Implementing instructional practices to improve American Indian and Alaska Native students' reading outcomes: An exploration of patterns across teacher, classroom, and school characteristics

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Abstract

The Native Community strongly recommends integrating Native language and culture (NLC) into reading instruction to improve outcomes for American Indian/Alaska Native (AI/AN) students. However, little is known about the extent to which recommended practices are used and what might facilitate their implementation. The National Indian Education Study conducted by the U.S. Department of Education surveys teachers of AI/AN students on their instructional practices. This descriptive study builds on previous analysis of survey data which identified measurable dimensions of NLC in instruction. We now examine (a) the extent to which teachers implement these dimensions, and (b) what teacher, classroom, and school-wide characteristics facilitate implementation. Outcomes suggest that the recommended practices are rarely implemented, and that AI/AN teachers speaking Native language(s) and teaching in classrooms with high AI/AN enrollment located in schools employing AI/AN teachers and staff implement the recommended practices more often. We discuss implications for teacher education and support.

Keywords: Multicultural education, equity, professional development, American Indian/Alaska Native students

Implementing instructional practices to improve American Indian and Alaska Native students' reading outcomes: An exploration of patterns across teacher, classroom, and school characteristics

To improve school outcomes for American Indian/Alaska Native (AI/AN) students, the Native American community recommends (a) emphasizing Native Language and Culture (NLC) in professional development for teachers (Executive Office of the President, 2014; National Congress of American Indians/National Indian Education Association, 2010; National Education Association, 2010-2011), (b) emphasizing NLC in instruction to increase the relevance of the curriculum (Bishop, Berryman, Cavanagh, & Teddy, 2009; Brayboy & Castagno, 2009; Brayboy, et al., 2015; Castagno & Brayboy, 2008; Chavers, 2000; Faircloth &Tippeconnic, 2010; Martinez, 2014; McCarty & Lee, 2014), (c) increasing the number of teachers of AI/AN backgrounds (NEA, 2010-2011), and (d) encouraging parents of AI/AN students to become active participants in their children's education (Chavers, 2000; Faircloth & Tippeconnic, 2010). These recommendations are critical given AI/AN students' tendency to lag behind their non-AI/AN peers in academics (Kena et al., 2015), attendance (Grant, 2014; Sprague, Vincent, Tobin & CHiXapkaid, 2013), and graduation rates (Klein, 2015). Integrating NLC into professional development might promote teachers' awareness of and capacity to validate AI/AN students' cultural and linguistic backgrounds, experiences, and learning styles (Brayboy, Faircloth, Lee, Maaka, & Richardson, 2015; Castagno & Brayboy, 2008). Emphasizing NLC in instructional materials is necessary to increase the curriculum's cultural relevance and allow students to identify with the content presented (Cross et al., 2011). Increasing the number of Native teachers and promoting outreach to parents could improve positive home-school relationships that have been associated with student school success (Young, 2010).

The literature provides guidance on how to integrate NLC into professional development. For example, Castagno and Brayboy (2008) suggest that teachers need to be trained to be sensitive to individual students' learning styles and to actively reach out to AI/AN students and their families. At the same time, they suggest that teachers of AI/AN students should be able to assess how curriculum reflects—or fails to reflect—Native culture. This means that teachers of AI/AN students need to be familiar with Native history, culture, and issues. In addition, the literature on professional development for teachers of AI/AN students emphasizes teachers' ability to forge positive relationships with Native students (Castagno & Brayboy, 2008; Pewewardy, 2002; Santamaria, 2009; Young, 2010).

Efforts to integrate NLC into instruction are reflected in curriculum created by state departments of education for teachers. For example, the state of Washington has developed *Since Time Immemorial* in collaboration with the federally recognized tribes in the state to assist teachers with providing instruction relevant to Native issues (see http://www.k12.wa.us/IndianEd/). Similarly, the Oregon State Department of Education has an AI/AN Education State Plan to promote teachers' knowledge of Native culture, and is developing a Native American curriculum focused on historically accurate and place-based education that will be mandatory for all students (see http://www.ode.state.or.us/search/results/?id=112). The Indian Land Tenure Foundation developed *Lessons of Our Land* (see http://www.lessonsofourland.org/) that offers curriculum materials that are relevant to Native students.

Around the country, efforts exist to recruit Native students into the teaching profession (Epstein, 2005; Wyland, 2016). The U.S. Department of Education offers Indian Education Professional Development Grants (see http://www2.ed.gov/programs/indianprofdev/awards.html) to recruit Native American students into the teaching profession. Boulter (2015) provides

an overview of Native American teacher training programs in Oregon, Minnesota, Oklahoma, and Washington. As an example, the Sapsik'ʷałá program (see https://education.uoregon.edu/program/sapsikwala-project) works with the nine federally recognized tribes of the state of Oregon to prepare Native teachers who can support AI/AN students and deliver instruction in a culturally relevant manner.

Professional development focused on training teachers to support AI/AN students commonly include strategies to reach out to parents and families (McCarty & Lee, 2014; Young, 2010). Welcoming Native parents into their child's school appears imperative to restore home-school relationships that have been harmed by the long history of boarding schools and marginalization of Native populations within the public education system (Brayboy et al., 2015; Castagno & Brayboy, 2008).

While efforts to translate the Native Community's recommendations into practices clearly exist, there appears to be little clarity on what facilitates or hinders implementation of the recommended practices. We theorize that the extent to which the recommended practices are implemented in schools varies with teacher, classroom, and school characteristics. For example, teacher awareness of Native issues might vary with teacher cultural background or immersion into Native culture. Teacher readiness to cater to individual learning styles of students might vary with the cultural diversity of the classroom. Teacher exposure to training necessary to promote AI/AN students' success might vary with school characteristics, including access to training and resources. Thus, while the training needs of teachers and recommended practices are clearly described in the literature, the conditions under which those trainings and practices can be implemented are less clear.

Data gathered by the National Indian Education Study (NIES, see http://nces.ed.gov/

nationsreportcard/nies/) provide important information on the quality of instruction provided to AI/AN students. Surveys administered to a nationally representative sample of 4th and 8th grade AI/AN students, their teachers, and their school administrators (see http://nces.ed.gov/nationsreportcard/nies/about_survey.aspx) provide data that allow us to identify the measurable dimensions of the construct of NLC in instruction as well as what facilitates and hinders integration of NLC in instruction. Van Ryzin, Vincent, & Hoover (2016) report the outcomes of factor analyses identifying the measurable dimensions of NLC in instruction from the student, teacher, and administrator perspective. Our current study builds on these findings and focuses primarily on the teacher and administrator survey data to examine the extent to which teachers report implementing the identified dimensions of NLC, and which teacher, classroom and school characteristics might facilitate implementation.

Developed by a cadre of Native American scholars and educators, the NIES *Teacher Background Survey* includes items querying respondents about demographic information as well as the extent to which they integrate NLC into reading and math instruction to create culturally responsive learning environments for AI/AN students. The *School Background Survey* includes items querying school administrators about demographic information pertaining to the administrator and the school's overall teaching staff as well as the school type.

Based on initial exploratory and confirmatory factor analyses with NIES *Teacher Background Survey* data collected in 2009 and 2011, survey items clustered into three measurable dimensions of NLC (Van Ryzin et al., 2016). Factor 1 ("teacher preparation") consisted of items asking respondents how often, during the last two years, they consulted on-line resources, professional publications, cultural centers, colleagues, and elders or cultural experts, and attended relevant workshops or classes. See Figure 1 for the items including in

Factor 1. Factor 2 ("integration of NLC into reading") consisted of items asking respondents to what extent they integrated AI/AN culture, history, and issues affecting Native populations into reading instruction, how often they had students read and discuss literature about AI/AN themes or written by AI/AN authors, and how often they had students write about issues affecting AI/AN populations or their own experiences as members of the Native community. See Figure 2 for the items included in Factor 2. Factor 3 ("integration of NLC into math") consisted of items asking respondents to what extent they integrated AI/AN culture, history, and issues affecting Native populations into math instruction, and how often they had their students solve math problems reflecting AI/AN situations and themes, study traditional AI/AN math, and study math within traditional AI/AN contexts (see http://nces.ed.gov/nationsreportcard/nies/questionnaire.aspx as well as Van Ryzin et al. (2016) for the teacher survey items).

Surprisingly, a number of studies (Jesse, Meyer, & Klute, 2014; Lopez, Heilig, & Schram, 2013), including our initial analyses (Van Ryzin & Vincent, in press) have found negative relationships between the presence of NLC in instruction and AI/AN student academic outcomes based on the NIES teacher survey data. However, because the datasets used are cross-sectional, we cannot assume a causal relationship between use of NLC in instruction and student outcomes, and contextual variables need to be further examined (Van Ryzin & Vincent, in press). To help interpret these findings within the context of the recommendations of the Native community as well as research supporting the necessity and benefits of culturally responsive instruction for ethnically, racially, and linguistically diverse students (Gay, 2010; Santamaria, 2009), our primary goals were to explore the extent to which the recommended practices are implemented, and if there are teacher, classroom, and school characteristics that might facilitate their implementation. In addition, given the differing needs of elementary and middle school

students, we wanted to explore if implementation patterns differed across 4th and 8th grade classrooms. Finally, given that recommendations for improving AI/AN students have existed for a number of years, we wanted to explore if there were changes in implementation patterns across years.

Our choice of teacher, classroom, and school characteristics was limited by the variables contained in our extant dataset. Because the literature suggests that same-race teachers could be important role models for students from racial/ethnic minorities (Dee, 2004), and that language is central to AI/AN students' cultural identity formation and validation (Castagno & Brayboy, 2008; Executive Office of the President, 2014), we selected race/ethnicity and knowledge of Native language(s) and preparation in bi-lingual education as teacher characteristics of interest. Because classroom racial/ethnic composition tends to affect outcomes of minority students (Jackson, Barth, Powell, & Lochman, 2006), we included AI/AN enrollment density as a classroom characteristic of interest. Finally, we included school administrator race/ethnicity, type of school, and percent of AI/AN teachers and staff as school characteristics to explore if the institutional setting influenced teacher use of recommended practices (Solomon, Portelli, Daniel, & Campbell, 2005).

Due to space restrictions and the importance of reading for students' overall school success, we focused our analysis on reading teachers only. The research questions driving our purely exploratory and descriptive analyses were:

1. What percent of AI/AN students are taught by teachers who engage in teacher preparation relevant to NLC?
2. What percent of AI/AN students are taught by teachers who implement reading instruction that emphasizes NLC?

3. Does the percent of AI/AN students taught by teachers who engage in teacher preparation relevant to NLC, and who implement reading instruction emphasizing NLC, differ across teacher, classroom, and school characteristics?
4. Does the percent of AI/AN students taught by teachers who engage in teacher preparation relevant to NLC, and who implement reading instruction emphasizing NLC, differ across 4th and 8th grade teachers?
5. Does the percent of AI/AN students taught by teachers who engage in teacher preparation relevant to NLC, and who implement reading instruction emphasizing NLC, change across time?

Method

To answer the research questions identified above, we used NIES *Teacher Background Survey* data and NIES *School Background Survey* data collected from 4th and 8th grade teachers and administrators in 2009 and 2011. Data from the *Teacher Background Survey* provided the following teacher characteristics: (a) years of experience, (b) race/ethnicity, (c) fluency in Native language(s), and (d) training in bilingual education. It also provided responses for each item associated with teacher preparation and integration of NLC into reading instruction, measurable factors of NLC identified by Van Ryzin et al. (2016). Finally, it provided information on the classroom characteristic of interest to us, namely the number of students from AI/AN backgrounds. Data from the *School Background Survey* provided information on the following school characteristics: (a) administrator's years of experience, (b) administrator race/ethnicity, (c) type of school (public, charter, tribal/contract, Bureau of Indian Education, alternative, other non-public), (d) percent of teachers from AI/AN backgrounds, and (e) percent of school staff from AI/AN backgrounds. It is important to note that our analyses focused exclusively on items

soliciting quantitative responses. Analyses of items soliciting qualitative responses from teachers and administrators about their perceptions of culturally responsive practices will be conducted separately.

The NIES survey datasets made available to researchers associate each student who participated in the NIES study with a reading teacher who completed the *Teacher Background Survey* and an administrator who completed the *School Background Survey*. The dataset contains weighting variables for students as well as for schools to adjust statistical outcomes based on the sampling method. It does not contain a weighting variable for teachers. Therefore, teacher analyses need to be completed at the student level and outcomes expressed as percentages of students who were taught by teachers implementing a given practice (National Center for Education Statistics, 2011).

Samples

In 2009, the reading teachers and administrators of 12,300 4th grade students in 2300 schools were asked to complete the NIES *Teacher Background Survey* and the *School Background Survey* respectively. Also in 2009, the reading teachers and administrators of 10,400 8th grade students in 1900 schools were asked to complete the NIES *Teacher Background Survey* and the *School Background Survey* respectively. In 2011, the reading teachers and administrators of 10,600 4th grade students in 1900 schools were asked to complete the NIES *Teacher Background Survey* and the *School Background Survey* respectively. Also in 2011, the reading teachers and administrators of 10,600 8th grade students in 2100 schools were asked to complete the NIES *Teacher Background Survey* and \the *School Background Survey* respectively.[1]

Table 1 shows that in both years and at the 4th and 8th grade level, greater percentages of students were taught by teachers with zero to four years experience than by more experienced

[1] All sample sizes were rounded to the nearest 100 to protect respondent confidentiality.

teachers. The majority of students across grade levels and years were taught by teachers who identified as White (64.9 to 71.0 percent), had no knowledge of Native language(s) (62.8 to 68.7 percent), and had no training in bi-lingual education (60.9 to 70.6 percent). Table 2 shows that greater percentages of students attended classrooms with less than 5 AI/AN students at both grade levels and both years. At the 8th grade level, a sizable percentage of students attended classrooms whose teachers chose "I don't know" or omitted this survey item: 10.3 and 16.6 percent respectively in 2009 and 2011. Table 3 shows that the majority of students across grade levels and years were taught by reading teachers in schools led by an administrator who had 0-4 years experience (50.9 to 54.3 percent) and identified as White (71.0 to 74.7 percent). The majority of students across grade levels and years were taught by reading teachers teaching in public schools (79.9 to 83.1 percent), where no or one to five percent of teachers were from AI/AN backgrounds and no or one to five percent of staff were from AI/AN backgrounds.

Analytical Procedures

We conducted only descriptive analyses to answer the research questions identified above. To answer research questions one and two (i.e., what percentage of students are taught by teachers who engage in teacher preparation and by teachers who integrate NLC into reading instruction), we first weighted the data with the overall student weighting variable and then calculated frequencies for each response option for each item included in the teacher preparation factor and the factor on integration of NLC into reading instruction (Van Ryzin et al., 2016).

To answer research questions three (i.e., does the percentage of students taught by teachers who engage in teacher preparation and by teacher who integrate NLC into reading instruction vary across teacher, classroom, and school characteristics), we again weighted the data with the overall student weighting variable. Because items in factors one (teacher

preparation) were scored from 1 = never to 4 = 5 or more times, and items in factor two (integration of NLC into reading instruction) were scored from 1 = never to 5 = every day or almost, we standardized all scores. We then calculated factor means by averaging across all factor items. Finally, we examined those factor means across teacher classroom, and school characteristics. Values above 0 indicated greater than average implementation of the factor, and values below 0 indicated less than average implementation of the factor.

To answer research questions four and five, we graphed our outcomes by grade level and by year to allow for visual examination of changes in implementation patterns across grade level and years. The dataset nests students and the teachers associated with them within schools. Because our analyses were purely exploratory, we did not account for the nested structure of the data. All analyses were conducted with SPSS, version 22.

Results

Figure 1 shows the percent of students by grade level and year taught by teachers who—during the last two years—consulted specific teacher preparation resources never, one to two times, three to four times, or five or more times. The following patterns emerged: The majority of students were taught by teachers who reported that they had never accessed any type of resources that might provide information on how to improve instruction to AI/AN students. Of the listed types of resources, "other teachers" in the respondents' schools was the most frequently accessed resource, followed by articles in professional journals. Our data did not contain information on the characteristics of "other teachers" or on what conversations with "other teachers" entailed. The least frequently accessed resource was in-service classes or workshops. These patterns were similar across grade levels and years.

The percent of students taught by teachers who implemented specific strategies to

integrate NLC into reading instruction never, at least once a year, at least once a month, at least once a week, or every day or almost every day is illustrated in Figure 2. The majority of students were taught by teachers who reported that they integrated culturally relevant materials and activities into reading instruction at least once a year. Results for the item querying teachers about providing students with the opportunity to write about their own experiences as individuals of AI/AN backgrounds indicated that the majority of students were taught by teachers who never provided them this opportunity. These patterns were again similar across grade levels and years.

When examining if implementation patterns differed for students taught by teachers with varying characteristics, including years of experience, race/ethnicity, fluency in Native language(s), and training in bilingual education, we found that—based on our descriptive analyses—only teacher race/ethnicity and fluency in Native language(s) were associated with visible differences in implementation means across the two factors. Due to space constraints, we present only those findings. Figure 3 shows implementation means for the two factors of interest across students taught by teachers of varying teacher race/ethnicity. We only included students taught by teachers who identified their race as AI/AN or White because those groups accounted for approximately 80 percent of the sample. We included students taught by teachers who identified their ethnicity as Latino, because it captured approximately five to six percent of the sample. On average, students who were taught by teachers who identified as AI/AN had teachers who were better prepared to create culturally responsive classrooms and who implemented NLC into reading instruction more often than students taught by teachers who identified as White. Students taught by teachers who identified as Latino had teachers who were somewhat better prepared and implemented NLC into reading instruction slightly more often than students taught by White teachers. These patterns were similar across grade levels and years. Figure 4 shows that

students taught by teachers with greater knowledge of AI/AN language(s) were taught by better prepared teachers and teachers who integrated NLC into reading instruction more often. This appeared to be the case for both 4th grade and 8th grade students, as well as for students who participated in the 2009 and those who participated in the 2011 NIES data collection. Variations in outcomes for students taught by fluent non-Native speakers might be due to the very low number of students taught by teachers who were fluent non-Native speakers.

Figure 5 shows that students attending classrooms with higher AI/AN enrollment had better prepared teachers and teachers who integrated NLC into instruction more often. Patterns were again similar across grade levels and years.

Examining implementation patterns across students attending school with varying characteristics as reported by the school administrator, we found that administrator race/ethnicity, type of school (public, charter, tribal/contract, Bureau of Indian Education, alternative, other non-public), percent of teachers from AI/AN backgrounds, and percent of school staff from AI/AN backgrounds were associated with visible difference in students' exposure to the identified factors. Figure 6 shows that students attending schools led by administrators who identified as AI/AN were exposed to better prepared teachers and teachers who integrated NLC into reading instruction more often compared to students who attended schools led by administrators who identified as White or Latino. This was true for students in 4th and 8th grade, as well as across the two years of investigation. We again included only students attending schools led by administrators who identified their race as AI/AN or White because they accounted for approximately 80 percent of our sample. We included students attending schools led by administrators who identified their ethnicity as Latino, because they represented between six and eight percent of the sample.

Figure 7 illustrates differences in student exposure to the factors of interest across school types. Students attending tribal schools and BIE schools were exposed to better prepared teachers and teachers who integrated NLC into instruction more often compared to students attending other types of schools. The differences among school types were quite pronounced, sometimes exceeding one standard deviation. This pattern was constant across grade levels and years. Figures 8 and 9 show differences in the extent to which students attending schools with various AI/AN teacher and staff density were taught by teachers who were prepared to create culturally responsive classrooms and who integrated NLC into reading instruction. Students who attended school with higher AI/AN teacher or staff density were taught by better prepared teachers, as well as teachers who integrated NLC into reading instruction more often compared to students who attended schools that had no or few teachers and staff of AI/AN backgrounds.

Discussion

Our descriptive analyses yielded important insights into the implementation of recommended practices, as well as what teacher, classroom, and school characteristics were associated with greater implementation. In general, we observed the following patterns. The majority of AI/AN students were taught by teachers who rarely accessed professional development intended to raise AI/AN student outcomes and rarely implemented recommended practices to integrate NLC into instruction. Notably, the most popular type of professional development was talking with other teachers at the school. Unfortunately the data included in our analyses did not contain information on what colleagues teachers considered to be valuable resources, and what types of conversations they engaged in with those colleagues. This type of qualitative information will be examined in a separate study. It is also unclear if reaching out to colleagues occurred proactively or in response to concerns about AI/AN students' performance.

However, our findings suggest that teachers value professional networks and peer guidance in providing culturally relevant instruction to AI/AN students. The extent to which these networks would be useful to improve AI/AN students' performance is yet to be examined. Further research on professional networking among teachers of AI/AN students is needed to gain insight into the personal characteristics of teachers serving as resources for their colleagues, the conditions under which colleagues are sought out as a resource, and the type of information that might be shared among colleagues.

More than half of students were taught by teachers who reported little use of structured training in the form of inservice classes or workshops, types of professional development that tend to require investment of time and money. These professional development patterns need to be interpreted in the context of opportunity and choice. We were unable to determine if teachers simply did not have the opportunity to participate in inservice classes and workshops, talk to elders and experts, and go to cultural centers and libraries, or if they chose not to access available resources. Additional examination of qualitative responses to survey items might provide more information.

Similarly, the majority of students were taught by teachers who integrated NLC into reading instruction once a year, and into writing instruction even less often. It appears likely that annual implementation of a given practice occurs in response to a holiday like Thanksgiving, and less in response to a strategic plan to provide culturally responsive instruction to AI/AN students (Pewewardy, 2002). This "token" use of culturally responsive practice might have iatrogenic effects and further alienate AI/AN students from their school community (Brayboy & Castagno, 2009; Pewewardy, 2002). Given this very rare provision of culturally relevant instruction to AI/AN students, the academic underperformance of AI/AN students might be due to lack of

implementation of recommended practices.

It is important to note that Figures three to eight show differences relative to the standardized mean score for all students. To make these differences more meaningfully interpretable, it is important to consider the unstandardized mean scores and standard deviations for the factors. The unstandardized mean score for Factor 1 (teacher preparation) in 2009 was 1.97 (slightly less than once or twice a year) with a standard deviation of .84 for 4th grade students and 2.00 (once or twice a year) with a standard deviation of .85 for 8th grade students. In 2011, the mean score for Factor 1 (teacher preparation) was 2.00 (once or twice a year) with a standard deviation of .80 for 4th grade students and 1.95 (slightly less than once or twice a year) with a standard deviation of .84 for 8th grade students. The mean score for Factor 2 (integration of NLC into reading instruction) in 2009 was 2.11 (slightly more often than once or twice a year) with a standard deviation of .68 for 4th grade students and 2.03 (slightly more often than once or twice a year) with a standard deviation of .73 for 8th grade students. In 2011, mean score for Factor 2 (integration of NLC into reading instruction) was 2.12 (slightly more often than once or twice a year) with a standard deviation of .65 for 4th grade students and 2.04 (slightly more often than once or twice a year) with a standard deviation of .77 for 8th grade students. As such, unstandardized mean scores averaged across all students were fairly low, and differences from the standardized mean should be interpreted in relation to the actual means and standard deviations. For example, Figure 4 shows that in 2009, 4th grade students taught by teachers who were moderately fluent in an AI/AN language were taught by teachers who integrated NLC into reading instruction 1.24 standard deviation above the mean. While this outcomes appears encouraging, it means that these students were taught by teacher who integrated NLC into reading instruction at an average unstandardized mean of 2.95 (slightly less often than once a

month).

The extent to which students' exposure to teachers prepared to create culturally responsive classrooms and to teachers who integrate NLC into instruction varied across teacher, classroom, and school characteristics were not surprising. AI/AN students taught by AI/AN teachers, teachers familiar with AI/AN language, in classrooms with high AI/AN enrollment and in schools led by AI/AN principals, tribal or BIE schools, or schools with high AI/AN teacher and staff density had higher exposure to well-prepared teachers and teachers who integrated NLC into instruction than AI/AN students who were in other educational settings. Unfortunately, the vast majority of AI/AN students in our sample were not part of that group, but were taught by White teachers with no knowledge of AI/AN language, in classrooms with few AI/AN students, and in schools led by White administrators and few AI/AN teachers and staff. This suggests that there is little integration of practices recommended by the Native community into education settings serving culturally diverse students, and that those practices might be considered relevant to AI/AN students only.

Same-race teachers and teachers familiar with Native language appear better prepared to include NLC into instructional content, perhaps because they have greater knowledge of Native history and experience with current issues affecting Native populations. A Native American cultural background might also make it easier for teachers to access professional development resources, such as cultural centers and elders, as well as materials that facilitate culturally responsive reading instruction, such as books or electronic materials on culturally relevant issues and experiences or in Native language(s). It is important to note that not all materials presented as "culturally responsive" to Native students have beneficial effects. Materials that might inadvertently perpetuate stereotypes are likely to have unintended negative effects.

Our finding that student exposure to the two factors of interest increased with the number of AI/AN students in the classroom could indicate that, given pressure to prepare their students to meet achievement benchmarks, teachers tend to use instructional practices that are culturally relevant for the majority of their students. However, it is important to attend to cultural minorities in the classroom as well, to ensure that all students have equal opportunity to succeed. It was disconcerting to see that, at the 8th grade level, ten to 17 percent of students were taught by teachers who did not know how many AI/AN students were in their classrooms. Unlike their 4th grade colleagues whose classroom populations tend to stay constant during the day, 8th grade teachers tend to teach specific subjects to classrooms made up of different students throughout the day. It might be necessary to encourage 8th grade teachers to get to know each individual student they teach to increase their ability to tailor instruction to individual student needs and establish positive relationships with all students in their classroom.

It is important to consider that many of the variables we examined are likely highly correlated. For example, AI/AN teachers might be more likely to teach in tribal or BIE schools, and tribal or BIE schools likely have higher AI/AN teacher and staff density or an administrator who identifies as AI/AN. These relationships and their impact on students' exposure to the factors of interest remain to be further explored.

The stability of patterns across years is somewhat concerning. While two years seem insufficient time for major changes in practices, one needs to consider that the NIES surveys have been implemented biannually from 2005 to 2011, and were implemented again in 2015. While we do not have access to previous years of data, it seems unlikely that implementation of the factors of interest declined over the years, and more likely that they stayed at the very low level we observed in the years included in our analyses. This might suggest that the NIES survey

data have yet to impact teacher education practices.

Overall, our findings suggest that professional development focused on AI/AN student needs and integration of NLC into reading instruction might be concentrated in schools serving primarily AI/AN students. Integrating training to support AI/AN students' needs as well as curriculum emphasizing NLC into instruction for all students might benefit the many AI/AN students attending schools with low AI/AN density as well as students of all racial/ethnic backgrounds.

Implications for Teacher Education

Our findings suggest that teachers of AI/AN students, the majority of whom identify as White, have no knowledge of Native language, teach in public school classrooms with low AI/AN enrollment, and do not receive sufficient training in the practices recommended by the Native community to improve AI/AN students' school outcomes. Perhaps in might be beneficial to provide teachers access to data identifying their students' racial/ethnic backgrounds in order to raise teacher awareness of their students' cultural support needs. While many teachers are pressured to ensure that their students meet testing benchmarks and therefore might focus on the cultural majority in their classrooms, it is important to emphasize that all students need to have equal access to the highest quality of instruction. This means balancing practices that validate varying cultural backgrounds represented in the classroom might be necessary.

Our findings also suggest that teachers of AI/AN students seek out their colleagues for advice and professional development. Perhaps it could be helpful to teachers in schools serving AI/AN students to create professional learning communities that provide peer mentors. In schools with AI/AN teachers or staff, these AI/AN teachers or staff might be encouraged to serve as mentors for their non-AI/AN colleagues. AI/AN mentors might help teachers find culturally

relevant materials that promote the reading achievement of AI/AN students, if evidence-based curricula are not readily available or marketed to teachers. They might also help teachers to provide materials in a culturally appropriate manner to avoid alienating AI/AN students through the most well-intentioned but purely seasonal practices. For example, reading a story by an AI/AN author once a year could reinforce a sense of marginalization in AI/AN students.

Given that the literature suggests that relationship building, knowledge of Native cultures and cultural self-awareness are key characteristics of a culturally relevant teacher of AI/AN students, professional learning communities led my AI/AN teachers and encouraging acquisition of culturally specific knowledge as well as cultural self-awareness might promote the capacity of teachers to provide culturally relevant classrooms to AI/AN students.

Most importantly, however, our findings imply that implementation fidelity is a critical aspect of any examination of the effectiveness of recommended practices. Any practice, if it is not implemented, is not likely to produce the desired outcomes. Focusing on strategically utilizing a school's resources, such as teachers and staff from AI/AN backgrounds, individuals who can speak Native language(s), and the larger community within which the school is located to boost teacher knowledge of their students' cultural support needs, ability to locate culturally relevant teaching materials, and capacity to provide culturally relevant instruction might be an important step towards improving the outcomes of AI/AN students.

Local and actionable data documenting the implementation fidelity of the recommended practices might be useful for school administrators and teachers to assess their support needs and develop action plans to increase their implementation fidelity. Regular assessments of practices from the teacher and administrator perspective could yield those actionable data. Including student voices through regularly administered student surveys might also assist staff in

improving their implementation of recommended practices.

Limitations

Our purely descriptive analyses need to be interpreted in the context of a number of limitations. First, we did not consider the nested structure of the data, with students and their teachers nested within schools. Second, we were unable to aggregated data to the teacher level and conduct analyses at the teacher level, due to the absence of teacher weights in the dataset. Instead, we had to conduct our analyses at the student level. Third, we did not conduct any two variable disaggregations, e.g. teacher race by school type. These types of disaggregations might have revealed correlations that could enhance our understanding of the observed patterns. Fourth, we did not follow-up with inferential testing to assess statistical significance of observed differences. These follow-up analyses will be conducted in a follow-up study.

Conclusion

Our descriptive findings suggest that implementation of the practices recommended by the Native community to improve outcomes for AI/AN students is overall low. Variations across teacher, classroom, and school characteristics suggest that implementation is higher in classrooms with high Native enrollment, taught by teachers who identify as AI/AN or have knowledge of Native languages, and located in schools led by AI/AN administrators or managed by the BIE or tribal governments. This concentration of implementation in settings that tend to be culturally homogeneous could mean that there is little integration of the recommended practices into preservice or inservice professional development for all teachers. The work of an increasing number of state departments of education to provide access to culturally relevant curriculum, or to make culturally relevant curriculum mandatory for all students might promote this integration.

It might be important to focus on local and data-driven teacher supports to promote implementation of recommended practices. For example, school practices could focus on giving all teachers access to the racial/ethnic enrollment in their classroom, so that they are aware of their students' cultural backgrounds. Teachers could use these data to assess their own needs for assistance with recommended practices for creating culturally responsive classrooms for AI/AN teachers such as relationship building and provision of historically accurate and place-based curriculum.

Teachers might also benefit from coaching in how to deliver available materials in a culturally respectful manner. Teachers of AI/AN backgrounds might be encouraged to work with non-AI/AN teachers to boost implementation of recommended practices. Professional learning communities led by AI/AN teachers might be especially useful to promote non-AI/AN teachers' knowledge of Native history and issues, and capacity to forge relationships with AI/AN students and their families. School administrators could encourage teachers to avail themselves of relevant professional development opportunities that are tailored to the demographics of their students. Once these supports can be documented and implementation of recommended practices improved, then relationships between recommended practices and student outcomes might be easier to interpret.

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Table 1:

Percent of students taught by reading teachers with given demographic characteristics. Results do not always add to 100 due to missing data.

		2009		2011	
		4th grade	8th grade	4th grade	8th grade
Years taught at school	0-4	32.9	32.8	27.2	29.4
	5-9	16.3	20.9	19.7	18.0
	10-19	20.9	18.4	25.5	17.9
	20-59	13.5	9.7	12.7	9.7
Race	AI/AN	13.2	13.0	15.2	10.5
	White	70.4	71.0	70.9	64.9
	Black	2.0	2.6	2.2	2.1
	Asian	1.2	1.6	.6	1.3
	Haw/PI	.7	.2	.3	.2
Ethnicity	Latino	6.2	5.3	5.1	5.6
Fluency with AI/AN language	No knowledge	67.2	68.7	63.2	62.8
	Minimal	13.8	12.7	17.2	10.4
	Moderate	1.9	1.7	2.1	1.8
	Fluent non-Native	.5	.2	.2	.2
	Fluent Native	4.1	3.1	4.7	2.7
Training in bi-lingual education	yes	16.5	14.7	16.2	14.8
	no	68.0	70.6	70.3	60.9

Table 2:

Percent of students taught by reading teachers reporting classroom level AI/AN enrollment density. Results do not always add to 100 due to missing data.

		2009		2011	
		4th grade	8th grade	4th grade	8th grade
AI/AN density	Few/less than 5	41.1	34.6	36.1	26.7
	Less than half class	15.4	18.6	15.2	13.9
	At least half the class	12.5	12.3	11.6	9.1
	Whole class	16.9	12.9	22.4	12.9
	Don't know/Omitted	3.5	10.3	3.5	16.6

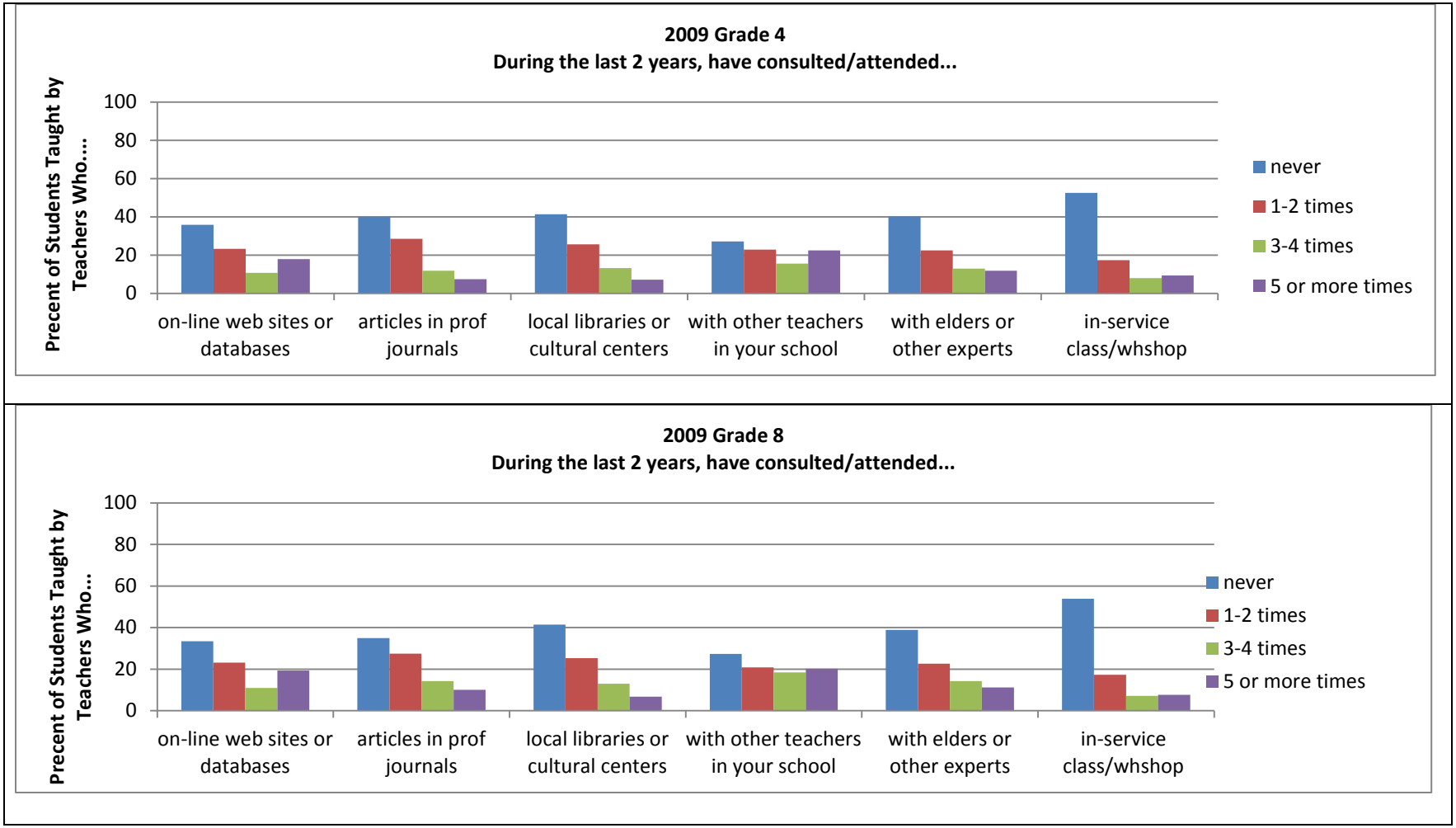
Table 3:

Percent of students taught by reading teachers teaching in schools with given administrator demographic characteristics. Results do not always add to 100 due to missing data.

		2009		2011	
		4th grade	8th grade	4th grade	8th grade
Years admin in position at school	0-4	52.4	54.3	50.9	53.1
	5-9	23.0	24.1	22.6	23.1
	10-19	10.3	9.1	15.3	9.0
	20-59	3.5	1.7	2.2	2.4
Administrator Race	AI/AN	15.7	13.9	20.4	14.3
	White	72.7	71.6	71.0	74.7
	Black	3.2	3.3	2.5	3.0
	Asian	.4	.7	.9	.6
	Haw/PI	.2	.9	.4	.1
Administrator Ethnicity	Latino	7.7	5.7	7.7	6.5
School type	Public	83.1	79.9	82.7	82.4
	Charter Public	.8	2.0	.6	1.2
	Tribal Contract/Grant	2.9	3.3	1.9	2.5
	BIE	3.0	2.6	3.5	3.5
	Alternative	.9	1.0	0	.4
	Other non-public	2.3	3.9	4.2	1.2
Percent of AI/AN teachers	0	32.5	27.0	28.4	25.1
	1-5	19.9	22.8	17.8	21.6
	6-10	7.9	8.1	5.9	9.3
	11-25	6.8	7.2	10.9	10.0
	26-50	8.6	6.4	10.4	5.4
	51-75	3.9	2.6	5.9	3.0
	76-100	4.5	6.0	4.9	3.4
Percent of AI/AN staff	0	25.7	21.3	23.5	24.6
	1-5	22.3	23.2	20.1	21.4
	6-10	5.7	7.1	9.9	6.5
	11-25	7.7	7.7	6.6	4.7
	26-50	5.9	4.5	6.9	5.7
	51-75	3.5	3.8	5.6	4.6
	76-100	12.3	11.4	11.6	10.1

Figure 1

Overview of the percent of students taught by reading teachers with varying levels of engagement in teacher preparation activities across grade levels and years.



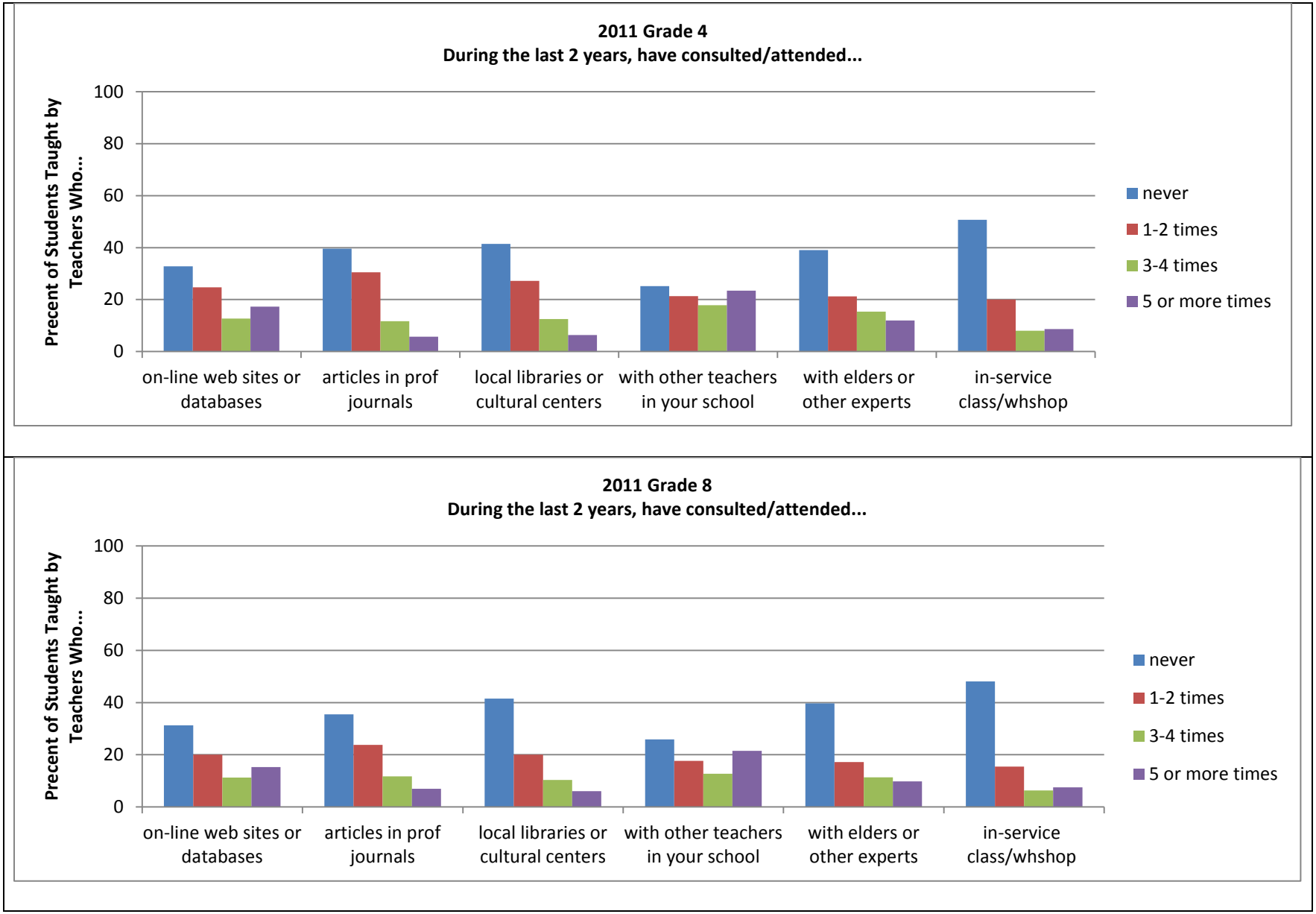
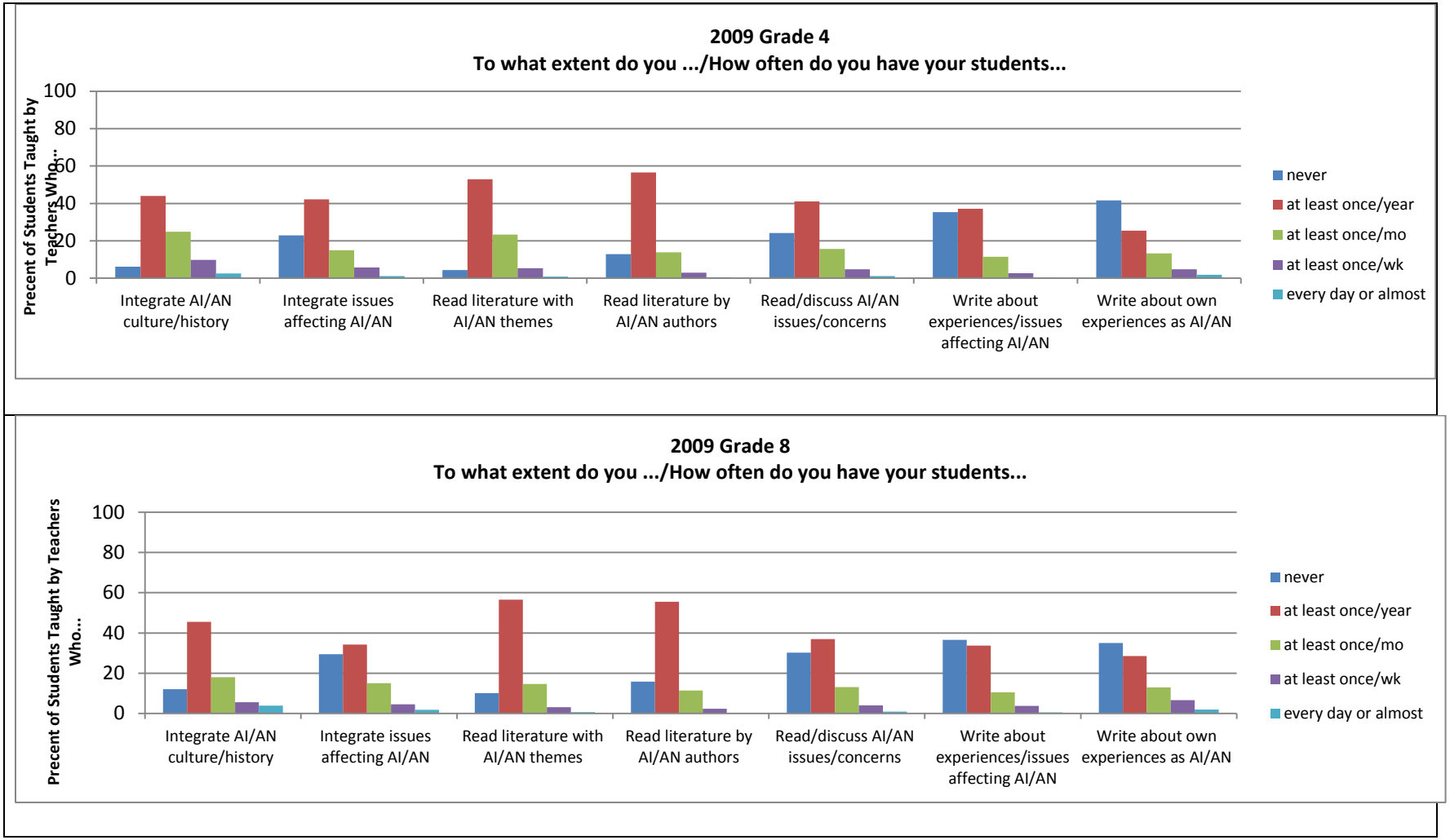

2011 Grade 4
During the last 2 years, have consulted/attended...
Precent of Students Taught by Teachers Who...
100
80
60
40
20
0
on-line web sites or databases
articles in prof journals
local libraries or cultural centers
with other teachers in your school
with elders or other experts
in-service class/whshop
never
1-2 times
3-4 times
5 or more times
2011 Grade 8
During the last 2 years, have consulted/attended...
Precent of Students Taught by Teachers Who...
100
80
60
40
20
0
on-line web sites or databases
articles in prof journals
local libraries or cultural centers
with other teachers in your school
with elders or other experts
in-service class/whshop
never
1-2 times
3-4 times
5 or more times

Figure 2

Overview of the percent of students taught by teachers who integrate Native Language and Culture into reading instruction to various extents across grade levels and years.



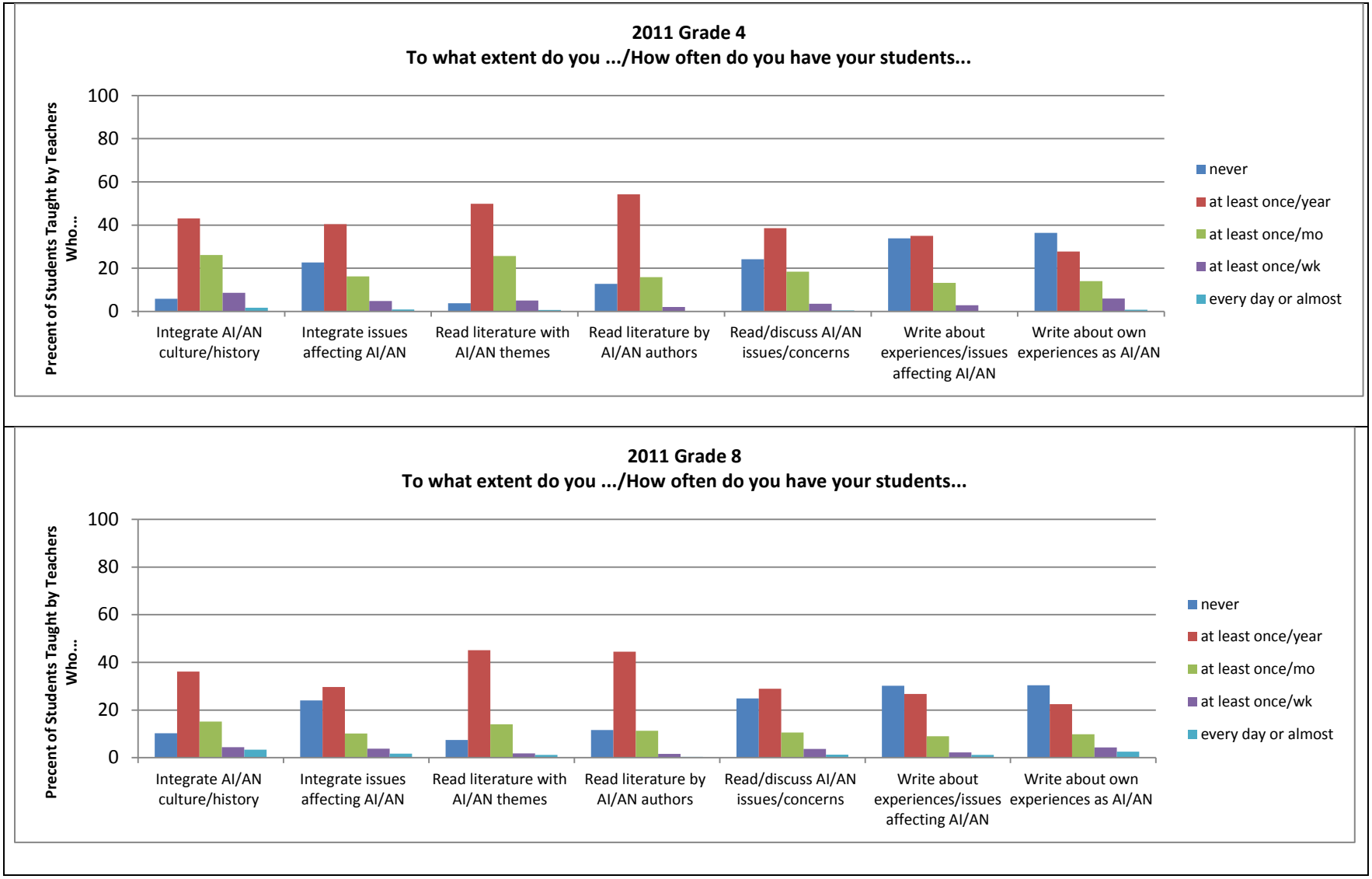

2011 Grade 4
To what extent do you .../How often do you have your students...
Precent of Students Taught by Teachers Who...
100
80
60
40
20
0
Integrate AI/AN culture/history
Integrate issues affecting AI/AN
Read literature with AI/AN themes
Read literature by AI/AN authors
Read/discuss AI/AN issues/concerns
Write about experiences/issues affecting AI/AN
Write about own experiences as AI/AN
never
at least once/year
at least once/mo
at least once/wk
every day or almost
2011 Grade 8
To what extent do you .../How often do you have your students...
Precent of Students Taught by Teachers Who...
100
80
60
40
20
0
Integrate AI/AN culture/history
Integrate issues affecting AI/AN
Read literature with AI/AN themes
Read literature by AI/AN authors
Read/discuss AI/AN issues/concerns
Write about experiences/issues affecting AI/AN
Write about own experiences as AI/AN
never
at least once/year
at least once/mo
at least once/wk
every day or almost

Figure 3

Standardized factor means by reading teacher race/ethnicity across grade levels and years.

Figure 4

Standardized factor means by reading teacher knowledge of Native language across grade levels and years.

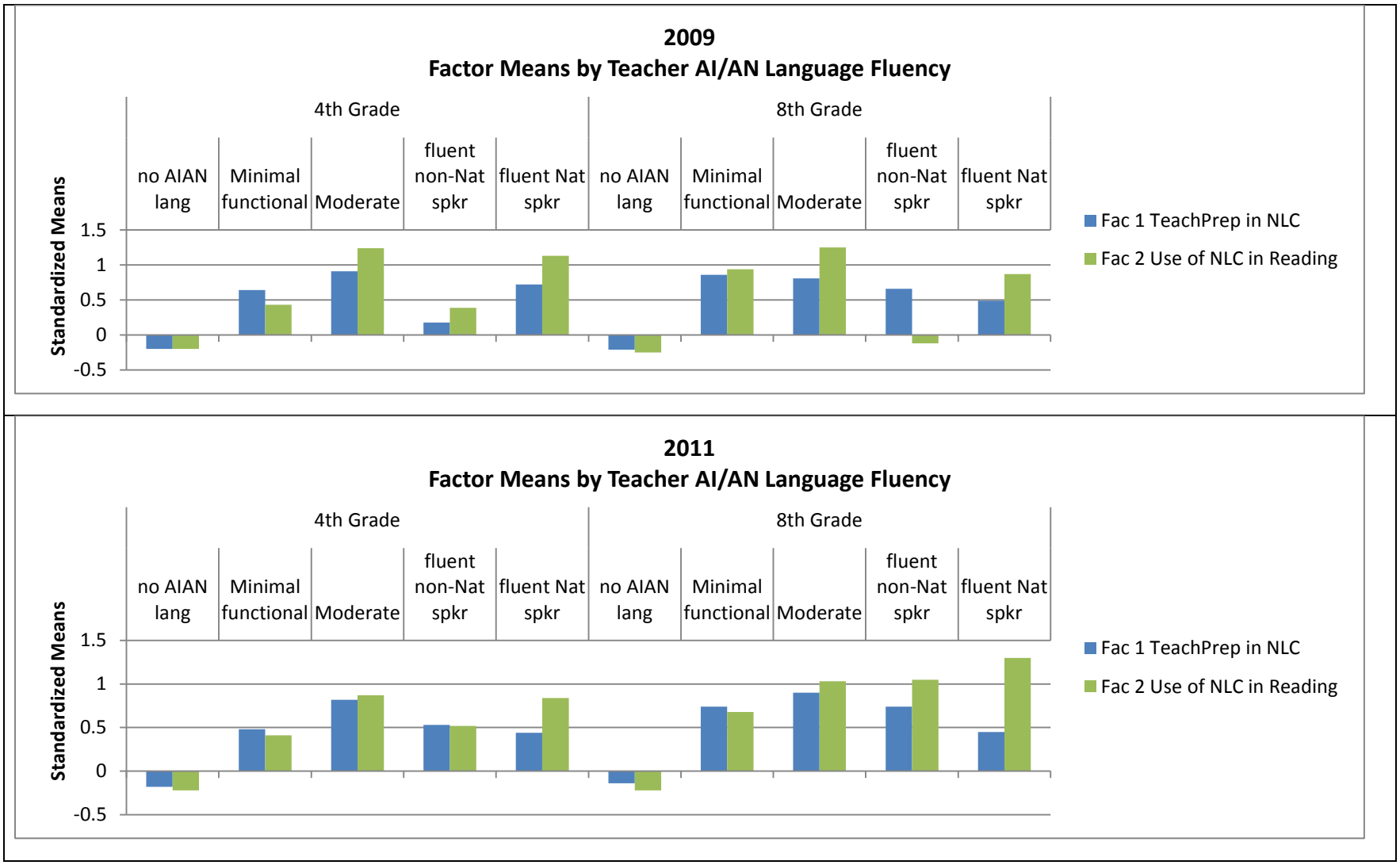


Figure 5

Standardized factor means by number of AIAN students in the classroom across grade levels and years.

Figure 6

Stanardized factor means by administrator race/ethnicity across grade level and years.

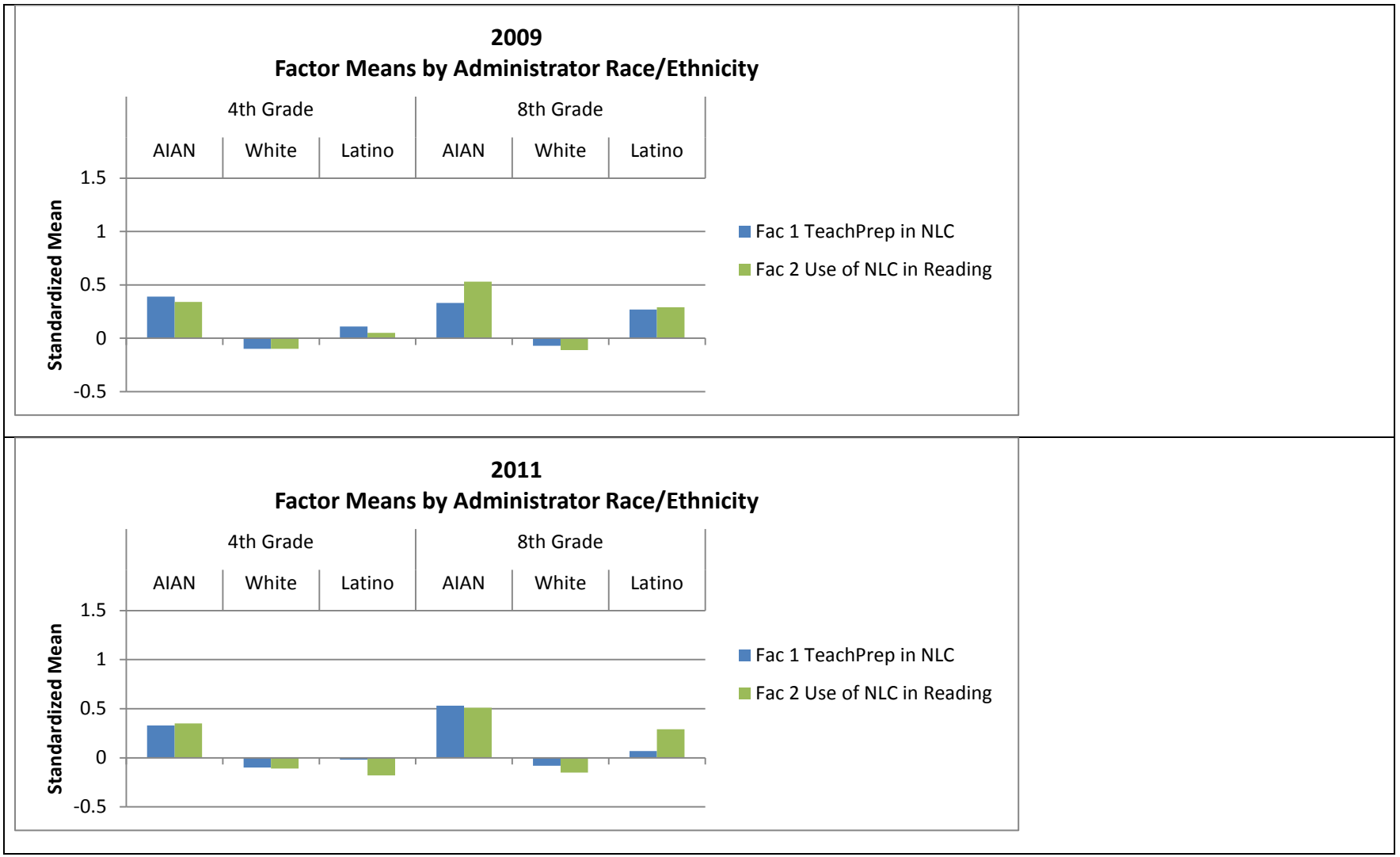


Figure 7

Standardized factor means by school type across grade levels and years.

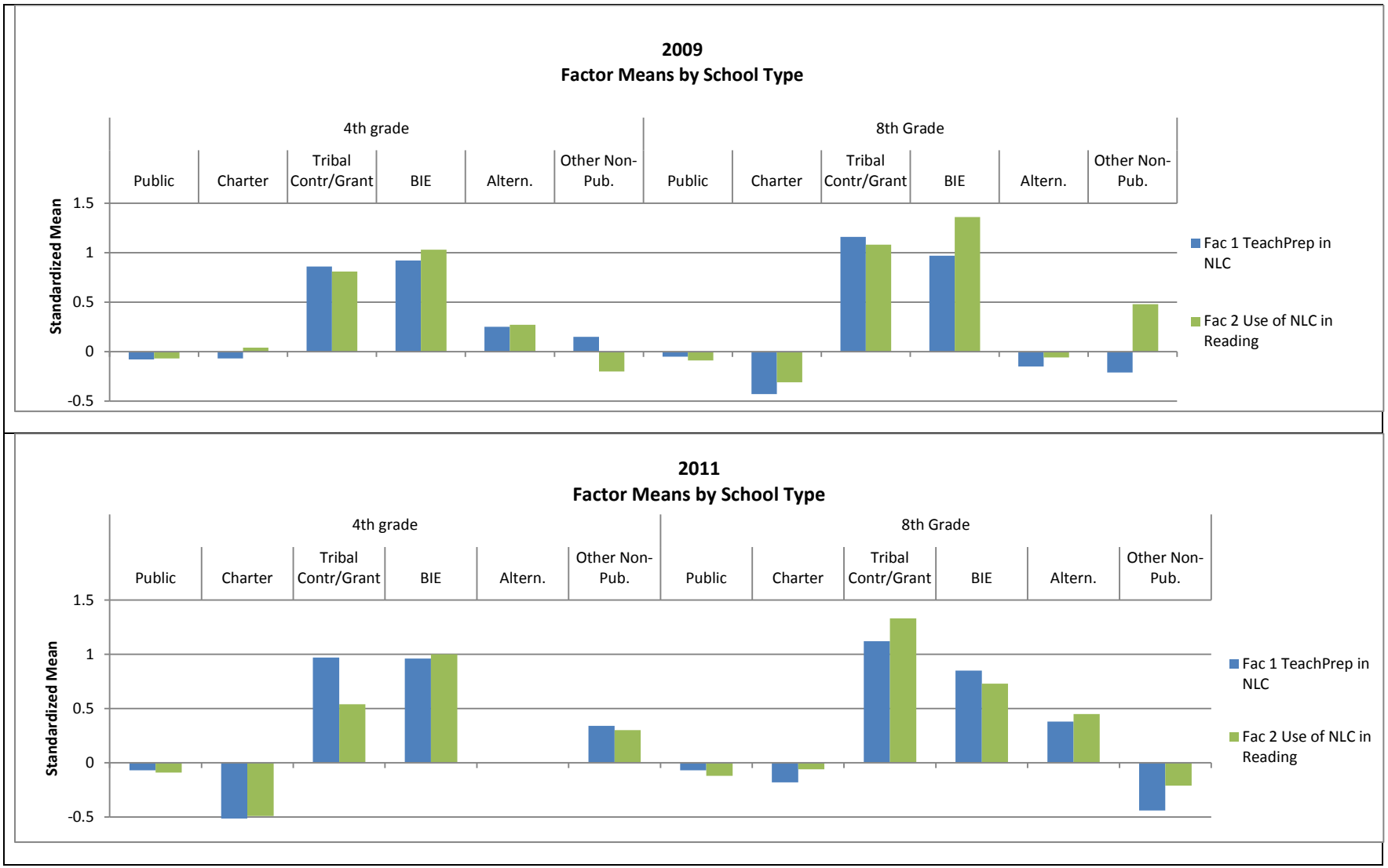


Figure 8

Standardized factor means by percent of AIAN teachers in the school across grade levels and years.

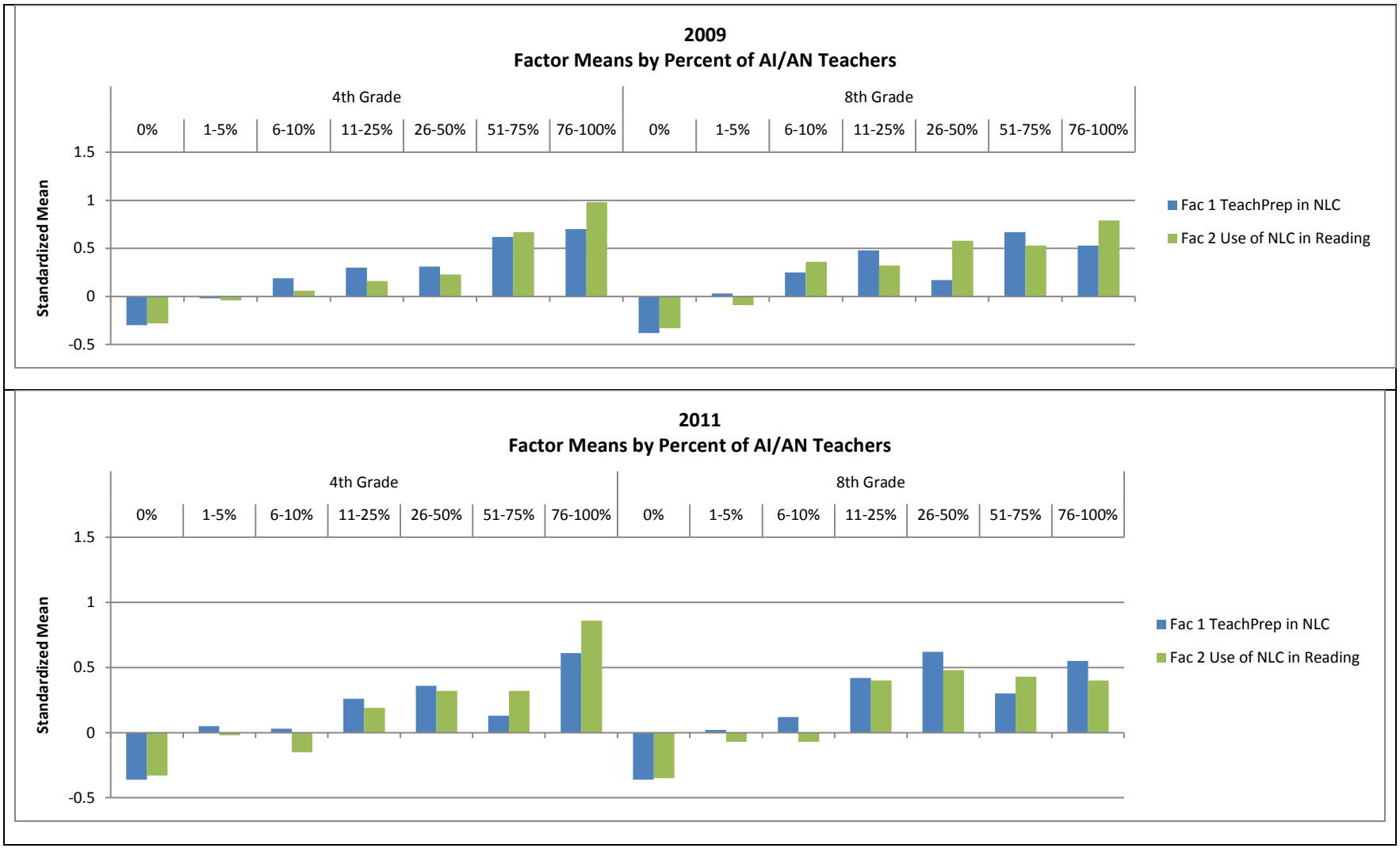


Figure 9

Standardized factor means by percent of AIAN staff in the school across grade levels and years.