachers look to other individuals for answers and act with ego networks in mind.

While we have strong evidence from this study to support Ajzen’s (1991) theory of planned behavior (TPB), we have less evidence to support the idea that alters change the beliefs of 1YTs, something we expected to find based on social contagion theory. We confirmed that some 1YTs had changed their beliefs to match the reported beliefs of alters they interacted with most. However, because these statistically significant changes occurred for only a few of our 1YTs, we cannot generalize these findings across our entire sample. Our data was limited in capturing the phenomenon of belief change and the directionality of this change, but we did have strong evidence supporting the similarities of beliefs between alters and 1YTs in the first half of the year. This finding is particularly noteworthy because it draws into question whether 1YTs are approaching alters whom they perceive as like-minded in the first place or approaching alters for other reasons.

If 1YTs are approaching alters whom they perceive as like-minded, it might explain our challenge in fully capturing belief change. Are 1YTs forming relationships with alters based on factors that we captured in this study (such as proximity or status), or are 1YTs self-sorting possible professional network alters based on a series of implicit beliefs prior to any sort of relationship? If the latter is true, future studies investigating the implicit biases and/or decision-making surrounding the phenomena of *why* 1YTs approach alters in the first place could help explain confounding factors that influence belief change that were not considered in this study.

Notwithstanding, it was clear that all 1YTs valued advice from members in their network. Also, because most of the 1YTs had recently formed relationships with many of the individuals mentioned in their ego networks, it is possible that the necessary level of relational trust had not yet accrued between 1YTs and alters to have an impact on beliefs. Monitoring this group of 1YTs and their ego networks over their early-career years might reveal more statistically significant findings in terms of belief change based on relationships with alters.

In terms of awareness, some teachers were consciously aware of their beliefs changing and others were not unaware of this change. 1YTs that were aware of this change provided compelling anecdotal accounts of how their beliefs had been changed in light of relationships with their most trusted alters. We also saw changes in responses to survey questions. Very few teachers expressed any influence from others outside of their new school community (i.e., professors or former peers from their teacher preparation programs), which provides further evidence that many relationships between 1YTs and alters were new.

Our data suggested that 1YTs are interacting with grade level/academic department colleagues, formal mentors, and cooperating teachers more than anyone else. Our data also found that 1YTs are less likely to turn to administrators for advice. Some 1YTs felt uncomfortable going to those with evaluative power (such as principals) with concerns because they did not want to appear as incompetent. Given this finding, principals should aim to not only interact with 1YTs during evaluations and informal classroom observations but should also cultivate nurturing relationships outside of these contexts to be more approachable and less intimidating. Principals and building administrators can also play an important role in helping to situate 1YT in supportive and productive working environments. Additionally, these examples of intentional placements and routine check-ins with 1YTs allow administrators to reiterate the school's mission and mitigate damaging deviation from it.

Given our finding that 1YTs rarely interact with the former university professors—individuals who often are very influential during teacher preparation and a valuable resource in disseminating current teaching pedagogy to student teachers—districts should consider how they can partner with local universities to establish a form of continuous improvement through teacher induction. As 1YTs improve their practice, it is important that they have feedback on how they are doing and how they can improve based on the latest research. During pre-service training, teachers learn about the best theoretical approaches in educating students, but they often have limited opportunities to practice these approaches in classroom settings. Deeper and more meaningful partnerships between PK-12 schools and institutions of higher education could provide 1YTs with more on-the-job opportunities to improve their

teaching practice and help them approach classroom instruction with the most relevant and research-based methods for teaching. Because most of the 1YTs in this study learned from other (more experienced) teachers, this type of partnership between a university and district would also provide more opportunities for experienced teachers to encounter up-to-date research on teaching and learning.

Lastly, while we cannot precisely define how 1YT beliefs change at large, we can describe how 1YTs perceive learning networks to impact their beliefs. Nearly all 1YTs in our sample felt strongly that their learning networks could impact their beliefs over time. 1YTs perceived their own expertise as limited compared with more experienced teachers in their ego networks. This naiveté made 1YTs much more likely to trust more experienced teachers, to turn to more experienced teachers for advice, and to perceive more experienced teachers as having an impact on their own beliefs. Given these findings, it is important for schools and teacher induction programs to empower teachers with a sense of self-confidence in their ability to appropriately and effectively execute the best pedagogy based on their own preservice teacher training. By empowering teachers, schools can not only mitigate the influence of individuals who may push for a more antiquated or less effective form of teaching in their relationships with 1YTs but can also boost confidence in their ability to teach effectively, which is crucial to the success and sustainability of their career. Collectively, schools can work to reduce early-career teacher attrition, structure opportunities for more and more productive collaboration, and establish a culture of new teacher empowerment by tending to the ego networks of 1YTs. This study contributes to new understandings of teacher learning by suggesting that 1YTs are continually learning, immersed in a network of new influences after graduating from their teacher preparation programs. This study builds on existing research that investigates how new teachers improve their practice and seek advice (Huet et al., 2018) by providing evidence of who 1YTs learn from and how frequently 1YTs interact with these individuals. Additionally, this study provides a new approach to organizing and understanding the influences on 1YT through the use of ego networks. This study argues that 1YTs are likely to form networks with like-minded individuals, but future research is needed to better understand how 1YT belief change varies based on ego network composition.

## Conclusion

This study addresses the complex issues that PK-12 schools are facing when onboarding 1YTs, a critically important subset that accounts for over 12% of all our nation's total teaching force (Sawchuk & Reborá, 2016). If we can better understand how 1YTs' beliefs are influenced by existing social groups, then we can better situate new teachers in environments where they are supported and empowered to make the best decisions for their students. By mapping 1YT ego networks, we can examine who may affect their beliefs, when a change in beliefs may occur, and how beliefs change over time. By studying the interactions between 1YTs and individuals in their ego networks, we can observe who 1YTs interact with based on personal characteristics (Gerber et al., 2013), teaching credentials (Spillane, 2005), or

something entirely unknown. Because this research is situated in a PK-12 context through a research partnership between an LEA and a local R1 university, it offers an action-oriented approach that can inform not only theory but also actionable results that guide the ways in which the LEA community responds to the needs of its constituent 1YTs. Finally, this study illuminates the need for more research on the ego networks of 1YTs as they relate to building supportive teacher environments and strong teacher induction programs.

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