The Commitment and Retention Intentions of Traditionally and Alternatively Licensed Math and Science Beginning Teachers

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Abstract

Teachers often enter the profession through a traditional (four-year teacher education program) or an alternative route without an education degree and appropriate testing credentials. Math teachers entering through an alternative route have a higher rate of attrition than math teachers with a traditional license. In addition, math and science teachers have a higher attrition rate than other teachers. This article looks at specific differences between traditionally and alternatively licensed math and science teachers' commitment to teaching and retention intentions. The differences explored can provide school system leaders with an insight into how to differentiate the induction experiences for math and science teachers with alternative and traditional licenses.

Teacher turnover is a significant problem in our nation's schools. School systems are constantly faced with the difficult challenges of not only attracting good teachers, but supporting and retaining them (Guarino, Santibanez, & Daley, 2006; Hanushek, Kain, & Rivkin, 2004; Ingersoll, 2003; Johnson & Birkeland, 2003). Retaining teachers is the key to solving the teacher shortage (Darling-Hammond & Sykes, 2003). High attrition rates among beginning teachers are especially striking. Research indicates that approximately 50% of all teachers who enter the field leave within their first five years of teaching (Alliance for Excellent Education, 2005; Ingersoll, 2003; Murnane, Singer, Willett, Kemple, & Olsen, 1991).

In the last 10 years, analyses of periodic surveys conducted by the National Center for Education Statistics have clarified reasons for escalating attrition rates among beginning teachers. Among the reasons found through a nationwide study are dissatisfaction with student discipline, poor student motivation to learn, inadequate support from administrators, and poor opportunities for professional advancement (Whitener et al., 1997). An important component of retaining beginning teachers is an effective and comprehensive induction program (Villar, 2004). The types of induction support most positively associated with retention include intensive mentoring (Stanulis & Floden, 2009; Wang, Odell, & Schwille, 2008), common planning time and regularly scheduled collaboration with other teachers (Smith & Ingersoll, 2004), an external network (Ingersoll, Smith, & Dunn, 2007*),* quality support from administration (Stockard & Lehman, 2004), adequate instructional resources (Johnson & Birkeland, 2003),

reduced assignment and workload (Ingersoll et al., 2007), and beginning teacher support seminars (Gold, 1996; Smith & Ingersoll, 2004; Thies-Sprinthall & Gerler, 1990).

Research Questions

The purpose of this study is to establish how traditionally and alternatively licensed math and science teachers differ in their commitment and retention intentions in an effort to guide reforms to induction programs. The research questions that guided this study are:

- How do classroom management, provision of instructional resources, and encouragement of student success predict traditionally and alternatively licensed math and science beginning teachers' commitment?

- Which specific aspects of classroom management, instructional resources, and encouragement of student success predict traditionally and alternatively licensed math and science beginning teachers' commitment?

- How do commitment and satisfaction predict traditionally and alternatively licensed math and science beginning teachers' retention intentions?

To frame our study, we began with a careful review of commitment, satisfaction, and attrition of math and science teachers and how they are prepared for the career of teaching.

Commitment and Satisfaction

The need to understand attrition among beginning teachers has spawned numerous studies of the characteristics of leavers, movers, and stayers as well as factors that influence beginning teacher success, commitment, and retention (Corbell, 2008; Hanushek, Kain, & Rivkin, 2004; Ingersoll, 2001; Johnson & Birkeland, 2003; Liu, Johnson, & Peske, 2004; Smith & Ingersoll, 2004; Weiss, 1999). Research indicates that a teacher's level of commitment to the teaching profession is a key factor in his or her decision to stay or leave the field (Corbell, 2008; Rots, Aelterman, Vlerick, & Vermeulen, 2007; Weiss, 1999). Though precise definitions of "commitment" vary, teachers' commitment is generally viewed as "the extent of their work investment, performance quality, satisfaction, attendance, and desire to remain in the profession" (Rosenholtz, 1989, p. 422). There are three elements that make up the theoretical framework of organization commitment, which include an emotional attachment, a need for continuance, and an obligation to a teaching career (Meyer & Allen, 1991).

Beginning teacher satisfaction also contributes to decisions to stay in or leave the field. Job satisfaction is defined as a person's perception of his or her workplace conditions (Johnson & McIntye, 1998; Ostroff, 1992). Job satisfaction is associated with

an individual's persistence in a job as well as his or her willingness to work effectively within an organization (Ostroff, 1992) and is one dimension of commitment (Johnson & Birkeland, 2003; Ma & MacMillan, 1999; Reyes & Shin, 1995).

A closer examination of teachers' career commitment and satisfaction in teaching can provide a more complete understanding of teacher attrition. Among the factors that influence a teacher's commitment, Corbell (2008) found classroom management, instructional resources, and student success to be significant predictors of commitment for beginning teachers across all grade levels and subject specialties. Riehl and Sipple (1996), using data from the 1987-1988 Schools and Staffing Survey, examined the ways in which teacher commitment is influenced by the characteristics of the school in which the teachers work. Their findings suggest teacher commitment to the profession is enhanced when administrators and teachers effectively manage student behavior.

Retention of Traditionally and Alternatively Licensed Teachers

Research suggests teacher preparation is another major factor influencing teacher retention (Darling-Hammond, 2003). Teachers generally take two main avenues to the teaching profession: traditional or alternative. Traditionally licensed teachers are those who have successfully completed an accredited teacher education program from a four-year institution. For the purposes of this article, we will refer to alternatively licensed teachers as those who have not completed a teacher education program and have not met the testing requirements for a traditional license. The state from which the sample came does not provide an initial license (what was used to categorize traditionally prepared teachers) unless the teacher has completed a teacher education program and met the testing requirements. Those not meeting these requirements are granted a provisional license. Alternative teacher certification programs may target different populations, such as retired military personnel, mid-career entrants, paraprofessionals, or teachers in subject areas of shortage, i.e., mathematics and science (Zeichner & Schulte, 2001).

Additionally, Henke, Chen, and Geis (2000) report that new teachers whose preservice training included student teaching had a 15% attrition rate over five years, while those who did not have student teacher training had a 29% attrition rate. Johnson and Birkeland (2003) found two patterns among teachers prepared through alternative licensing programs. Mid-career entrants to the teaching profession were more than three times as likely as first-career teachers to move from one school to another and teachers who entered through alternative routes left in higher proportions than those who received certification through traditional programs. However, in looking at retention patterns among alternatively certified teachers and traditionally prepared teachers, Johnson and Birkeland advise researchers to examine the factors underlying the patterns and not draw conclusions about the mid-career entrants or alternative certification programs based on numbers alone.

In concurrence with Johnson and Birkeland (2003), other researchers underscore the importance of examining subject matter differences when comparing retention rates among teachers who are traditionally prepared and those who enter teaching through alternative certification programs (Natriello & Zumwalt, 1992; Murnane et al., 1991). In response, we sought to understand the factors behind this pattern that are specific to math and science teachers.

Trends among Beginning Science and Mathematics Teachers

Using data from the 1987-1988 Schools and Staffing Survey, Weiss (1999) found mathematics, science, and computer first-year teachers were less likely than other first-year teachers to say they were committed to their career choice and were also less likely to plan to stay in teaching. Several studies found mathematics and science teachers were more likely to leave the field than teachers in other subject areas (Ingersoll, 2001; Murnane et al., 1991; Smith & Ingersoll, 2004).

Natriello and Zumwalt (1992) found 80% to 90% of traditionally prepared mathematics teachers remained in teaching after three years, while approximately 60% of alternatively prepared mathematics teachers remained. Mathematics teachers were the least likely of the teachers studied to report that they would have entered teaching if the alternate route had not been available.

Methodology

Sample

The 69 beginning teachers in this study represented twelve rural and suburban counties in the state of North Carolina. This sample came from a larger study that included 439 beginning teachers in their first three years of teaching. The sample includes math and science teachers of grades 6-12. Teachers who taught students younger than 6th grade were removed from the sample, since we wanted to ensure there was a specialty in the area of math or science. This sample was composed of 35 middle school teachers (grades 6-8) and 34 high school teachers (grades 9-12). Teachers were male (n = 15) and female (n = 56); multiple races were represented with the majority being White (n = 52) or Black (n = 16); and licensure was balanced between the traditional (n = 33) and alternative routes (n = 36). Two teachers did not provide their license type, and thus were not included in subsequent analyses using license type as a key variable.

Measures

The Perceptions of Success Inventory for Beginning Teachers (PSI-BT; see Appendix) is the measure used for this study. All teachers took the survey well into the

school year to give teachers a chance to get established and form their perceptions of each of the constructs. A review of the psychometric properties of the PSI-BT has been conducted (Corbell, 2008). A confirmatory factor analysis has found that the PSI-BT has 8 distinct factors measuring Mentor Support, Colleague Support, Administration Support, Classroom Management, Student Success, Instructional Resources, Assignment and Workload, and Parental Contacts ($\chi^2_{(589)}$ = 907.81, RMSEA = .04, TLI = .96, CFI = .96) (Corbell). In addition, the PSI-BT is comprised of three outcome variables measuring satisfaction, commitment, and teacher retention intentions. Corbell found the PSI-BT factors of Classroom Management, Instructional Resources, and Student Success to be significant predictors of commitment for beginning teachers across all grade levels and subject specialties. It is important to note that the PSI-BT is a self-assessment. While this is a limitation of the study, teachers' decisions to remain in the classroom or pursue other career opportunities are often personal decisions derived from their perception of their experiences in teaching.

An analysis of variance (ANOVA) was used to determine if traditionally and alternatively licensed teachers differed in the mean scores of their commitment to teaching, satisfaction with their job, and retention intentions. Following the ANOVA analyses, regression analyses were used to establish the latent factors and manifest variables that predicted commitment and retention intentions.

Missing Data

Intermittently, teachers skip or neglect individual items on the PSI-BT. Individuals with more than one missing data point per factor were removed from further analysis. Where individuals had a single missing data point from a factor, imputation (predicting scores via multiple regression from other items on the same factor) replaced the missing data to retain these individuals (Osborne, 2008).

Data Cleaning

An essential element in any quantitative study is cleaning the data to ensure that only valid data points are in the analyses. In this study, data cleaning began with ensuring that all data points were within the acceptable range of one to six for all Likert scale items. In addition, teachers were excluded from the analyses if the standardized residual for the analysis in question was greater than three standard deviations from the mean.

Research Design

Predicting Commitment

With a background understanding of the factors that predicted beginning teacher commitment, we were interested in which factors predicted the commitment of

traditionally prepared and alternatively licensed math and science 6-12 grade teachers. Commitment was assessed by the item "I consider teaching to be my ideal career." Multiple regression analyses were used to determine the factors that predicted commitment of math and science teachers. The multiple regression analysis determined how much variance in commitment was accounted for by the factors of the PSI-BT. In addition, the analysis provided the extent to which a single factor predicted commitment when other factors were controlled. Subsequent to ascertaining the factors that predicted traditional and alternative licensure teachers' commitment, specific items were used in a multiple regression to determine the specific areas that predicted commitment as a method of targeting support for the traditionally and alternatively licensed beginning teachers. The items used as predictors in the multiple regression analyses were ascertained using the order of decreasing tolerance specified by Statistical Package for the Social Sciences (SPSS) when using a multiple regression with all factor items as independent variables. A stepwise multiple regression entering one item at a time in the order of decreasing tolerance was conducted to determine when there was no longer a significant change in R^2. The items entered up to that point were then the only items included in a one block multiple regression predicting commitment. The number of items used in the final multiple regression include the most important items as predictors since each analysis had a sample size of 33-36 teachers.

Predicting Retention Intentions

A multiple regression with commitment and satisfaction as the independent variables was the analytical method used to ascertain the areas that contributed to a math or science beginning teacher's intentions regarding remaining in the classroom vs. leaving the classroom.

Think about your intentions of teaching. Which category best fits your intentions? Beginning teacher retention intention is measured by the following items:

- I am not considering leaving teaching.

- I have considered the possibility of leaving teaching, but have decided to teach next year.

- I am making preparations to leave the profession of teaching at some time in the future.

- I have made the decision to leave teaching after this year.

Results

These analyses found a significant difference in commitment across the different levels of licensure ($F_{(1, 67)} = 6.41$, $p = .01$, $\eta^2 = .09$). A significant difference in retention

intentions were found across traditionally and alternatively licensed math and science teachers ($F_{(1, 67)}$ = 8.74, p = .004, η^2 = .12). The graph in Figure 1 shows the means across the two different levels of license type for commitment and retention intentions. Those beginning teachers who were traditionally prepared had a higher commitment and were more likely to intend to remain in the teaching profession than those who came to teaching through an alternative route.
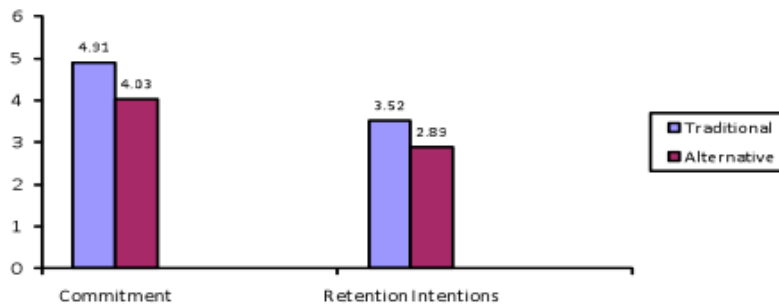

Figure 1. Mean scores for commitment and retention intentions

Commitment was the factor that most significantly predicted retention intentions for both the alternatively and traditionally licensed teachers, and thus the remainder of this article focuses on exploring the predictors of commitment for both groups of beginning teachers and later a closer analysis of the specific features that predict commitment for the two groups of beginning teachers.

Predicting Commitment by Factors of PSI-BT

The overall model with classroom management, instructional resources, student success, and satisfaction as predictors of math and science traditionally licensed teachers' commitment was significant ($F_{(3,35)}$ = 14.98, p < .001*),* and together the predictors accounted for 61% of the variance (R^2 = .61). The same analysis was run with alternatively licensed math and science teachers. The overall model for this analysis was significant ($F_{(3,35)}$ = 10.71, p < .001*)* and accounted for 50% of the variance (R^2 = .50). Table 1 provides the unstandardized *b*-weights, standard error, β weights, *t* statistics, and p-values for each predictor in both analyses. The larger the β and *b*-values, the stronger the relationship is between the predictor and commitment (the dependent variable). However, the *b*-values and standard errors are unstandardized coefficients and thus, cannot be compared across predictors. The β is standardized and these values can be compared, which provides insight into the importance of the predictor in the model. The *t* statistic indicates whether the predictor is a significant contributor to the overall model. Thus, *p*-values are associated with each *t*-statistic, with the conventional significance level being *p* < .05.

Table 1
Predicting Commitment

Predictors	Traditionally licensed					Alternatively licensed				
	b	SE	β	*t*	*p*	*b*	SE	β	*t*	*p*
Constant	-3.31	1.28		-2.60	.02	-3.21	1.45		-2.21*	.03
Classroom management	.41	.27	.26	1.55*	.13	.77	.32	.40	2.43*	.02
Instructional resources	1.10	.30	.57	3.72**	.001	.14	.30	.07	.48	.64
Student success	.03	.25	.02	.13	.89	.62	.34	.34	1.86	.07

Note. *p* < .05, **p* <.01

While both of these models are significant and account for a large portion of the variance, it is noteworthy how different both of these analyses are from beginning teachers as a whole in addition to traditionally and alternatively licensed teachers of all grade and subject specialties. Thus, the focus will be to understand the differences between these two groups of math and science teachers, in an effort to promote induction program changes that are targeted towards the needs of math and science teachers. The first difference that is notable is that of classroom management. Classroom management was a significant predictor of commitment for alternatively licensed math and science teachers, but not for the initially licensed teachers. The second difference was that instructional resources variable was a significant predictor of commitment for the traditionally licensed teachers, but not for those alternatively licensed. Student success was a significant predictor for traditionally licensed teachers, but was not for alternatively licensed teachers (*p* < .07). While the factor differences are interesting and compelling, understanding the specific types of support within these factors will prove to be most helpful to school system leaders as they shape their induction programs to meet the needs of beginning math and science teachers.

Predicting Commitment from Items on PSI-BT

Classroom management. Classroom management has many different aspects. An induction program targeted to the specific areas that beginning teachers perceive themselves to be the least successful is important to increase their perceptions of success and commitment. The two items in the classroom management factor that best predicted commitment are: (a) The discipline procedures in my classroom are effective, and (b) The discipline in my classroom is supportive of a good learning environment for my students.

These items were determined as the best predictors based upon a non-significant change in R^2 when adding other items to the regression analysis. The

regression analysis with these two items was a significant overall model ($F_{(2, 35)}$ = 13.70, $p < .001$), and together, the predictors accounted for 45% of the variance ($R^2 = .45$) for the alternatively licensed teachers. The same items were the most significant in predicting commitment for the traditionally licensed teachers with the overall significant model ($F_{(2, 32)}$ = 12.14, $p < .001$) accounting for 45% of the variance ($R^2 = .45$). Table 2 presents the statistics associated with each predictor in this model.

Table 2
Predicting Commitment from Classroom Management Items

Predictors	Traditionally licensed					Alternatively licensed				
	b	SE	β	*t*	*p*	*b*	SE	β	*t*	*p*
Constant	.13	1.00		.13	.90	-.89	.98		-.91	.37
Effective discipline	.38	.36	.26	1.04	.31	.28	.27	.18	1.05	.30
Supportive discipline	.56	.33	.43	1.71	.10	.79	.26	.54	3.07	.004

*Note. *$p < .05$*, **$p < .01$

Despite the similarities in the overall model significance, there was a difference in how each of the items reacted in the overall model. Supportive discipline was a highly significant predictor ($p = .004$) for alternatively licensed teachers; however, it was not a significant predictor for traditionally licensed teachers. Effective discipline was a significant predictor of commitment when controlling for the supportive discipline variable for either group of teachers. These findings were not surprising due to the traditional teachers' experiences in education courses and student teaching, which provided opportunity to see quality learning environments. While alternatively licensed teachers may have solid handle on the subject matter, they have not had the experience or the courses that provide such opportunities. Thus, offering this support to alternatively licensed teachers is important to their perceptions of success in classroom management and overall commitment to teaching.

The alternatively licensed teachers perceived classroom management and, in particular, discipline that supported a good learning environment, to influence their commitment to teaching. The significance of a supportive discipline implies that alternatively licensed teachers are likely to assess themselves as being committed to the profession of teaching when the discipline in their classroom is supportive of a good learning environment. This item did not predict commitment as much for traditionally licensed teachers, implying that other factors influence traditionally licensed teachers' commitment to teaching.

School systems and school leaders need to keep this in mind when providing support. While traditionally licensed teachers may have had some opportunities during

student teaching to work on student discipline techniques, alternatively licensed teachers come to teaching without any experience in education courses or student teaching. Therefore, they have a greater learning curve, and support in this area is critical to an alternatively licensed teacher's perceptions of success and commitment to teaching.

Instructional resources. As is the case with classroom management, the instructional resources factor also has a variety of areas that impact a beginning teacher's perception of success. The instructional resources items that predict commitment are: (a) I have been provided with curriculum that aligns with the state's objectives for my grade level or subject area, (b) The school provides professional development that is valuable to my instruction in the classroom, and (c) I feel comfortable with reporting the assessment of my students' work.

These items were determined as the best predictors of commitment based upon a non-significant change in R^2 when adding other instructional resources items to the regression analysis. The regression analysis for traditionally licensed teachers with these three items was a significant overall model ($F_{(3, 32)} = 15.26$, $p < .001$), and together, the predictors accounted for 61% of the variance ($R^2 = .61$). In contrast to what was found with the classroom management items, the same items for the instructional resources were not the most significant model. Instead, when adding the item "I feel confident in my ability to use the instructional technology available to me," the model became the most significant ($F_{(4, 35)} = 2.82$, $p < .05$) and accounted for 27% of the variance. Table 3 provides the results of the regression analysis predicting commitment from the four instructional resources items above. As instructional technology was not included in the regression for traditionally licensed teachers, the corresponding columns are blank in table 3.

Table 3
Predicting Commitment from Instructional Resources Items

Predictors	Traditionally licensed					Alternatively licensed				
	b	SE	β	*t*	*p*	*b*	SE	β	*t*	*p*
Constant	-3.14	1.25		-2.51*	.02	-.19	1.66		-.11	.91
Curriculum	.58	.20	.41	2.93**	.003	.27	.19	.24	1.43	.16
Professional development	.58	.18	.43	3.21**	.007	.50	.28	.35	1.77	.09
Reporting assessment	.32	.29	.17	1.08	.29	.25	.28	.15	.91	.37
Instructional technology						-.22	.26	-.15	-.83	.41

Note. *p < .05, **p <.01

Despite the overall model for alternatively licensed teachers being significant, none of the items were individually significant predictors of commitment when controlling for the other three items. This once again brings to light the need to differentiate induction programs for beginning math and science teachers according to type of licensure. Alternatively licensed math and science teachers do not have the same needs as traditionally licensed. Therefore, if we hope to retain teachers, a differentiated induction program is essential. Traditionally licensed teachers' commitment seems to be more directly related to instructional resources available to them including curriculum and professional development. This is not to say that alternatively licensed teachers don't view these things as important; rather, other more pressing concerns may be more directly related to their commitment to teaching. As they acquire more experience in the classroom, curriculum, professional development, reporting assessment, and instructional technology may become more important.

Encouraging student success. Unlike classroom management and instructional resources, in which one group of math and science teachers' commitment was significantly predicted by a factor, Encouraging student success was on the verge of being a significant predictor for the alternatively licensed teachers at a .08 level and not significant at all for the traditionally licensed teachers. All of the items in this factor were important in the overall model predicting commitment. The regression with all math and science teachers found the following items to be significant predictors when controlling for all of the items: (a) I am able to successfully teach students with a variety of ability levels, (b) I am able to effectively teach students with learning disabilities, and (c) I am able to effectively teach my students from diverse backgrounds. Although these items were significant for all math and science teachers, this was not true for the sample when the selection variable of license type was used. For traditionally licensed teachers, the overall model was not significant, and none of the items were significant predictors. In contrast, the overall model was significant for the alternatively license teachers ($F_{(7, 35)}$ = 4.92, $p < .001$) and accounted for 55% of the variance ($R^2 = .55$). The one item that was significant for the alternatively licensed teachers was related to effectively teaching students with learning disabilities ($b = .49$, $SE = .23$, $\beta = .46$, $t = 2.16$, $p < .05$). While the finding is not surprising, it showcases another reason for differentiation in induction programs. One possible reason for the difference again resides in the fundamental distinction between the two license types. Often the traditionally licensed teachers take classes specific to meeting the needs of students with learning disabilities and have practical experience from student teaching. Conversely, alternatively licensed teachers may not have this experience and are learning on the job.

Predicting Retention by Factors of PSI-BT

This study builds on research conducted with beginning teachers. This research found commitment and satisfaction to be significant predictors of retention intentions (Corbell, 2008). The overall model with commitment and satisfaction as predictors of math and science teacher retention intentions was significant for both traditionally

licensed teachers ($F_{(2,32)}$ = 21.48, p < .001) and alternatively licensed teachers ($F_{(2,35)}$ = 6.84, p < .003). Together, the predictors for the traditionally prepared teachers accounted for 59% of the variance (R^2 = .59). In contrast, satisfaction and commitment only accounted for 29% of the variance in retention intentions for alternatively licensed teachers. Table 4 provides the results from the multiple regression analyses predicting retention intentions for the two groups of math and science teachers.

Table 4
Multiple Regression Analyses Predicting Retention Intentions

Predictors	Traditionally licensed					Alternatively licensed				
	b	SE	β	*t*	*p*	*b*	SE	β	*t*	*p*
Constant	1.26	.35		3.56***	.001	1.12	.54		2.07	.05
Commitment	.28	.07	.52	3.90***	.000	.28	.10	.43	2.70*	.01
Satisfaction	.20	.07	.38	2.88**	.007	.15	.12	.20	1.21	.23

Note: *p < .05, **p <.01, ***p < .001

Satisfaction was a significant predictor of traditionally licensed math or science teachers, though it was not for the alternatively licensed teachers. As can be seen from these analyses, there is more variance unaccounted for by satisfaction and commitment when predicting retention intentions of alternatively licensed teachers. Therefore, as a post hoc analysis, latent factors and demographic variables that could account for this difference were sought in the literature. Ingersoll and Smith (2004) found that beginning teachers who were provided with six supports (mentor in the same field, common planning time, time for collaboration, an induction program, a seminar for beginning teachers, and administration support) had an attrition rate of 24% as compared to those without any type of formalized induction program who had an attrition rate of 40%. Mentors should optimally teach the same subject(s) and grade(s) as the beginning teacher and teach at the same school, though these conditions rarely exist (Bauer & LeBlanc, 2002; Ingersoll & Smith, 2004; Johnson & Birkeland, 2003; Reiman & Thies-Sprinthall, 1998).

With this background knowledge, administration support, mentor support, and having a mentor in the same subject area were addressed as additional predictors of retention intentions. For the alternatively licensed teachers, these three factors were significant predictors of retention intentions, but not for the initially licensed teachers. The one conflicting finding was that mentor support was a negative predictor of retention intentions. That this finding could be a result of whether the mentor taught the same subject or a different subject. Unfortunately, with running multiple regression analyses for each of these subgroups would not be powerful enough. Since it was not possible to run the multiple regression analysis with only alternatively licensed teachers without mentors in their same field, the authors instead analyzed all math and science teachers without mentors in their same field versus all math and science teachers with

mentors in their same field while controlling for type of license to see if similar patterns arose. The predictors in the multiple regression equation are commitment, mentor support, administration support, and type of license (traditional vs. alternative). Table 5 provides the results from these multiple regression analyses.

Table 5
Impact of Subject Area Specialty on Predicting Retention Intentions Using Multiple Regression

Predictors	Mentor in the same subject					Mentor not in the same subject				
	b	SE	β	t	p	b	SE	β	t	p
Constant	1.07	.71		1.50	.14	1.69	.64		2.66*	.01
Commitment	.39	.08	.65	4.99***	.00	.27	.09	.43	2.84*	.01
Mentor support	-.07	.14	-.06	-.54	.60	-.36	.12	-.47	-3.05**	.005
Administration support	.19	.09	.28	2.09	.05	.32	.11	.40	2.78*	.01
Type of license	.05	.20	.03	.23	.82	.87	.31	.42	2.81*	.01

Note: *$p < .05$, **$p < .01$, ***$p < .001$

These analyses provided enough preliminary data to hypothesize that for math or science teachers, having a mentor in the same subject is an important part of their decision making process of whether to stay in teaching. When mentors were not in the same subject, participants' perceptions of the mentor support negatively impact retention intentions. In contrast, the retention intentions of those with mentors in the same subject were not significantly impacted by mentor support. As the sample sizes in this study are low, just over 30, it is important to confirm these findings with a larger sample in future research. The inability to look specifically at the alternatively licensed teachers with and without a mentor in the same subject is a limitation of this study and should be explored later with a larger sample.

Discussion and Implications

This article focuses on the differences between traditionally and alternatively licensed math/science beginning teachers in an effort to promote the need for differentiated induction programs. Traditionally and alternatively licensed teachers differed in their commitment to teaching and their retention intentions, though the specific factors that predicted these two variables were different for each group. In addition, the specific items predicting the factors differed across groups as well.

Instructional resources significantly predicted the traditionally licensed beginning teachers' commitment to teaching. Conversely, instructional resources variable was not a significant predictor for alternatively licensed teachers, but instead classroom management and, to a lesser extent, encouraging student success were significant predictors of commitment. As commitment significantly predicts a beginning teacher's retention intentions, these differences are especially important as school system leaders think about how to most effectively support beginning teachers. Like students, beginning teachers have different needs and a one-size-fits-all approach is not the best solution. From this study, one can conclude that alternatively licensed teachers need more support in classroom management whereas traditionally licensed teachers desire more instructional resources. Specifically, traditionally licensed teachers find that the availability of a curriculum that aligns with state objectives and the provision of valuable professional development to be the most significant predictors of the factor mean score for instruction resources. For policymakers and school system leaders, providing curriculum materials and professional development that align with the needs of beginning teachers are imperative.

The lack of training of alternatively licensed teachers was again highlighted with the regression that predicted commitment from student success items. The item about working with students with learning disabilities was significant for these teachers, but not for the traditionally licensed teachers. In most teacher education programs, teachers receive training for working with students with learning disabilities which can make a difference in how teachers feel about their overall success. Alternatively licensed teachers need professional development or support from mentors and administration related to teaching students with learning disabilities.

The findings highlighted the need for mentors to be in the same subject area, especially when the teacher was an alternatively licensed math or science teacher. Not having a mentor in the same subject area seems to create a feeling of dissatisfaction with the mentor support and negatively influenced their retention intentions at a significant level. While the teachers with a mentor in the same subject area also showed a negative impact, it was not significant. Therefore, no conclusive evidence is available for this group of teachers, as their mentor support relates to retention intentions. It is also important to note that the state of North Carolina does not have a standardized mentor program for school districts. While school districts must provide a mentor to beginning teachers, the type of support that is given varies widely. Unfortunately, without equal groups of teachers from various school districts, significant differences cannot be analyzed to make further conclusions about how mentor support affects beginning teacher retention intentions.

Each of these findings led to a careful examination of the implications of this study. The most significant theme throughout the analyses is the need to differentiate induction programs for beginning teachers. Teacher shortage is a problem that cannot solely be solved by producing more traditionally licensed teachers. Instead, school

systems must support their beginning teachers and put a focus on the importance of retaining these teachers. Spending more money on induction will, in the end save the district money on recruiting new teachers if the changes in induction culminate in retaining more teachers. Retaining just 1% of school districts' teachers can save tens of thousands of dollars, so this goal is not insurmountable. The need to hire alternatively licensed teachers is not likely to go away. In the mean time, districts must focus on how to better serve beginning teachers so they can be successful. School district leaders, administrators, colleagues, and mentors must understand that alternatively licensed teachers do not have the same training as a traditionally prepared teacher. Therefore carful and coordinated efforts to differentiate induction programs may lead to increased commitment and retention of traditionally and alternatively licensed math and science beginning teachers.

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Appendix

Perceptions of Success Inventory for Beginning Teachers

Classroom Management
1. I have developed clear routines and procedures for my classroom that are aligned with school policy.
2. I have implemented consistent routines and procedures in my classroom.
3. The discipline procedures in my classroom are effective.
4. The discipline in my classroom is supportive of a good learning environment for my students.
5. I feel in control when I am teaching.

Student Success
6. I am able to successfully teach students with a variety of ability levels.
7. I am able to motivate all students.
8. I am able to use a variety of teaching strategies to provide my students with instruction that is effective for them.
9. I am able to effectively teach students with learning disabilities.
10. I am able to effectively teach students with limited English proficiency.
11. I am able to effectively teach my students from diverse backgrounds.
12. I am able to frame my instructional decisions based on my students' learning.

Instructional Resources
13. I have been provided with curriculum that aligns with the state's objectives for my grade level or subject area.
14. I have the curriculum materials I need to teach effectively.
15. I feel confident in my ability to use the instructional technology available to me.
16. The school provides professional development that is valuable to my instruction in the classroom.
17. I feel confident in my ability to grade student work.
18. I feel comfortable with reporting the assessment of my students' work.

Satisfaction
19. In general, I am satisfied with my current job.

Commitment
20. I consider teaching to be my ideal career.

Retention Intentions
21. Think about your intentions of teaching. Which category best fits your intentions.
    1. I am not considering leaving teaching.
    2. I have considered the possibility of leaving teaching, but have decided to teach next year.
    3. I am making preparations to leave the profession of teaching at some time in the future.
    4. I have made the decision to leave teaching after this year.

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