

Exploring the Causalities of Pre-service Teachers' Perception of Learning Styles Theory

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Learning styles theory (LST) is among the most widely-supported ideas in educational psychology. Although no universal definition exists, LST can broadly be described as the belief that each learner possesses an individualized, genetically predetermined modality of instruction in which they learn most effectively. In recent scholarship, it has been demonstrated that LST is widespread and popular among K-12 education standards and policy (English, 2020), K-12 teachers (English, 2021), pedagogy textbooks (Wininger et al., 2019), higher education instruction (Newton, 2015; Newton & Miah, 2017), medical education (Newton et al., 2021), and social media (Leung et al., 2025). This popularity is despite the fact that little empirical evidence exists to support LST, leading many researchers to refer to it as a “myth” (English, 2020; Furey, 2020; Kirschner, 2017; Nancekivell et al., 2020; Newton, 2015; Rubin et al., 2022). Researchers have continually attempted to discourage teachers, professors, administrators, superintendents, school board members, state level officials, and others with an impact on educational policy and practice from implementing LST. Nevertheless, LST remains broadly popular (English, 2021).

While the popularity of LST is well-documented, there is still much to learn about how and why LST continues to persist despite a lack of evidence-based support. It has been theorized that two of the most potentially powerful influences upon pre-service teachers' perception of LST are the apprenticeship of observation and teacher education programs (English, 2021). This quasi-research design study was conducted to provide better insight regarding which of those two factors might be most plausible. If the apprenticeship of observation is indeed a powerful factor in the continuation of LST, one would expect pre-service teachers to enter teacher education programs and coursework (typically their freshmen year) with positive perceptions of LST and that those perceptions would remain largely unchanged. If, on the other hand, teacher education programs are largely responsible for the continuation of LST, one would expect pre-service teachers to become more supportive of LST as they advance through teacher education programs from their freshmen through senior years.

Based on these assumptions, this study surveyed American undergraduate pre-service teachers on their perception of and exposure to LST and disaggregated data by academic class. The aim was to determine what role the theory of the apprenticeship of observation and traditional teacher education programs have on the continued popularity of LST. Therefore, the research questions were:

1. Do pre-service teachers develop a more positive perception of LST as they advance through teacher education programs (as measured by academic class, freshman-senior) and therefore suggest the influence of teacher education programs?

2. Do pre-service teachers enter teacher education programs with a positive perception of LST and maintain that positive perception across academic class (freshman-senior), thus suggesting the influence of the apprenticeship of observation?

It was hypothesized that pre-service teachers would report broad support for LST with no significant difference between groups (academic class), therefore suggest that the apprenticeship of observation is a powerful influence in the continued popularity of LST.

Learning Styles Theory

The first thing one must understand about LST is that it is a misnomer. This arises from the fact that there is not a single theory on learning styles but dozens of alternatives, and in some cases competing, theories (Coffield et al., 2004). While LST categorical systems based on sensory modalities (such as auditory, visual, and kinesthetic) are most popular, LST systems attempt to categorize students in a variety of other ways. For example, the Gregorc Model divides learners into concrete/sequential, concrete/random, abstract/random, and abstract/ sequential categories. The Dunn and Dunn model identifies four learning styles variables: environmental, emotional, physical, and sociological. Each variable in turn contains a number of factors. Factors include sound (environmental), motivation (emotional), time of day (physical), and support from authority figures (sociological) (Coffield et al., 2004). Despite this plethora of learning styles theories, it can broadly be said that learning style advocates claim that all students can be tested for and categorized into specific learning modalities. If teachers are then willing and able to differentiate learning to students' modalities, according to what is known as the meshing hypothesis, student learning and performance will be improved (Pashler et al., 2009). LST has been subject to a number of methodologically-sound studies which have consistently demonstrated no evidence to suggest its effectiveness. For example, in one recent example, although students predicted that their learning would improve when instructed in their preferred learning style, (verbal vs visual) no association with learning performance was demonstrated. This led the researchers to conclude that LST has "little utility in optimizing learning" (Knoll et al., 2017, p. 560). More broadly, it has been well-discussed that that is little evidence to support the implementation of LST exists (Dinsmore, et al., 2022; English, 2021; English, 2020; Gudnason, 2017; Kirschner, 2017; Knoll et al., 2017; Newton & Miah, 2017; Pashler et al., 2009; Pomerance et al., 2016). Nevertheless, LST remains widely popular.

LST's continued popularity can (at least partly) be explained by the fact that its most basic claims are true. Students learn differently from one another. Those differences, however, are based on factors such as ability and experiences rather than static, genetically predisposed differences in ideal learning modality and tend to be relatively small outside of a learning disability (An & Carr, 2017). Attempting to categorize students based on static learning styles, however, tends to appeal to educators' egalitarian views toward students. LST emphasizes that all students are equally able to succeed if instruction is differentiated appropriately. This belief in turn augments the perceived influence that teachers can have over students' learnings. Although this might make teachers feel empowered, it deflects discussion away from the obvious but uncomfortable reality that students differ in ability. It is most certainly true that all students are capable of learning. The fact that some students learn more quickly or with greater levels of

mastery than others, however, is not evidence of teachers' inadequacy in differentiating instruction to some students' particularly learning modality.

It should also be pointed out that LST undoubtedly continues to enjoy popularity at least in part because teachers have succumbed to the pressures applied upon them by state standards, standardized tests, and accreditation expectations. Our education system (thankfully) expects all students to learn and holds schools accountable that they do. It seems only natural that teachers would therefore gravitate toward a system (or set of systems) which claim that all students will learn effectively if instruction is differentiated accordingly.

While the lack of evidence to support LST has been well-demonstrated, the potential harm that LST poses to students and teachers alike has been less commonly discussed. One might be tempted to assume that LST will harmlessly disappear based on the lack of evidence to support its effectiveness. This would be a misunderstanding, however. When students receive results from a LST test along with confirmation from adults they trust, they may likely avoid disciplines that tend to emphasize other learning modalities (for example, visual learners avoiding music or kinesthetic learners avoiding math) or have unwarranted confidence within their perceived learning style (Newton & Miah, 2017). Learning styles test results may also encourage students to develop a static or fixed perception of their abilities based on their reported genetic predisposition for a particular learning modality. For example, if a student is led to believe that they are a kinesthetic learner, they may easily adopt a fatalistic attitude toward their likelihood to experience success in math class, a content area that is less likely to adopt teaching strategies that emphasize extended periods of gross motor movements.

LST also poses a potential threat to teachers and the teaching profession. In an attempt to appeal to a variety of learning styles, teachers may be encouraged to adopt teaching strategies that are less than best practice. Rather than showing a video to appeal to visual learners or playing a podcast to appeal to auditory learners, teachers should design lessons that best fit the content and context of the lesson objectives (Riener & Willingham, 2010). When a teacher begins to credit student learning to their particular learning style, it distracts them from evidence-based practices. For example, one strategy that has been associated with greater student learning is quality teacher feedback (Charalampous & Darra, 2025). As opposed to learning styles, feedback is something that a teacher can realistically control and utilize on a consistent basis to improve learning for all students. Finally, LST risks placing unrealistic expectations upon teachers (Newton & Miah, 2017). If, as LST advocates claim, all students can learn more effectively when instruction is matched to students' individual learning style, nearly all student failure can be attributed to the teacher's inability or unwillingness to do so rather than the student's lack of ability, preparation, attendance, or attentiveness to the material. Certainly, poor instruction is a contributing factor in many students' failures. To create an environment where the default reaction is to assume that teachers are to blame, however, is not healthy for teachers, students, or parents.

LST advocates often point to the theory's ability to individualize learning for each student. In practice, however, LST reduces students to a single, simple category, ignoring the complexity of learning and dehumanizing the individual. Any system that treats students in this way while

placing static, artificial limitations upon their abilities requires a high threshold of evidence to support. No LST program has met that requirement thus far.

The Apprenticeship of Observation

The theory of the apprenticeship of observation originated with Dan Lortie's (1975) work, which identified the heavy influence K-12 teachers have on their students' perceptions of effective teaching strategies. Lortie identified this as a stagnating influence, which impeded innovation in education as teachers were likely to revert to practices they observed their former teachers conducting nearly a generation previously (Lortie, 1975). This school of thought seems to minimize the impact that teacher education programs can have on their pre-service teachers, as the job before teacher education programs is not only to teach evidence-based practices but to first *unlearn* the ineffective practices implemented by the students' previous teachers and adopted by their students.

It should be noted that Lortie's original conceptualization of the apprenticeship of observation has been under recent criticism and revision. A number of researchers have demonstrated that this influence can perpetuate both effective and ineffective teaching practices (Boyd et al., 2013; Channa, 2020; Gelfuso, 2018; Smagorinsky & Barnes, 2014). There is also more recent evidence which suggests that the apprenticeship of observation can, at least in part, be overcome by intentional teacher education programs (Gray, 2020). Despite these recent critiques and revisions, it seems clear that both pre-service and in-service teachers are heavily influenced by the teaching strategies implemented by their former teachers. This study aimed to obtain more formal understanding of the role of the apprenticeship of observation on the continuation of LST by surveying pre-service teachers on their perception of LST. As it has already been demonstrated that in-service teachers broadly support LST (English, 2021), if pre-service teachers enter their teacher education program with similar levels of support, it might suggest that the apprenticeship of observation is heavily influencing these views. If, however, pre-service teachers seem to develop conviction for LST while in their teacher education programs, then it might be concluded that other factors (including the teacher education programs themselves) are influencing its perpetuation.

Methods

The aim of this study was to utilize survey data from a sample of American undergraduate pre-service teachers to determine their perception of LST. As described in the research questions, the aim was to determine the degree to which students' perception was due to the apprenticeship of observation and/or their instruction in teacher education programs. This was determined by disaggregating students' perception of LST by academic class (freshman-senior) and calculating the differences between respondents by class. Participants were surveyed on six independent LST factors: (a) if LST is best for student learning (b) if implementing LST is essential for effective instruction (c) if testing students' learning styles is essential for effective instruction (d) if the student intends to implement LST in their future classroom (e) belief that LST is a sound, evidence-based practice, and (f) their identification with a specific learning style.

Sample

This study utilized the snowball sampling (or chain sampling) method of distribution. In this convenience sampling method, participants are solicited from within the target population, asked to participate, and encouraged to solicitate other participants from the population (Stapleton, 2010). As the target population was undergraduate pre-service teachers and no national database or contact list exists, participants were solicited indirectly through two strategies. First, through the use of available databases, college and university faculty, administrators, and other staff who likely had contact with pre-service teachers were emailed and asked to distribute the survey instrument to pre-service teachers under their supervision as well as distribute the request for participation to other teacher educators they had a relationship with. Additionally, a number of teacher educator or college/university department of education Facebook groups were solicited, requesting the distribution of the survey instrument to pre-service teachers they had contact with. As is typical of any snowball sampling method, participants were asked to distribute the instrument to other potential participants (undergraduate pre-service teachers) they had contact with.

The snowball sampling method was primarily chosen for this study in order to mirror prior relevant research (English, 2021; Newton & Miah, 2017). Additionally, as there is no national database of pre-service teachers, a true random sampling would be problematic, if not impossible. Finally, as pre-service teachers are nearly universally accessible by email and teacher educators typically have contact with large numbers of teacher educators, it was hoped that soliciting participation of pre-service teachers via emails from their professors would effectively reach the largest number of participants possible.

Despite these advantages, any convenience sampling has drawbacks. Most notably, the first wave of participants can heavily influence the final sample and its representativeness (Ruel, et al., 2016). Still, efforts were taken to solicit a robust sample. In total, 1,989 emails were sent out to college/university faculty and staff in all fifty states. Additionally, Facebook solicitation included representation from a wide array of states and regions across the United States.

A second drawback to a snowball distribution method, particularly one with an indirect solicitation, is that calculating the response rate is impossible. There is no way to know how many teacher educators forwarded the request for participation to their colleagues or how many pre-service teachers forwarded it to their peers. Therefore, a participation rate for this study is not available.

Instrument

The survey instrument for this study was created on SurveyMethods, a widely used digital survey platform. This was chosen in hopes that a more recognizable URL to the survey might result in greater participation. In the case of email solicitation, the subject “Survey Participation Request” was chosen, and the title of the survey was “Pre-service Teacher Survey”. In both cases, direct reference to LST was purposefully avoided to mirror prior research (English, 2021; Newton & Miah, 2017) and minimize selection bias through polarizing participation. While prior research has demonstrated LST’s popularity among K-12 teachers (English, 2021), it is as of yet

unclear when teachers develop their affinity for it. Therefore, it was hoped that soliciting pre-service teachers might provide clarity as to if teachers develop their support while with their respective teacher education programs or if LST support seems to develop earlier.

In an effort to quantify participants' perception of LST, a series of LST factors Likert scale questions ranging from 1 (strongly disagree) to 6 (strongly agree) were asked. These LST factors included: (a) if LST is best for student learning (b) if implementing LST is essential for effective instruction (c) if testing students' learning styles is essential for effective instruction (d) if the student intends to implement LST in their future classroom (e) belief that LST is a sound, evidence-based practice, and (f) their identification with a specific learning style. These six LST factors were adopted based on prior research (English, 2021). The *Cronbach's Alpha* reliability test value on these six LST factors was 0.91, indicating acceptable reliability. Validity of these six LST factors was first insured through a panel of three experts in teacher education, each with advanced degrees in education and collectively more than sixty years' experience in education and teacher education, which were asked to evaluate the instrument and its validity. They unanimously approved the instrument and its six LST factors. Next, to improve validity, the instrument was piloted among 15 pre-service teachers (the intended demographic). Feedback was solicited to improve clarity. No changes were deemed necessary to the existing instrument.

It should be noted that based on the broad popularity and support for LST (English, 2021), it was assumed that the overwhelming majority of participants would be familiar with this theory. Based on this assumption, a 6-point Likert scale, which is without a "neutral" option, was chosen. The advantage of this strategy was to encourage participants to reveal a position on LST, even if it was subtle. The risk, however, was that a student who had no prior experience with LST would continue the survey and take a position on a theory with which they had no prior experience. While this seemed like a relatively small risk, a short description of LST was provided in the survey so that even a participant who had no prior experience with LST (which was presumed to be a small minority) would be able to complete the survey at least minimally informed. To ensure this choice of a 6-point Likert scale was not a threat to the study's validity, participants were asked about their previous exposure to LST. Nine options for a potential source of exposure to LST were provided, and participants were asked to mark all that applied. An additional option to write in sources of exposure and a "I have never been exposed to this theory" box were also included.

Finally, in order to be able to measure how, if at all, pre-service teachers' perception of LST changes while in their teacher education programs, participants were asked their class (freshman through senior). A numerical value was assigned for each participant based on their response ranging from 1 (freshman) to 4 (senior).

Results

The survey instrument was left active for eight weeks, during which time 771 participants responded. Of those, six responses were removed because they responded that they were not a pre-service teacher, leaving 765 responses. Of those 765 responses, 761 reported that they were from the United States. Two participants responded "NA", and two did not respond. In total, 22 states were represented with Kansas ($n = 390$), Texas ($n = 90$), Montana ($n = 74$), and

Pennsylvania ($n = 47$) receiving the largest representation. See Table 1 for the complete state demographic data.

In order to ensure a diverse sample, participants were also asked their academic major. While inconsistent terminology between various states and institutions makes any categorization of majors somewhat ambiguous, efforts were made to consolidate apparently similar majors for the sake of simplicity. A broad sampling of majors was represented. Elementary education ($n = 419$), social studies education ($n = 63$), English/ELA education ($n = 61$), and special education ($n = 51$) were among the most numerous responses. See Table 2 for the complete academic major demographic data.

All data analysis was conducted on Statistical Package for Social Sciences (SPSS), the predominant statistical software for social science research. In order to further support the validity of the study, descriptive statistics were collected, which demonstrated that pre-service teachers (like in-service teachers) are widely exposed to LST. These results were expected based on prior research (English, 2021). In total, 97% of participants responded that they had previously been exposed to LST. Among the most frequently reported sources of exposure were college professors (81.57%), K-12 teachers (75.16%), and college textbooks (66.14%). See Table 3 for a complete depiction of reported sources of exposure to LST.

Also supporting previous research (English, 2021), descriptive statistics demonstrated that pre-service teachers (like in-service teachers) widely support LST. Of the six LST measurements, mean responses ranged from 4.63 (identification with a specific learning style) to 5.17 (belief that LST is essential for effective instruction) on a 6-point Likert scale. See Table 4 for complete descriptive statistics of the six LST measurements.

In order to determine what, if any, difference in perception of LST exist between participants by academic class (freshmen through senior), a one-way 1 x 4 analysis of variance (ANOVA) was conducted for each of the six LST factors. Significant results were determined in one of those factors: the belief that LST is best for student learning, $F(3, 752) = 2.66, p = .04$. In this LST factor, freshmen reported a mean response of 5.42 ($SD = .76$), sophomores reported a mean response of 5.04 ($SD = 1.17$), juniors reported a mean response of 5.19 ($SD = 1.14$), and seniors reported a mean response of 5.09 ($SD = 1.10$). Post hoc analysis using Fisher's Least Significant Difference (LSD) Test indicated a significant difference between freshmen and sophomores as well as freshmen and seniors. See Tables 5 and 6 for the ANOVA and post hoc outcomes for belief that LST is best for student learning disaggregated by academic class. To provide greater context for the differences of means, Cohen's d effect size for each significant difference was calculated. The difference between freshmen and sophomores was .38 while the difference between freshmen and seniors was .35, both suggesting a small to medium effect size (Cohen, 1988, 1992). Of the remaining five LST measures (essential for effective instruction, testing, implementation, evidence-based practice, and identification with a learning style), no significant difference of mean response by class was demonstrated.

Discussion

This quasi-research design study was developed to provide insight regarding the plausible influence of the apprenticeship of observation and teacher education programs on pre-service teachers' perception of LST. Therefore, the research questions were:

1. Do pre-service teachers develop a more positive perception of LST as they advance through teacher education programs (as measured by academic class, freshman-senior) and therefore suggest the influence of teacher education programs?
2. Do pre-service teachers enter teacher education programs with a positive perception of LST and maintain that positive perception across academic class (freshman-senior), thus suggesting the influence of the apprenticeship of observation?

First, descriptive statistics were collected to determine if pre-service teachers were exposed to and supportive of LST, as suggested by previous research (English, 2020, 2021; Newton, 2015; Newton & Miah, 2017; Seymour, 2020). 97% of pre-service teachers surveyed reported at least one previous exposure to LST. These pre-service teachers also had a positive perception of LST. All six LST measures reported a positive Likert score, ranging from 4.63 (identification with a specific learning style) to 5.17 (essential for effective instruction) on a six-point scale. In totality, these results suggest that pre-service teachers are exposed to and have an overall positive perception of LST.

To gain a greater understanding of how, if at all, students' perception of LST changes while in teacher education programs, students' Likert scores to the six LST factor questions were disaggregated by academic class (freshmen through senior). Five of the six measured LST factors reported no statistically significant change in LST perception by academic class. In one measure, the belief that LST was best for learning, there was a significant decrease in reported score between freshmen and sophomores as well as between freshmen and seniors, the effect size to which was small to medium. It is as of yet unclear why this single measure, that LST is best for learning, reported a significant change by academic class despite the other five LST measures reporting no such change.

What perhaps makes these results particularly ambiguous is the non-linear nature of the change. Freshman through senior mean responses were 5.42, 5.04, 5.19, and 5.09. It is possible that these results signal the beginning of a shift in perception of LST among pre-service teachers. Perhaps upperclassman pre-service teachers, many of whom just completed much of their methods coursework, would have recently been instructed in alternative, evidence-based practices, were less receptive to LST. If that were the case, however, it seems likely that this change of perception would be demonstrated in more than one of the LST factors. It also possible that something about this LST factor evoked a different response from participants in comparison to the five other factors. It should be noted that even in this single measure, support for LST remained quite strong. More research clearly needs to be done before broad conclusions can be made.

This study sought to ask what role traditional teacher education programs (research question 1) and the apprenticeship of observation (research question 2) have on the continued popularity of LST.

Teacher Education Programs

Based on previous research (English, 2021), this study theorized that if teacher education programs were the primary influencers in pre-service teachers' perception of LST, survey results would demonstrate an increase in support of LST as students advanced through their teacher education programs, as measured by academic class (freshmen-senior). While teacher education programs certainly influence pre-service teachers, this trend was not broadly produced in the results of this study. Five of the six LST measures reported no statistical change by academic class. The one measure that did demonstrate statistical change, the belief that LST was best for learning, did so in a non-linear fashion. Freshman through senior mean responses were 5.42, 5.04, 5.19, and 5.09, making it difficult to attribute students' change in perception to the influence of teacher education programs.

The Apprenticeship of Observation

This study theorized that if the apprenticeship of observation was primarily responsible for pre-service teachers' perception of LST, results would demonstrate a strong support for LST among college freshmen that would be largely sustained throughout students' time in teacher education programs. Likert scale results indicated that college students strongly support LST. When disaggregated by academic class, five of the six LST measures demonstrated no statistical change. One LST measure, the belief that LST was best for learning, included a statistical change between freshmen and sophomores as well as between freshmen and seniors. No change was reported, however, between freshmen and juniors. It is as of yet unclear what may have caused these changes. The collective results of the six LST can be interpreted to suggest that pre-service teachers demonstrated a generally sustained support for LST, justifying at least a tentative "yes", to research question 2.

Limitations and Future Research

While this research represented a step forward in understanding the factors that lead to the continuation of LST, clearly more research is needed. First, a larger and more representative sample of pre-service teachers would bring greater confidence in the results obtained here. The sample collected here was relatively large in comparison to prior relevant research, but clearly skewed geographically, with more than 50% of the sample coming from Kansas. Additionally, this study divided participants by academic class using a freshman through senior configuration. This was chosen for convenience, as these labels are relatively universal. This decision, however, excluded pre-service teachers outside of these labels such as graduate, nontraditional, and transition to teaching pre-service teachers. For greater clarity of the size and scope of the problem, these perspectives should be included.

It should also be pointed out that in many teacher education programs, academic freshmen have not yet been admitted into the program and have therefore taken little (if any) teacher education coursework. Freshmen were intentionally chosen to be included to provide a more comprehensive view of how pre-service teachers' perception of LST changes throughout their undergraduate studies. Still, the inconsistency of the college freshmen experience and coursework makes the precise impact of freshmen is unclear. Freshmen surveyed here strongly

supported LST. It is possible that this represents the impact of the apprenticeship of observation, as their perception would be largely based on prior exposure to LST. It is also possible that there is something particular about the freshmen experience and coursework that makes them receptive to LST. More research is needed, however, for greater clarification.

Finally, research needs to be conducted on in-service teacher training on alternatives to LST. It is not yet known how effective such training could be in changing in-service teachers' perceptions or what specific strategies are more or less effective in moving in-service teachers away from non-evidenced based strategies. Pre and post training survey, longitudinal studies, and case study research would be helpful in gaining an understanding of best practices in in-service training.

Conclusion

This study sought to use survey data of pre-service teachers on their perceptions of LST in order to determine what, if any, impact the apprenticeship of observation and teacher education programs have on the continuation of LST. Results supported previous research by demonstrating the widespread popularity of LST among pre-service teachers. Freshmen pre-service teachers came into teacher education programs widely supportive of LST. This positive perception remained generally strong, as five of the six LST measures showed no statistical change by academic class. One measure (belief that LST was best for student learning) resulted in a small to medium change between freshmen and sophomores as well as between freshmen and seniors. This suggested that the apprenticeship of observation is a more plausible influencer on pre-service teachers' perception of LST than teacher education programs. Pre-service teachers enter teacher education programs with positive perceptions of LST and their views largely remain unchanged.

If the apprenticeship of observation is indeed a primary influencer in the continued popularity of LST, another dimension must be addressed. Inservice teachers, some of whom are continuing to implement LST and influencing the next generation of pre-service teachers, must be taught through in-service training that LST is not an evidence-based strategy. In addition, evidence-based alternatives should be introduced, encouraged, and funded. Our K-12 practitioners are clearly overworked and regularly told at in-service training to add a new teaching strategy and work even harder to maximize their students' learning. This may be a rare opportunity to tell them that they can do less: stop testing students for learning styles, stop dividing your class into learning modality specific groups, and stop differentiating instruction by learning styles. In the meantime, they would stop suggesting to the next generation of pre-service teachers that LST is an evidence-based practice.

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Table 1

Demographic Data by State

State	n	%
Kansas	390	50.98
Texas	90	11.76
Montana	74	9.67
Pennsylvania	47	6.14
Arizona	29	3.79
Illinois	29	3.79
Missouri	22	2.88
New York	19	2.48
New Mexico	10	1.31
Indiana	8	1.05
Virginia	8	1.05
Iowa	7	0.92
Georgia	7	0.92
Wisconsin	5	0.65
Hawaii	4	0.52
NA/No Data Provided	4	0.52
Kentucky	3	0.39
New Jersey	3	0.39
North Carolina	2	0.26
Arkansas	1	0.13
Louisiana	1	0.13
Minnesota	1	0.13
Oklahoma	1	0.13

Total:765

Table 2***Demographic Data by Major***

Academic Major	n	%
Elementary Education	419	53.30
Social Studies Education	63	8.01
English/ELA Education	61	7.76
Special Education	51	6.49
Math Education	44	5.60
Physical Education	32	4.07
Early Childhood Education	31	3.94
Music Education	18	2.29
Science Education	14	1.78
Art Education	12	1.53
General Education	7	0.89
Foreign Language Education	5	0.64
Theology	4	0.51
Bilingual Elementary Education	3	0.38
Family and Consumer Science Education	3	0.38
Speech/Theater Education	3	0.38
Business Education	2	0.25
Core Subjects 4-8	2	0.25
ELL Education	2	0.25
General Education	2	0.25
Interdisciplinary	2	0.25
Technology Education	2	0.25
Child Development	1	0.13
Curriculum Instruction and Design	1	0.13
Engineering Education	1	0.13
No data provided	1	0.13
Total: 786		

Note: The total number of majors represented is greater than the sample size due to students identifying as multiple majors.

ELL = English Language Learners

Table 3***Pre-service Teacher Exposures to Learning Styles Theory***

Reported sources of exposure to Learning Styles Theory	n	Percentage of respondents that reported this exposure
College professors	624	81.57
K-12 teachers	575	75.16
College textbooks	506	66.14
Peers	356	46.54
Social media	322	42.09
Independent research	305	39.87
Parents	273	35.69
Popular culture	237	30.98
State standards/policies	235	30.72
I have never been exposed to this theory	23	3.00
Other	7	0.92

Table 4***Descriptive statistics of six LST measurements***

	N	Mean	St. Deviation
Best for learning	764	5.15	1.10
Essential for effective instruction	764	5.17	1.03
Testing	764	4.73	1.20
Implementation	763	5.15	1.05
Evidence-based practice	759	4.81	1.15
Identification with a specific learning style	764	4.63	1.23

Table 5***ANOVA test outcomes for Best for Student Learning and Class***

	Sum of Squares	df	Mean Squares	F	Sig.
Between Groups	9.54	3	3.18	2.66	.04*
Within Groups	899.35	752	1.20		
Total	908.89	755			

*p<0.05

Table 6

Differences between Academic Class on Best for Student Learning Evaluated by Fisher's Least Significant Difference (LSD) Post Hoc Test

(I) Class	(J) Class	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Freshmen	Sophomore	.38	.15	.01*	.08	.68
	Junior	.23	.14	.09	-.03	.50
	Senior	.33	.13	.01*	.07	.59
Sophomore	Freshman	-.38	.15	.01*	-.68	-.08
	Junior	-.15	.12	.22	-.39	.09
	Senior	-.05	.12	.67	-.28	.18
Junior	Freshman	-.23	.14	.09	-.50	.03
	Sophomore	.15	.12	.22	-.09	.39
	Senior	.10	.09	.29	-.09	.28
Senior	Freshman	-.33	.13	.01*	-.59	-.07
	Sophomore	.05	.12	.67	-.18	.28
	Junior	-.10	.09	.29	-.28	.09

*p<0.05