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# Why Do You Want to Teach? Interpreting STEM Pre-Service Teachers' Motivations through a Semantic Lens

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WHY DO YOU WANT TO TEACH? INTERPRETING STEM PRE-SERVICE  
TEACHERS' MOTIVATIONS THROUGH A SEMANTIC LENS

A Capstone Project Presented in Partial Fulfillment  
of the Requirements for the Degree Bachelor of Arts  
with Honors College Graduate Distinction at  
Western Kentucky Univeristy

By

Delaney L. Holt

April 23, 2019

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I dedicate this thesis to my parents, Darrell and Monique Holt, who have continually pushed me to my fullest potential, guiding me with unyielding support and love.

This thesis is also dedicated to Ann Holt, Danny Holt, Margaret Whitaker, and John Whitaker. I hope that I have made you proud.

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## Abstract

This qualitative study sought to examine the relationship between the motivational profiles that pushed undergraduate STEM pre-service teachers ( $N = 181$ ) to enter the teaching profession and the word choice used to articulate those motivations. Through the application of a semantically-analytical lens, this study aimed to uncover preliminary patterns that could predict STEM pre-service teachers' overall commitment levels to the completion of the STEM education major and overall certification. Written responses to the question "Why did you want to become a teacher?" were gathered from a longitudinal survey administered from spring 2011 to fall 2016 as part of the Knowing and Learning in Mathematics and Science course—a prerequisite to the remainder of the pre-service teachers' undergraduate curricula. Findings indicated that the STEM pre-service teachers who completed their certification ("stayers") more frequently articulated a specific love for teaching, expressing commitment to the STEM education field through the use of boosters and evidentially-supported inflationary discourse devices. On the other, STEM pre-service teachers who deserted the education major prior to acquiring certification ("leavers") used hedges and broad inflationary discourse devices to articulate a weakened overall commitment to gaining teacher certification. The findings provide evidence to support the incorporation of clinical models into the undergraduate curricula. In addition, evidence supports that university advisors who are systematically trained to interpret the semantic structures of their advisees' written responses could use the tool to better serve those advisees' needs.

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## **Introduction**

By 2025, 3.8 million teachers will be needed to accommodate the number of children enrolled in elementary and secondary schools (both public and private) in the United States. In addition, 350,000 new teacher hires will be sought (Hussar & Bailey, 2017). Unfortunately, according to data compiled by the Learning Policy Institute, there was a 35% reduction between 2009 and 2014 in “undergraduate and postbaccalaureate teacher preparation enrollments, which [amounted] to a decrease of almost 240,000 fewer professionals working their way toward the classroom in 2014 as compared to 2009” (Sutcher, Darling-Hammond, & Carver-Thomas, 2016, p. 25). In other words, as the need for teachers continues to increase, university enrollment in college education majors continues to statistically decrease. Shortages in science, technology, engineering, and mathematics (STEM) education fields are of great concern, especially as university enrollments continue to decrease (Sutcher, Darling-Hammond, & Carver-Thomas, 2016).

Each year, around 10% of schools within the United States report difficulties in locating qualified educators to fill STEM-based positions (Sutcher, et.al, 2016). Due to this national shortage of certified STEM teachers entering the workforce, school systems and education stakeholders are grappling with constant recruitment and employment problems (Cohen-Vogel & Smith, 2007; Jacob, 2007). As a result, employers are beginning to turn to universities to fix this ever-mounting issue (Rogers, Winsip, & Sun, 2015). To assist universities and teacher-preparatory programs as they work to gain (and retain) STEM pre-service educators, researchers have shifted to analyses of STEM pre-service teachers’ motivations for entering the profession (Rogers, et. al, 2015).

In a broad sense, research dating back to 1960 shows that pre-service teachers' motivations for entering the profession typically fall into one of three categories: altruistic, intrinsic, or extrinsic (Fox, 1961; Book et. al, 1983; Book et. al, 1986; Brookhart & Freeman, 1992; Urdan & Karabenick, 2010). With these categories in mind, pre-service teachers in the United States who are fueled primarily by altruistic (i.e. making a better world) or extrinsic motivations (i.e. money or recognition) have a lower rate of degree program completion and career advancement (Kim & Corcoran, 2018). However, as evident in countries like Australia, intrinsically-driven motivations, including self-efficacy regarding teaching ability and perceived social importance, lead to persistence through education programs, later resulting in long-term employment (Watt & Richardson, 2007). These generalized motivational analyses have been used as lenses into the internal workings of pre-service educators with the ultimate goal of uncovering a "motivational combination profile" that creates the perfect, most-effective educator (Urdan & Karabenick, 2010; Watt & Richardson, 2008; Watt & Richardson, 2007). However, no perfect "motivational combination profile" has ever been conclusively determined (Urdan & Karabenick, 2010). As a result, researchers have been forced to address these motivations in broad, all-encompassing categories; they have not been able to conclusively connect pre-service teachers' later actions to their motivational statements.

Given the ever-declining statistics regarding STEM-teacher retention within U.S. universities, effective university advisors and program designers could garner extensive knowledge of these motivational patterns in an attempt to better encourage students' internal reflective practices. However, these advisors would be lacking conclusive

evidence of their advisees' commitment levels to the STEM-education field. Therefore, to help discern whether or not the education profession is appropriate for each advisee (before money, time, and resources are wasted), university advisors could apply a semantic analysis of personalized, open-ended writing samples (Reja, Manfreda, Hlebec, & Vehovar, 2003). Within the last half-century, research into compositional studies and discourse artistry has unearthed an interconnected relationship between the writer's internal workings and the linguistic features that he or she uses in written responses (Barton, 2003; Hyland, 2005; Beare & Meade, 2015).

Therefore, the purpose of this study was to deconstruct that interconnected relationship between our participants and their written responses, furthering the study by “analyzing the ways that specific features of language contribute to the interpretation of texts in various contexts” (Barton, 2003, p. 57). Ultimately, analyzing how pre-service teachers articulate their motivations for entering the profession could provide stronger guidance when estimating projected program longevity, leading to more accurate retention projections for major programs. Thus, the aim of the present study was 1) to determine the differences in the motivational profiles between STEM teacher candidates who persisted toward certification and those who did not, 2) to discern how the level of commitment to teaching manifests within written responses regarding those motivations to teach, and 3) to uncover the most significant semantic differences between the written responses of future STEM teachers and STEM teacher candidates who decided to leave the major. By completing these steps, the goal was to unearth explicit evidential patterns that could point toward STEM pre-service teachers' completion or desertion of STEM certification.

## Literature Review

**Motivations to Teach.** In an effort to understand motivations for entering teaching, one must first consider the root word: motivation. Extensive research into motivational studies has led to two distinctive branches; these branches are the “initiating motivation which is concerned with the reasons for doing something and deciding to do something, and the sustaining motivation, referring to the effort for sustaining or persisting in doing something” (Han & Yin, 2016, p. 3). Based on these definitions, when studying pre-service teachers’ claims for entering the profession, one would be grappling specifically with *initiating* motivations. Therefore, to construct a full profile of pre-service teachers’ initiating motivations, researchers must consider 1) the facets that initially attracted individuals to their teacher education programs and 2) the longevity of their presence in said programs (Sinclair, 2008; Sinclair, Dowson, & Mcinerney, 2006; Han & Yin, 2016).

As previously stated, pre-service teachers’ motivations for entering the profession have historically fallen into one of three categories: altruistic, intrinsic, or extrinsic (Fox, 1961; Book et. al, 1983; Book et. al, 1986; Brookhart & Freeman, 1992; Urdan & Karabenick, 2010). Ranging from the 1960s until around 1992, these three categories were slowly expanded upon. However, until the development and validation of Australian researchers Watt and Richardson’s “FIT-Choice” framework (2006), a systematic framework that works to determine an individual’s motivations to teach did not exist. Watt and Richardson (2006) grounded the FIT-Choice Model’s theoretical framework and scale in preexisting motivational constructs originally articulated in the Expectancy x Value motivational theory (Eccles et al., 1983). This theory determines the

motivational driving decisions based upon the perceived desirability of those decisions' outcomes, for one's "choices are directly related to two sets of individual beliefs: one's ability beliefs and expectations for success, and the value one attaches to the task" (Watt, Richardson, et. al, 2012, p. 793).

Following their dissection of the Eccles et al. (1983) theory, Watt and Richardson (2007; 2012) then cross-referenced the constructs in the Eccles et al. instrument with Lent, Lopez, and Bieschke's (2002) social-cognitive career theory and research present in existing teacher education literature. The conglomeration of this research informed the development of eight constructs that encompass pre-service teachers' motivations for entering the profession; these constructs marked the genesis of today's FIT-Choice framework: socialization influences, task demand, task return, self perceptions, intrinsic value, personal utility value, social utility value, and fallback career (Watt & Richardson, 2012). Six of the eight previously-mentioned constructs further separate into smaller, more-specific motivations. Specifically, "socialization influences" include social dissuasion, prior teaching and learning experiences, and social influences. "Task demand" divides into expert career and high demand, while "task return" includes social status and salary. "Self perceptions" holisitically encapsulate an individual's perceived teaching abilities. Regarding "personal utility value," the construct has three branches: job security, time for family, and job transferability. The largest construct ("social utility value") includes shaping the futures of children and adolescents, enhancing social equity, making social contributions, and working with children and adolescents (Watt & Richardson, 2012).

Today, the FIT-Choice framework is a validated, quantitative instrument that, when applied, strives to 1) establish profiles of motivations for career choice at teaching degree entry, 2) trace changes in perceived competencies and professional commitment from degree exit through to early professional experiences, and 3) identify factors and contextual processes conducive to or inhibitory of retention (Watt and Richardson, 2007). Holistically, the quantitative data needed to gauge the previously-outlined goals are gathered through the FIT-Choice scale. Using this scale, participants encounter a variety of multiple-item indicators. Each “indicator” or “statement” begins with the phrase “I chose to become a teacher because...”, and participants are expected to rank each statement from 1 (“not at all” applicable to me) through to 7 (“extremely important” to my entry into the field) (Richardson & Watt, 2006).

In their first full study using their newly-validated FIT-Choice framework, Richardson and Watt (2006) found that Australian pre-service teachers (both undergraduate and graduate-level) rarely cited “fallback career” as a motivation for entering teaching, instead consistently rating perceived teaching ability, personal (i.e., job security) and social utility values (i.e., enhancing social equity), and positive prior experiences of teaching and learning as the most pivotal motivations. When referring back to the FIT-Choice framework, it becomes clear that Australian pre-service teachers’ motivations align with four of the larger constructs: self perceptions, personal utility value, social utility value, and socialization influences. Analysis of the study led Richardson and Watt to conclude that there were “few systematic differences between undergraduate and graduate participants across the three universities, implying that motivations for choosing teaching as a career tend to be unrelated to whether participants

chose teaching as their initial career or not” (p. 51). In the end, the motivational profiles within this study illuminated tentative patterns, but definitive patterns regarding which motivations led to committed pre-service teachers could not be discerned or finalized.

Having initially designed the framework in Australia, Watt and Richardson (2011) have moved forward, administering the scale to pre-service teachers across multiple continents and countries, including Germany, Ireland, Croatia, China, and Kenya. Then, in 2012, they completed a cross-cultural comparative study in an effort to discern motivational variations among several countries. Data from Australia, the United States, Germany, and Norway showed little variation between the pre-service teachers’ motivations, for all four countries rated intrinsic value, perceived teaching ability, desire for social contribution, desire to work with children, and prior teaching experiences (Watt & Richardson, 2012) the highest. Though more motivational similarities than differences arose from the cross-cultural data set, definitive patterns were still unreachable, and it was solidified that the FIT-Choice framework would be an effective tool to “guide investigations” and “facilitate” comparisons of samples (Watt & Richardson, 2012, p. 804).

Even though reliably-categorized constructs of pre-service teachers’ motivations have been gathered and discussed, research has “tended to overlook the centrality of teacher motivations as integral to teachers’ goals, beliefs, perceptions, aspirations, and behaviors” (Urduan & Karabenick, 2010, p. 139). As scholars have refined their interpretive instruments, pre-service teachers have been longitudinally followed, and certain combinations or “profiles” have been found to connect to either education program completion or desertion (Watt & Richardson, 2007). However, this methodology

was quantitatively-driven. As a result, there is little-to-no research that digs into the implications of qualitative analysis when it is paired with pre-service teachers' articulated motivations. Currently, it still "remains an open question as to which motivational profiles will produce the most psychologically-robust teachers, and those who can be retained as effective teachers" (Urdan & Karabenick, 2010, p. 141). Therefore, this study aimed to explore a tool that could build the foundation of a motivational, longitudinal study, incorporating a qualitative method of semantic discourse analysis to push research beyond solely the identification of STEM pre-service teachers' motivations. Instead of only identifying and analyzing solely the motivations, this study provided the opportunity to analyze how pre-service teachers conveyed those motivations through their word choices and structures in an effort to discern predictive patterns.

**Semantic Analysis.** In linguistics, the generalized term "semantic" or "semantics" is defined as the meaning of a word, phrase, sentence, or text (Barton, 2003; Löbner, 2013). Whether considered in academic or creative writing settings, semantic construction is a deliberate action that directly impacts the overall meaning of a text. The broad term "semantic" first became associated with discourse analysis—a new linguistic practice—in 1972 when anthropological linguist Dell Hymes introduced the practice to academia. To Hymes (1972), discourse analysis looked at "the ways in which language in different communicative events [functioned] to create and reflect aspects of culture, including world view" (Barton, 2003, p. 60). In other words, Hymes believed that an individual's word choice and semantic construction were explicitly connected to his or her societal and personal values, morals, and ideals. Since this birth of discourse analysis, multiple iterations of the definition have occurred. Now, modern-day discourse analysis

is defined as “the study of the ways that language is organized in texts and contexts; discourse analysis can investigate features of language as small and specific as aspects of sentence structure, or it can investigate features of texts and contexts as large and diffuse as genres and sociocultural world views” (Barton, 2003, p. 57). Unsurprisingly, these broad definitions soon bred specific discourse analysis features and conventions.

Since 1972, it has become an industry standard that “written texts embody interactions between writers and readers” (Hyland, 2005, p.173). Therefore, a writer’s overarching stance, engagement, and commitment levels regarding a specific topic can be directly interpreted by a reader. Hyland (2005) deconstructs nine specific stance and engagement discourse features in his work; however, for the purpose of this study, the most focus should be directed toward two of these features: “boosters” and “hedges.” In Hyland’s (2005) academic discourse studies, boosters are defined as “words like *clearly*, *obviously*, and *demonstrate*, which allow writers to express their certainty in what they say and to mark involvement with the topic and solidarity with their audience” (p. 179). With booster usage, an individual can show the strength of his stance regarding a particular topic and highlight his convictions all within a written sample (Biber & Finegan, 1989; Faber, 1996). Conversely, hedges are defined as “devices like *possible*, *might*, and *perhaps* that indicate the writer’s decision to withhold complete commitment to a proposition, allowing information to be presented as an opinion rather than accredited fact” (Hyland, 2005, p.178). Ultimately, boosters and hedges can be pinpointed and analyzed to interpret the writer’s conscious commitment level—or lack thereof (Biber & Finegan, 1989; Faber, 1996).

Hyland's (2005) deconstruction of academic discourse features has inspired multiple iterations of semantic discourse analyses throughout the last decade. Of these iterations, germane to this study is the use of Beare and Meade's (2015) Forms of Hyperbole in Student Writing instrument. Using this recently-developed discourse instrument, hyperbole can be coded for 1) form of hyperbole and for 2) rhetorical function of that hyperbolic form. The instrument was developed using "a practice of open coding to allow for the identification of new hyperbolic forms and rhetorical functions as they arose in the analysis of hyperbolic utterances" (Beare & Meade, 2015, p. 76). Due to the flexibility of this instrument, it can be applied to a variety of student writing samples—including survey responses. By analyzing the usage of boosters, hedges, and hyperbole in a written sample, any reader can look beyond the content of a writing sample to truly discern meaning.

As the previous explanations have shown, most forms of semantic discourse analyses occur in either academic settings where scholars must adopt "a point of view in relation to both the issues discussed in the text and to others who hold points of view on these issues" (Hyland, 2005, p. 175) or in students' "composition studies" courses (Barton, 2003, p. 57). As a result, discourse analysis—though completely applicable to the field—has never been applied to the qualitative analysis of written survey responses. Therefore, the present study provides a new lens for the linguistic tool. Previous research shows that open-ended questions allow respondents to spontaneously include more information—including feelings about, attitudes on, and understandings of a particular topic (Reja, Manfreda, Hlebec, & Vehovar, 2003). So, writing samples provided in response to open-ended questions can allow researchers to better access the respondents'

true feelings on an issue (Reja, et al., 2003). Considering this reality, this study aimed to analyze STEM pre-service teachers' commitment levels to the teaching field based on how they articulated their motivations in a written survey response.

Together, this research would suggest that an analysis that targets both STEM pre-service teachers' motivations for entering teaching and their purposeful semantic discourse selections could uncover rudimentary patterns that might offer some predictive insight into their commitments to the teaching field. Likewise, the use of Hyland's (2005) stance and engagement discourse features, as well as Beare and Meade's (2015) hyperbole elements, could offer an additional methodology to analyze pre-service teachers' qualitative data that could result in a framework on which future longitudinal research could expand. Specifically, the guiding research questions are:

1. How does a STEM teacher candidate's level of commitment to teaching manifest within a written response regarding motivations to teach?
2. Are there differences in the motivational profiles between STEM teacher candidates who persisted toward certification and those who did not?
3. What is the most significant semantic difference between the written responses of future STEM teachers and STEM teacher candidates who decided to leave the major?

## **Methods**

### **Participants**

Participants were undergraduate students ( $n = 181$ ) enrolled at Western Kentucky University in an educational psychology course for mathematics and science education majors during one semester between the spring 2011 and spring 2016 semesters. As

science or mathematics education majors, each of these 181 participants were required to enroll in the Knowing and Learning in Mathematics and Science course as a prerequisite to the remainder of their undergraduate curriculum. Therefore, the majority of the participants had only reached sophomore equivalency. The participants were 20.82 years of age on average with a mean GPA of 3.29 on a 4.0 scale and a mean ACT composite score of 24.67 on a 0-36 scale.

Out of 68 science education majors, 36 participants were secondary science education majors and 32 participants were middle grades science education majors. On the other hand, out of 113 math education majors, 63 participants were secondary math education majors, and 50 participants were middle grades math education majors. Of the 181 total participants, 132 completed their teacher certification (“stayers”) and 49 did not (“leavers”). From the science education majors, eight participants left the secondary program, and six left the middle school program. From the math education majors, 21 participants left the secondary program, and 12 left the middle school program.

### **Measures**

Data were extracted from Dr. Lisa Duffin’s existing longitudinal study which had been approved by WKU’s Institutional Review Board. Her study examined changes in pre-service teachers’ professional beliefs and competencies over time. For this study, I focused on participants’ responses to one question gathered at the beginning of the course that asked: “Why did you choose to become a teacher?” The question was formatted as an open response item, so participants could provide answers of varying lengths.

## **Analysis**

Each participant's response was analyzed from two separate lenses: the pre-service teacher's motivation(s) for becoming a teacher and the semantic construction of the pre-service teacher's written response.

**Motivations to Teach.** Responses were coded through a combination of inductive and deductive methods (e.g., Huberman & Miles, 2002), adapting the STEM-to-Education Motivational Factors Instrument (SEMFI); an instrument rooted in the FIT-Choice framework (Watt & Richardson, 2006) and developed by Duffin, Overstreet, and Cook (2013). The SEMFI was originally designed to evaluate science, technology, engineering, and mathematics (STEM) majors' motivational factors for switching into education and contained 23 codes. A two-rater system was used to evaluate participants' responses against the existing codes of the SEMFI. Through an iterative process, 16 codes were retained from the SEMFI (Duffin et al., 2013): love of content (C), make a difference (D), personal fulfillment (F), family time (FT), desire for helping people (H), identity (I), important age of development (IA), love for specific group (LG), love to teach (LT), influential others (O), prior personal experience (PP), prior teaching experience (PT), relate to age group (RA), receptiveness to learning (RL), high self-concept (SC), and social responsibility (SR). From the data emerged an additional 6 codes: fallback career (FB), job security (JS), loves children (LC), love of learning (LL), noble profession (N), and role model (RM). The final revised SEMFI instrument contained 22 codes representing a variety of reasons for becoming a teacher (see Appendix A).

The second phase of the process involved applying the coding scheme to a small portion of the data (13.2%) by two trained raters: myself and Dr. Duffin. The purpose was to: ensure consistency in the application of the instrument, refine the codes, identify examples for each, and make necessary revisions. When the responses mentioned more than one motivation, we coded them with all relevant categories. This process allowed us to gain a shared understanding of the coding categories and notation. We independently coded the remaining responses and compared codes. To calculate inter-rater reliability, I took the number of codes in agreement ( $n = 368$ ) and divided by the number of total codes ( $n = 399$ ) resulting in 92.3% agreement. Discrepancies ( $n = 31$ ) were discussed and resolved with a final dataset ( $N = 459$  codes; “Stayers”  $n = 342$ ; “Leavers”  $n = 117$ ).

**Semantic Analysis.** Adapted from practices commonly applied to linguistic discourse analysis, the semantic portion of this study’s coding followed similar practices to the “motivations to teach” section. To properly approach the data set through a semantic lens, we utilized the Content-Sensitive Text Analysis instrument developed by Thomas Huckin (1992). The instrument requires six steps in the analysis: “1) select an initial corpus that is of intrinsic interest, 2) identify salient patterns through holistic scanning, 3) determine the patterns’ “interestingness” or intrigue, 4) select a sample, 5) verify the pattern through coding or counting, and 6) develop a functional-rhetorical analysis. The participant sample—or initial corpus—was already defined prior to the semantic analysis’s fruition, so we utilized the established categories—those who eventually gained teacher certification (“Stayers”) and those who did not (“Leavers”). As a result, the total participant sample ( $n = 181$ ) divided into “Stayers” ( $n = 132$ ) and “Leavers” ( $n = 49$ ). Then, we began to interpret the data from a holistic perspective,

quickly noticing the consistent usage of hyperboles. After hypothesizing that particular hyperbolic usage patterns could suggest a participant's genuine dedication to his or her field—or lack thereof, we decided to select this topic as our “interesting” sample.

The responses were again coded through a combination of inductive and deductive methods (e.g., Huberman & Miles, 2002), adapting the Forms of Hyperbole in Student Writing Instrument developed by Beare and Meade (2015). The Forms of Hyperbole in Student Writing Instrument was originally designed to evaluate how student hyperbolic usage in writing samples conveys overall passion for and dedication to a particular topic; it contained nine codes. A two-rater system was used to evaluate participants' responses, and, through an iterative process, seven codes were retained from the Forms of Hyperbole in Student Writing Instrument (Beare & Meade, 2015): absolutism, assumption, deflation, generalization, inflation, metaphoric, and typographic. From the data emerged an additional three discourse device-driven codes: booster, hedge, and metaphor. The final instrument contained 10 codes representing a variety of semantic patterns in student writing (see Appendix B).

The second phase of the process involved applying the coding scheme to a small portion of the data (16.71%) by two trained raters: myself and Dr. Jane Fife. The purpose of this rating system was to: guarantee the consistency of the instrument, ensure rater alignment, refine the semantic codes, identify examples that illustrated those codes, and make necessary revisions. When the responses included more than one semantic text feature, we coded them with all relevant categories. This process allowed us to gain a shared understanding of the coding categories and notation. We independently coded the remaining responses and compared codes. To calculate inter-rater reliability, I took the

number of codes in agreement ( $n = 260$ ) and divided by the number of total codes ( $n = 294$ ) resulting in 88.4% agreement. Discrepancies ( $n = 34$ ) were discussed and resolved with a final dataset ( $N = 353$  codes; “Stayers”  $n = 263$ ; “Leavers”  $n = 90$ ).

## Results

**Motivations to Teach.** Descriptive statistics for the percentage of stayers and leavers at the onset of each semester presented several patterns. Table 1 presents the frequencies and Chi-square statistics for both participant groups, and Table 2 presents the categories by group in rank order from most cited to least. Overall, the motivational influences most cited by the stayer group were a love of content (23.7%), an outside role model (15.5%), a love of teaching (10.2%), and a high self-concept regarding skill sets (9.4%). Together, these cited influences accounted for 58.50% of the total stayer responses. For the leaver group, the motivations most frequently cited were love of content (28.2%), an outside role model (16.2%), and a high self-concept regarding skill sets (10.3%). When combined, those influences accounted for 54.7% of the total leaver responses. To determine if any statistically significant differences occurred between the two groups (stayers and leavers) in regard to cited influences, I used a chi-squared test for independence. Results from the analyses indicated no statistically significant differences between the two groups’ cited motivations to enter teaching.

**Table 1***Influences Named by PSTs as Motivations to Teach*

Influence	Stayers ( <i>n</i> = 342)		Leavers ( <i>n</i> = 117)		$\chi^2$
	<i>n</i>	%	<i>n</i>	%	
Love of Content	81	23.7	33	28.2	0.251
Role Model	53	15.5	19	16.2	0.005
Love to Teach	35	10.2	6	5.1	0.152
High Self-Concept	32	9.4	12	10.3	0.008
Influential Others	24	7	8	6.8	0.000
Prior Teaching Experience	24	7	7	6	0.008
Prior Personal Experience	19	5.6	7	6	0.001
Identity	18	5.3	8	6.8	0.022
Make a Difference	13	3.8	2	1.7	0.021
Personal Fulfillment	10	2.9	1	0.9	0.013
Loves Children	10	2	5	4.3	0.061
Job Security	5	1.5	2	1.7	0.000
Noble Profession	4	1.2	2	1.7	0.002
Family Time	4	1.1	1	0.9	0.000
Love for Specific Group	3	0.9	0	0	--
Social Responsibility	2	0.6	1	0.9	0.001
Fallback Career	1	0.3	0	0	--
Desire for Helping People	1	0.3	1	0.9	0.002
Important Age for Development	1	0.3	1	0.9	0.002
Love of Learning	1	0.3	1	0.9	0.002
Relate to Age Group	1	0.3	0	0	--
Receptiveness to Learning	0	0	0	0	--
TOTALS	342		117		

*Note:* The *n* in this table represents number of codes, not number of participants.

**Table 2***Rankings of Motivational Influences by Group*

		Stayers				Leavers	
		<i>n</i>	%			<i>n</i>	%
1.	C	81	23.7	1.	C	33	28.2
2.	RM	53	15.5	2.	RM	19	16.2
3.	LT	35	10.2	3.	SC	12	10.3
4.	SC	32	9.4	4.	I	8	6.8
5.	O	24	7	5.	O	8	6.8
6.	PT	24	7	6.	PP	7	6
7.	PP	19	5.6	7.	PT	7	6
8.	I	18	5.3	8.	LT	6	5.1
9.	D	13	3.8	9.	LC	5	4.3
10.	F	10	2.9	10.	D	2	1.7
11.	LC	10	2	11.	JS	2	1.7
12.	JS	5	1.5	12.	N	2	1.7
13.	N	4	1.2	13.	F	1	0.9
14.	FT	4	1.1	14.	FT	1	0.9
15.	LG	3	0.9	15.	H	1	0.9
16.	SR	2	0.6	16.	IA	1	0.9
17.	FB	1	0.3	17.	LL	1	0.9
18.	H	1	0.3	18.	SR	1	0.9
19.	IA	1	0.3	19.	FB	0	0
20.	LL	1	0.3	20.	LG	0	0
21.	RA	1	0.3	21.	RA	0	0
22.	RL	0	0	22.	RL	0	0
TOTALS		342				117	

**Semantic Analysis.** Descriptive statistics for the percentage of stayers and leavers at the onset of each semester presented distinctive patterns. Table 3 presents the frequencies and Chi-square statistics for both participant groups, and Table 4 presents the categories by group in rank order from most cited to least. The semantic discourse devices most frequently utilized by the stayer group were a hyperbolic inflations (35%), boosters (16.7%), and hyperbolic absolutes (10.6%). Together, these cited influences accounted for 62.3% of the total stayer responses. For the leaver group, the devices most

frequently utilized were hyperbolic inflations (25.6%), hyperbolic absolutes (14.4%), and hedges (13.3%). When combined, those influences accounted for 53.3% of the total leaver responses. To determine if any statistically significant differences occurred between the two groups (stayers and leavers) in regard to discourse device usage, I used a chi-squared test for independence. Results from the analyses indicated no statistically significant differences between the two groups' cited motivations to enter teaching.

**Table 3**

*Discourse Device Utilized by PSTs in Written Responses*

Device	Stayers (n = 263)		Leavers (n = 90)		$\chi^2$
	n	%	n	%	
Hyperbolic Inflation	92	35	23	25.6	0.728
Hyperbolic Absolute	28	10.6	13	14.4	0.120
Metaphor	8	3	4	4.4	0.014
Booster	44	16.7	11	12.2	0.132
Hyperbolic Deflation	7	2.7	2	2.2	0.001
Hyperbolic Generalization	21	8	11	12.2	0.144
Hyperbolic Metaphor	37	14.1	2	2.2	0.224
Hyperbolic Assumption	5	1.9	11	12.2	0.418
Hedge	16	6.1	12	13.3	0.411
Typographic	5	1.9	1	1.1	0.003
TOTALS	263		90		

**Table 4***Rankings of Discourse Devices by Group*

Device	Stayers ( <i>n</i> = 263)		Device	Leavers ( <i>n</i> = 90)	
	<i>n</i>	%		<i>n</i>	%
1. Hyperbolic Inflation	92	35	1. Hyperbolic Inflation	23	25.6
2. Booster	44	16.7	2. Hyperbolic Absolute	13	14.4
3. Hyperbolic Metaphor	37	14.1	3. Hedge	12	13.3
4. Hyperbolic Absolute	28	10.6	4. Booster	11	12.2
5. Hyperbolic Generalization	21	8	5. Hyperbolic Generalization	11	12.2
6. Hedge	16	6.1	6. Hyperbolic Assumption	11	12.2
7. Metaphor	8	3	7. Metaphor	4	4.4
8. Hyperbolic Deflation	7	2.7	8. Hyperbolic Deflation	2	2.2
9. Hyperbolic Assumption	5	1.9	9. Hyperbolic Metaphor	2	2.2
10. Typographic	5	1.9	10. Typographic	1	1.1
TOTALS	263			90	

### Discussion

The aim of the present study was to uncover and scrutinize pre-service teachers' written responses about their motivations, evaluating possible patterns that could assist advising and decision-making processes. After analyzing the coded responses, one stark difference surfaced between the motivations of the “stayers” and the motivations of the “leavers”: the “stayers” articulated a specific love for *teaching*. Statistically, both populations ranked a love of content, a high self-concept, and an outside role model as largely-influential motivations on their motivation lists. However, the “stayers” were the only participants who openly and outwardly stated a love for the profession into which they were entering (i.e., “love for teaching” was ranked higher on their motivational prevalence than the “leavers”). Since the survey question was structured as an open-ended response, each participant was free to include whatever motivations with which

they personally identified, highlighting the reality that—in a question that provides no guidance—the “leavers” were less likely to say that they actually loved teaching. For example, consider the following responses provided in Table 5:

**Table 5**

*Written Response Example of Varied Motivations*

Stayer	<p>“When I was younger I would come home from school and teach imaginary students. It has been dream to become a teacher since I was young. I also have found a love for science so teaching middle grades science combines my love for children, science, and my passion for teaching. In high school I had the opportunity to work with an 8th grade science classroom and I loved every minute of it. It was then that I knew for sure that I wanted to teach middle school science.”</p>
Leaver	<p>“I have chosen to become a high school chemistry teacher because science has always been my favorite subject, and was always involved in my favorite memories of high school. I believe that high schools need effective science and math teachers because they are hard subjects to grasp ahold of. I had a wonderful chemistry teacher my senior year who helped me tremendously, and I want to pass on the passion for science that my teacher gave to me.”</p>

As the “stayer” response specifically shows, the participant includes the phrase “my passion for teaching,” explicitly writing that he or she is dedicated to the craft that is “teaching.” This is made especially obvious when compared to the “leaver” example within which the participant claims that things like content area, past experiences, and altruistic pursuits were imperative to his or her dedication to becoming a teacher, taking precedent over the actual profession of “teaching.” As baseline findings from Watt and Richardson (2012) explain, pre-service teachers across four different countries all cited intrinsic value, perceived teaching ability, desire for social contribution, desire to work with children, and prior teaching experiences as their most frequently-occurring motivations. Therefore, based on the predictive patterns taking shape in this study, most of Watt and Richardson’s pre-service teachers were aligning with “leaver” mentalities.

Yet, as previously discussed, analyses of pre-service teachers’ word choices in the survey responses add a richer layer of understanding to their motivational profiles. By administering a semantic analysis, pre-service teachers’ actions can be connected to their words.

Semantically, there were two distinct deviations between the constructions of the “stayers” written responses and the “leavers” written responses—one dealing with overall commitment level and one with perceived genuineness. First and foremost, based on a ranking of total usage, STEM “stayers” used more boosters, and STEM “leavers” used more hedges. Boosters are applied to express certainty of and solidarity with a topic (Hyland, 2005). With booster usage, an individual can show the strength of his or her commitment in a statement, using particular words to tell a reader that he or she used sound reasoning and reflection prior to writing a statement. On the other hand, STEM “leavers” utilized more hedges within their written responses. Hedge usage withholds complete commitment to statements, allowing the writer to avoid stating “facts” (Hyland, 2015). As these definitions explain, the “stayers” expressed a stronger commitment to their assertions within their written responses, while the “leavers” were withholding a committed stance regarding their decisions to become educators. The following example in Table 6 explicitly highlights this reality:

**Table 6**

*Written Response Example of Boosters vs. Hedges*

Stayer (Boosters)	“I have chosen to become a math teacher because I have a passion for math, as well as a passion for children. I <i>have always</i> caught on to math fairly easily and enjoying helping others. I <i>have always</i> thought I would become a teacher, and having phenomenal high school math teachers just solidified that thought even more because it made me desire to give students the passion for math that my teachers gave me throughout my education.”
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Leaver (Hedges)	“I want to make a difference in future students’ lives. Mathematics is the most applicable subject, and I <i>feel like</i> I have the drive to learn the ability to teach students. I also <i>think</i> it is what I am meant to do in this life.”
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As the “stayer” example demonstrates, this pre-service teacher has explicitly acknowledged his or her commitment to entering teaching; the booster “have always” highlights his or her strong commitment. The “stayer” pairs this booster with several facets of the teaching career, saying that he or she *has always* understood math, liked assisting others, and (ultimately) wanted to enter the teaching profession. Readers are not left with any qualms about this pre-service teacher’s motivations, for it is clear that he or she has been committed to becoming a teacher for many years. Ultimately, the pre-service teacher’s semantic construction matches his or her internal motivations, and these two pieces manifest to show true dedication to the field.

Conversely, there are two hedges that occur within the “leaver’s” example that lead readers to question his or her commitment to a career choice: “feel like” and “think.” These word choices exemplify “plausible reasoning rather than certain knowledge” (Hyland, 2005; Hyland, 1998, pg. 180). As a result, the pre-service “leaver” communicates a lower level of confidence regarding his or her statements. Unlike the previously-discussed “stayer,” this “leaver” never explicitly states that he or she is committed to entering teaching. In fact, by using a phrase like “I think,” this “leaver” is openly admitting that he or she equally believes that teaching may *not* be a chosen path for the entirety of his or her life. Ultimately, the “leaver” is cushioning reality by semantically preparing room for a major program (or overall career) exit.

In addition to the “booster” and “hedge” distinction, the “stayers” and “leavers” also had another semantic divergence. However, this difference dealt with the same

feature in varied manners: hyperbolic inflation. In linguistics, hyperboles are extreme exaggerations—whether positively or negatively conveyed in inflationary or deflationary terms (Beare & Meade, 2015). In addition, the term inflation is defined as “an increase of magnitude, intensity, or frequency” within semantic or syntactic construction.

Hyperbolically-inflationary usage in writing is often viewed as a blatant lack of genuineness; in other words, using words like “love” or “amazing” too often makes a writer seem overly intense or pushy (Beare & Meade, 2015). In this study, based on total percentage of usage, the most-frequently occurring hyperbolic feature in both the “stayer” and “leaver” responses was the hyperbolic inflation. So, one would assume that the “stayer” and “leaver” populations utilized hyperbolic inflations in the same, overly-intense manner. However, as the example provided in Table 7 demonstrates, the hyperbolic inflations achieve different semantic feats:

**Table 7**

*Written Response Example of Varied Inflation*

Stayer (Inflation)	“When I was younger, I would come home from school and teach imaginary students. It has been dream to become a teacher since I was young. I also have found a <i>love</i> for science so teaching middle grades science combines my <i>love</i> for children, science, and my passion for teaching. In high school, I had the opportunity to work with an 8th grade science classroom, and I <i>loved</i> every minute of it. It was then that I knew for sure that I wanted to teach middle school science.”
Leaver (Inflation)	“I <i>love</i> math; I <i>love</i> kids. This is the perfect profession for me.”

As the “stayer” response shows, this pre-service teacher utilizes a variation of the inflated term “love” in three different locations. However, his or her usages are all supported by grounded evidence. The “stayer’s” love for teaching and children can initially be traced back to memories of teaching “imaginary students.” Then, he or she

adds additional evidence to the inflationary usage by discussing experiences within an “eighth-grade science classroom.” Therefore, instead of channeling the typical lack of genuineness like most inflationary usages, the “stayer” actually articulates a genuine, well-reasoned response that supports the “love” that he or she possesses for the facets of the education field. In contrast, the “leaver’s” response used the inflated term “love” in two brief locations. Unlike the “stayer” response, within which well-supported explanations were provided for his or her loves, the “leaver’s” response “only inflates [his or] her interest in the topic” (Beare & Meade, 2015, p. 81). To a reader, this brief, unsubstantiated response not only lacks genuineness, but also lacks reasoning for why the love of math or children supports subsequent entry into the education field.

### **Conclusions, Implications, and Limitations**

**Conclusions.** Overall, the study uncovered the importance of semantic discourse analysis to the true understanding of a STEM pre-service teacher’s mindset. The initial conclusion that STEM “stayers” note a “love of teaching” more so than STEM “leavers” provided a surface-level, unsubstantiated explanation for pre-service teachers’ decisions to desert teacher certification. However, with the addition of semantic discourse analysis, methodologies were triangulated, allowing the pre-service teachers’ articulation of their commitment to and love of education to be evaluated and gauged. Ultimately, this study established rudimentary patterns that—through further study and application—could uncover validated predictions for whether or not a STEM pre-service teacher will gain or desert teacher certification.

**Implications.** Based on Richardson and Watt’s (2006) prior research, “the characteristics of those people choosing to enter teacher education in the current climate

of teacher shortages provide valuable background information for policy-makers, recruitment bodies, university governance and teacher educators” (p. 52). Keeping this reality in mind, pre-service teachers who are inclined to exit the education field might be encouraged to stay if they are exposed to researched-based clinical models that fully immerse them into a true “school” environment (Darling-Hammond, Holtzman, & Heilig, 2005; Watt & Richardson, 2007; Urdan & Karabenick, 2010). In a clinical model, pre-service teachers are exposed to genuine interactions with students, reality-based instructional experiences, lesson planning expectations, curricular-alignment endeavors—among a plethora of other experiences (Darling-Hammond, Holtzman, & Heilig, 2005). Since the STEM “stayers” cited a genuine “love for teaching” as a motivation for entering the profession, early immersions into genuine teaching experiences for waivering STEM pre-service teachers may enhance their belief systems and encourage them to complete certification. If universities incorporate clinical models into their education preparatory programs, pre-service educators will gain firsthand experience in the field, building a plethora of evidence on which to decide whether or not to continue pursuing teacher certification.

In addition, based on holistic patterns uncovered within this study, universities should begin to alter the manner through which pre-service educators are advised. University education programs need to make changes to freshmen and sophomore advisory practices by, for example, requiring that every student complete a written survey prior to entering his or her first-ever advising meeting. If advisors are systematically trained to pinpoint semantic “red flags” in those survey responses, education programs will be armed to better-serve their pre-service teachers’ needs. Consider the example

presented in Table 5. The “stayer” student openly stated that teaching was his or her passion, while the “leaver” leaned toward his or her content. Then, in Tables 6 and 7, the STEM “stayer’s” responses articulated a true commitment to and genuine love of the education field. Therefore, with a preliminary survey screening, an advisor could bring attention to the implications of a student’s responses. By considering a student’s motivations, career goals, and competencies, an advisor could provide focused guidance and, firstly, encourage that student to actively pursue a teaching career through immersion into early clinical experiences. Then, if the student’s firsthand experiences in the profession are proven futile, an advisor could urge that student to consider a redirection into another major program.

In post-secondary education, elevated retention rates are critical to an institution’s health, so ensuring that students have declared the most fitting major and career pathway is an essential panacea (Cohen-Vogel & Smith, 2007; Sutchter, Darling-Hammond, & Carver-Thomas, 2016). Pre-service teachers who are encouraged by advisors to pursue clinical experiences will, as a result of the real-world experience, be more committed to the completion of their major programs (Darling-Hammond, Holtzman, & Heilig, 2005). However, if teaching is found to not be a viable career path, students could redirect in a timely manner, saving both the student and the teacher education program valuable time, money, and resources and allowing the program room to invest in recruitment and immersive training opportunities for other students.

**Limitations and Future Research.** Although this study adds to the existing body of research investigating pre-service teachers’ motivations for teaching (e.g. Sinclair, Dowson, & Mcinerney, 2006; Watt & Richardson, 2007; Han & Yin, 2016), one must

acknowledge a major limitation – generalizability of the results. This study used 181 participants from one university enrolled in different sections of one professor’s educational psychology courses over the duration of several years. As a result, this limits the representativeness of the sample, indicating that predictive patterns and conclusions could be more-confidently stated if more responses could have been analyzed from a larger sample of pre-service teachers from STEM teacher education programs across the country. Thus, future studies should encompass response analyses from pre-service teacher populations stretching across multiple universities; these efforts should be completed in an effort to validate predictive patterns.

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## Appendix A: Revised SEMFI Instrument

Code	Name	Description	Example
C	Love of Content	Student wants to teach because they have a passion for the <b>content</b> and/or want to share their passion for the content.	"I have a huge passion for math."
D	Make a Difference	Student sees teaching as their avenue to make a difference for individual students.	"I want to help students mold into the adults they have the potential to be."
F	Personal Fulfillment	Student feels that teaching will be personally rewarding or fulfilling to them.	"When I worked with student one-on-one and saw the progress they made, it made me feel like I was on top of the world."
FB	Fallback Career	Student sees teaching as a backup to their main career choice.	"If I don't want to do one job, I have a second career to fall back on."
FT	Family Time	Student sees teaching as a career that will allow them to spend an adequate amount of time with their family.	"I honestly think teaching is the perfect career for a family environment."
H	Desire for Helping People	Student's love for helping people influenced their decision to be a teacher.	"My passion in life is helping others."
I	Identity	Student sees teaching as integral part of their identity.	"After some soul searching and research I knew teaching was for me."
IA	Important Age for Development	Student perceives that the age they chose to teach is a crucial stage in personal development.	"This is the age where they take many of the things they already know, and they build on it."
JS	Job Security	Student views the education field as one that is easy to enter, citing salary, vacancies, and discrepancies as supporting evidence.	"The school system desperately needs effective teachers, so it would be easy to get a job."
LC	Loves Children	Student finds enjoyment when working with children.	"I love kids."
LG	Love for Specific Group	Student wants to teach because they have a passion for that specific group of students (i.e. special education, elementary school, middle school, etc.)	"Special Education students are a blessing to the world."
LL	Love of Learning	Student actively enjoys the act of learning, moving beyond simple understanding—searching for extensive answers.	"I, personally, love to learn."

LT	Love to Teach	Student wants to teach because they have a passion for <b>teaching</b> .	"I enjoy instructing others."
N	Noble Profession	Student views teaching as a career path with elevated societal importance	"I want a career that offers more than a paycheck, and being a math educator is the most rewarding job a person can choose to have."
O	Influential Others	A significant person in the student's life influenced their decision to become a teacher (parents, teachers, other mentors, etc.).	"I had wonderful chemistry professors."
PP	Prior Personal Experience	Student had a non-teaching personal <b>experience</b> which influenced their decision to become a teacher (grew up in a particular environment, personal struggles in school, etc.).	"I've always enjoyed being in a school setting more than anywhere else."
PT	Prior Teaching Experience	Student taught, tutored, or was in a teaching role that motivated them to become a teacher.	"I worked as a Reading Coach for two years in the school system."
RA	Relate to Age Group	Student feels like they empathize with, relate to, or understand their chosen age group the best.	"I feel I relate better to children than I do older students."
RL	Receptiveness to Learning	Student feels that the age group they chose will be easier to teach, more receptive to instruction, OR the most eager to learn.	"I feel as though students at that age still have a willingness to learn and be creative that seems to decline as they get older."
RM	Role Model	Student wants to be an "influential other" for students, inspiring others.	"I want to help as many kids as I can and be a positive influence on their lives."
SC	High Self-Concept	Student sees him- or herself as being competent in either his or her content or teaching abilities.	"I have always been good at science."
SR	Social Responsibility	Student sees teaching as a way to contribute to society or future generations as a whole.	"It's so important that all children are given a good education."

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(Duffin, Overstreet, & Cook, 2013)

Appendix B: Adapted Forms of Hyperbole in Student Writing Instrument

Code	Form	Definition/Explanation	Student Example
B	Booster	A word or phrase that to express conviction and to mark heightened involvement without inflated exaggeration	"I have <i>always</i> wanted to be a teacher."
H	Hedge	A word or phrase that signals a tentative assessment of referential information, conveying hesitancy	"I am just now taking math classes outside of calculus and straight forward math, so I'm unsure as to how I will feel about those."
A	Hyperbolic Absolute	An inflation or deflation to the point of no exception	"I decided that medicine and education were the <i>only</i> options I might consider."
HA	Hyperbolic Assumption	A stated or unstated claim attached to any of the other forms that is unsupported by evidence	"I want to teach middle grades because I feel that is the age that students really need an effective teacher."
D	Hyperbolic Deflation	A decrease of magnitude, intensity, or frequency	"I was afraid to go into education because I didn't want to do it just because others saw me as a teacher and because I had grown up around educators."
G	Hyperbolic Generalization	An application of a characteristic of one or a few to a larger set	"I know many students dread their math classes."
I	Hyperbolic Inflation	An increase of magnitude, intensity, or frequency	"I <i>love</i> math. I <i>love</i> to teach. I am truly blessed in the sense that I get to do my dream job."
HM	Hyperbolic Metaphor	Use of a comparative figure that exceeds expected experience in a given situation	"We did all kinds of projects and tests like to have killed me, but he was incredible and after having him for three years straight he became like a father figure to me."
M	Metaphor	A comparative figure so frequently utilized that it has become "dead" or overused	"I want to help as many students as possible succeed in school and reach levels they didn't know they were capable of reaching."
T	Typographic	The manipulation of text or punctuation to construct a tone of excess	"When I was in high school, we had SO many teachers who failed to do their job."

(Beare & Meade, 2015)