# The Influence of Family Engagement on Hispanic Youth Science Education

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*As with many rural and western states in the U.S., Idaho is seeing a dramatic increase in Hispanic youth in the schools, in fact, Hispanic students are the fastest growing demographic in Idaho's school system. Between the years 2000 and 2001, K-12 public schools in Idaho saw a 75% growth in enrollment by Hispanic students compared to only 8% growth in non-Hispanic students. However, results from the annual Idaho Standards and Achievement Test for 2013 demonstrate lower proficiency among Hispanic students in all subjects, especially science. The University of Idaho, with a generous gift from the Micron Foundation, conducted a 5 year study to investigate the attitudes and perceptions of parents, teachers, and elementary and secondary students with respect to science and STEM education. The research revealed significant differences in attitudes toward science and math between Hispanic and non-Hispanic participants, which provides insight into possible contributors to poor student achievement in science, as well as potential approaches to intervention. Research showed that Hispanic community members had a high level of distrust for scientists and found it difficult to navigate the educational system. Since family engagement appears to be essential to the interest and pursuit of science education, and early engagement of children may help overcome many barriers, a pilot program offering a bilingual pre-school STEM camp to Hispanic children and their parents was conducted and assessed. This program highlighted the importance of family involvement in student learning and has led to the development of future lines of investigation of the interaction between cultural diversity and student engagement. This paper will describe the research that was conducted investigating participants' attitudes, the results for Hispanic participants, and the pilot intervention and assessment, and will pose hypotheses for future research.*

## INTRODUCTION

Hispanic students are the fasted growing demographic in Idaho's public school system. Southern Idaho, in particular, has a relatively large Hispanic population due to the migrant and seasonal farm workers. The 2014 census reported Idaho's population just over 1.6 million, with 12% Hispanic or Latino. However, Northern Idaho includes only 5% and Southern Idaho maintains 16% of the Hispanic population. Some counties, such has Jerome (34%), have three times more Hispanic population compared

to the Idaho's average. In addition, the Hispanic population is characteristically young. For example, in Jerome County the median age is 22 years (Idaho 35) (Pew Research Center, 2015), suggesting a future increase in the Hispanic population. Although the number is increasing, the unemployment and poverty levels are also higher. Pew Research Center (2015) put Hispanic poverty rate at 40% and a median income close to three times lower than the Idaho average. Research shows that poverty had a negative influence on STEM performance, especially among underrepresented minorities (Capra, 2009; Laorenza, Pacheco, and Hardeek, 2012), and can also be an impediment to educational reforms (Capra, 2009).

In spite of the economic downturn, in Idaho STEM skills have stayed in demand. Change the Equation reports that in 2011 there were 3.7 unemployed people for every 1 non-STEM job while there were 2.4 STEM jobs for every 1 unemployed person. However, low completion rates for post-secondary education remain a hurdle in Idaho. For low-income and Hispanic communities, failure to complete high school contributes to this low postsecondary completion rate. Approximately sixty percent (60%) of Hispanic students leave high school early (Northern Idaho Agency, Bureau of Indian Affairs, 2009).

Education is clearly linked to economic prosperity. Unemployment has spiked in Idaho's rural areas, exceeding 10% for those over 25 years of age as compared to the U.S. rate of 8.9% (Bureau of Labor Statistics – Local Area Unemployment Statistics, February 2011 – January 2012 Averages). The Idaho Department of Employment reports that 63% of those applying for unemployment lack higher education experience. Severe underemployment and unemployment throughout the region, low educational achievement (U.S. Census, 2009), and limited access/exposure to technology characterize much of the workforce. For many Latinos, such as those living in the Jerome region, language and cultural barriers create additional impediments to educational and economic achievement. This growing and challenged population continues to underperform academically, particularly in science and math.

There is an urgency to better understand the factors that contribute to this educational crisis among the Hispanic community, and the ones that may help solve it. The 2011 report from the National Research Council notes that current STEM education research lacks a focus on cultural and contextual factors that shape youth experiences and opportunities even with the abundance of evidence that early childhood experiences are linked to learning. For example, research shows that critical aspects of brain architecture are shaped by experiences in the first few years of life and taking advantage of these early stages can help develop children's learning capacities (National Scientific Council on the Developing Child, 2007). This is because between ages 1 and 4, the brain seems to be particularly receptive to learning math and logic (National Association of Child Care Resource and Referral Agencies, 1998). While inquiry and exploration are known to be the foundations for math and science, they have also been shown to be the foundations of early learning (Massachusetts Department of Early Education and Care, 2003). Such findings suggest a need to better understand key cultural dimensions that serve as important contexts for understanding students' experiences and attitudes towards science, STEM education, and education in general.

The University of Idaho, with a grant from the Micron Foundation, undertook the UI-Micron STEM Education Research Initiative, a five-year study designed to investigate the complexity of cultural dimensions that shape STEM educational outcomes in Idaho with a focus on local contexts. The study explores STEM attitudes, scientific literacy, and educational aspirations.

Two aspects of cultural complexity of particular interest when looking at STEM education for Hispanic students are the attitudes of Hispanic adults regarding science and education and the role of the primary caregiver in early education. We suggest that the attitudes and perceptions of family and community members, particularly with respect to science and STEM education influence student interest in and achievement in STEM education. Apart from K-12 academic experiences, Crisp & Nora (2012) found that cognitive factors and socio-cultural factors influence Hispanic students' decisions to pursue STEM in college. Further, it is likely that cultural factors impact the adult's role in their student's education and may contribute to their students' attitudes, aspirations, and achievement. There is sufficient research to demonstrate that parents and teachers are both fundamental parts of the students' learning environment as they play a vital role in their educational achievement and success (LaRocque et al., 2011). If addressed early, interventions may have a long term positive impact on educational achievement

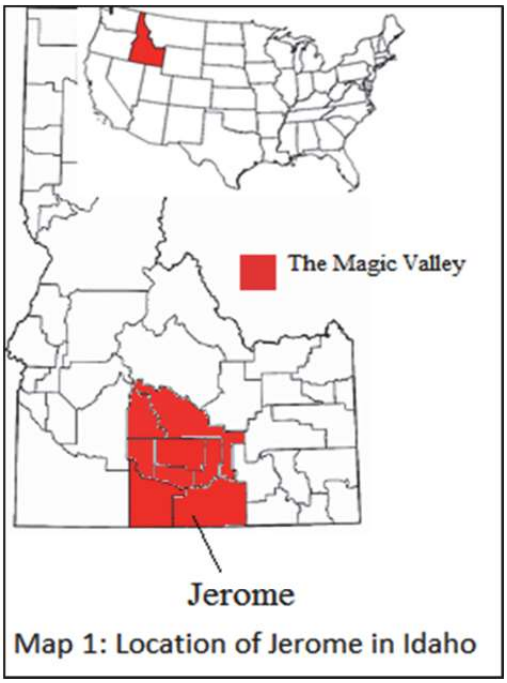
and interest in science. Research has demonstrated that low-income children who attended high-quality early education programs on average outperformed those who did not on mathematics tests throughout childhood and young adulthood (Campbell et al, 2002). A New Jersey preschool program has shown significant effects on children's science and math outcomes through fourth grade and fifth grade, respectively (science test only administered in 4th grade). Effects are strongest for children who experienced two years of preschool, and are the equivalent of closing 20-40% of the achievement gap between white and minority students (Barnett et. al, 2014). Based on the results of the UI-Micron STEM Education Research Initiative findings, a University of Idaho (UI) team composed of Spanish and Environmental Science instructors and faculty conducted a pilot study to investigate the impact of preschool STEM education and parent involvement on Hispanic student achievement in math in science.

## METHODS

### Statewide and Community Surveys

Thirty nine focus groups comprised of parents, teachers, and community members were conducted in 12 communities across the state of Idaho in order to provide an understanding of local context for STEM education. Twelve communities from different counties in Idaho were selected to provide data given the regional differences in economic base, geography, and population demographics. This was followed by a statewide survey in which these 12 counties were oversampled in order to measure STEM attitudes, experiences and science orientations. The results reported here are based on two survey samples.

The first survey sample was drawn from the entire state of Idaho through random selection of phone numbers, both from landlines and wireless phones. We randomly sampled 900 household landlines and 1,500 wireless phone numbers. Out of these sampled phone numbers, we completed a total of 407 telephone interviews across the state, for a response rate of 22.5 percent. The second survey sample was drawn from Idahoans with phone numbers (either landlines or wireless phones) from the counties of the twelve communities selected to participate in this study (Storrs et.al, 2012).



Map 1: Location of Jerome in Idaho

In 2013, more detailed surveys were administered to students, their parents, and teachers in the 12 communities. Surveys were conducted by the research team in each of the twelve districts with children in grades four, seven, and ten. Within each school district, a nested cluster sample design was used. To

select schools (the first level of the cluster sample), we randomly selected a high school in each district from the available mainstream/non-charter schools. Next, a middle school/junior high which was a feeder school to the selected high school was randomly selected from the available feeder schools for the seventh grade sample. Finally, we selected an elementary school from the available feeder schools for that middle school for the fourth grade sample. Some districts have only one school at each level, in which case that school was selected by default. Once the schools were selected, the second level of cluster sampling were classrooms within schools. In order to facilitate survey administration logistics, this level of selection was not purely random. In the smaller districts (with less than 250 students), the survey was administered to all the students in the three grade levels that consented and were present. In the larger districts, surveys were administered during classes that were required of all students in that grade level. Parents of these

students were contacted by phone and Spanish speaking calls were also made. To increase response rate, hard copy surveys were mailed to those that did not respond to the phone surveys. The final sample size was 1559 complete surveys for a response rate of 62 percent. Teachers in the 12 counties were surveyed by phone and follow-up mail surveys as well. A sampling frame of potential Idaho teachers was obtained through LITe (Low Incidence Targeting), with a total of 3,183 names. Retired teachers, college professors, and preschool teachers as well as individuals who were never teachers that responded to the survey were considered ineligible. Due to the unusually high proportion of ineligibles, as a result of frame limitations, and the high amount of non-responses, the best representation of the final disposition rates includes an estimation of the proportion of cases of unknown eligibility that are eligible. This estimate is based on the proportion of eligible units among all units in the sample for which a definitive determination of status was obtained (a conservative estimate). In this case our estimated proportion of cases of unknown eligibility is 17.7 percent. The final response rate including this estimation was 47.5 percent.

**Pilot Intervention:**

Based on the results from Hispanic respondents in the statewide surveys, a pilot intervention was developed and conducted in Jerome, Idaho located in Jerome County. Hispanics comprise 34.3% of the total population in Jerome County, which has increased by 40% from 2000 (U.S. Census Website). Jerome is located in the Magic Valley that comprises almost half of the Hispanic population in the Southern Idaho (Map 1). This significant change to the city's ethnic composition has been coupled with a lowering of the median age, a trend that adds complexity to understanding cultural factors in youth STEM education experiences. This project's purpose was to increase the participation of the Hispanic population in STEM education by introducing bilingual (English and Spanish) math and science hands-on activities to Head Start children through a three-day summer camp in Jerome County, Idaho, and including parents and other caregivers in the activities. Project leaders hypothesized that introducing STEM education at an early age and involving parents would enable school age children as well as community members to view science and math as integral parts of their natural lives rather than the seemingly complex subjects and prerogative fields of study that conflict with their beliefs and values.

The UI team developed the curriculum that was used in the camp. This involved researching practical and relatable best-practices, modifying, and developing new ones. To ensure full immersion, avoid confusion, and enhance understanding of mathematical and science concepts, the curriculum was developed around three themes: measurements, germs, and experimentation. On each day of the camp, the children learned different concepts surrounding these themes. The end product was 27 hands-on activities, nine activities per theme. The activities were planned so the children would be able to think, experiment, and find their own solutions. The hands-on activities allowed the children to actively explore and interact, and at the same time understand the targeted concept. Additional activities were given to parents to do at home with their children.

The team used a mixture of direct observation, child interviews, surveys, and external assessment to assess the effectiveness of the project during and immediately after the camp, followed by another assessment one year later with the Head Start teachers of the participants. The project assed the children's

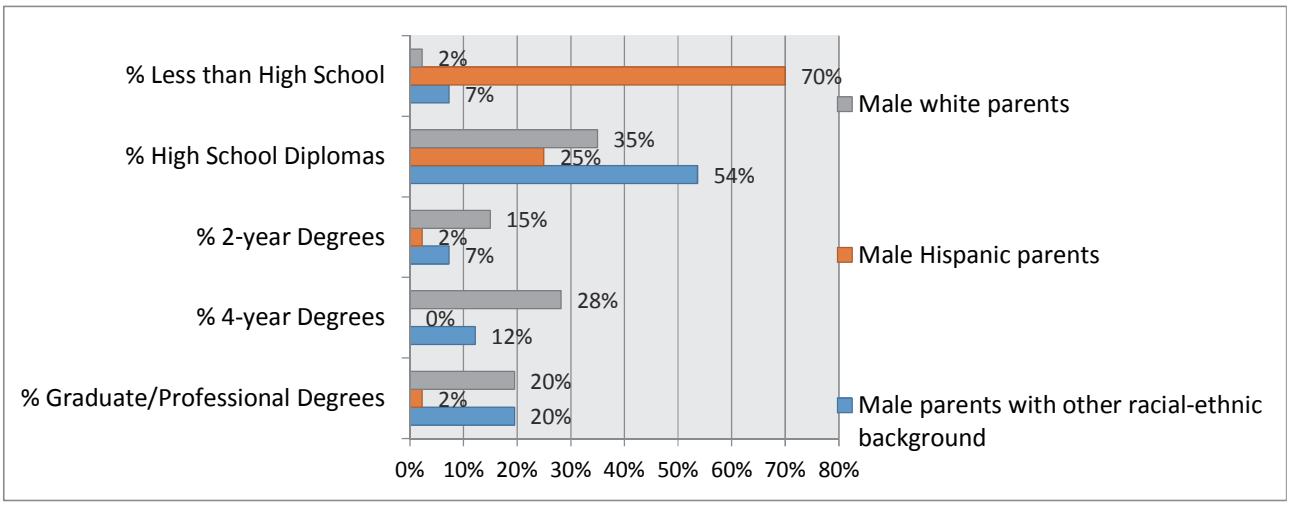
interest and engagement in the hands-on activities and parents' confidence in participating in their children's education and their experience with the camp.

## RESULTS

### Statewide and Community Surveys

In the statewide survey we found that the level of educational attainment among Hispanic parents was significantly lower than the other two racial-ethnic groups considered in the study regardless of gender (Figures 1 and 2). Not surprisingly, a much larger percentage of Hispanic parents reported income below the poverty level (63%) compared to white parents (Figure 3). It is important to consider how these factors may impact parental influence and student career and educational choices.

**FIGURE 1**
**MALE PARENTS' EDUCATIONAL ATTAINMENT BY RACIAL-ETHNIC GROUP**




However, when all parents of 10th grade students were asked about their aspirations for their student's future, regardless of their educational attainment, 90% of the respondents wanted at least a 4-year degree for their students (Figure 4). Aspirations, however, did not necessarily translate into parents' ability to help students reach those goals. Parents, both male and female, with lower educational attainment, felt they would like (Figure 5). Parents experiencing poverty were significantly more likely to feel their financial situation constrained their involvement in their child's education than parents who were not experiencing poverty. Approximately half of the parents considered to be above poverty, and also reported that being involved in the students' education was difficult due to their financial situation (Figure 6).

In the statewide surveys, students (4th, 7th, and 10th grades) were queried about their specific interests in science and math. Differences between Hispanic and white respondents were noted. White students reported liking math and science more than Hispanic students in both seventh and tenth grades (Figure 7.) High school students were also queried about their concerns for future education. The most important considerations reported were: high school grades, scores on college entrance exams, availability of financial aid, and the cost of college. Where di erences exist, Hispanic students and parents are more likely to say these factors are "very important" to their college-going decision.

*Jerome County*

In our sample from Jerome County (n=208) women were significantly overrepresented, with 65% of county respondents being women when compared to 2010 U.S. Census statistics (50%). Hispanics in the

survey were underrepresented, comprising 2% of the Jerome County survey sample, compared to 34% of the population. However, this was the highest percentage of Hispanics participating in the county surveys across the state in this study.

**FIGURE 2**
**FEMALE PARENTS' EDUCATIONAL ATTAINMENT BY RACIAL-ETHNIC GROUP**

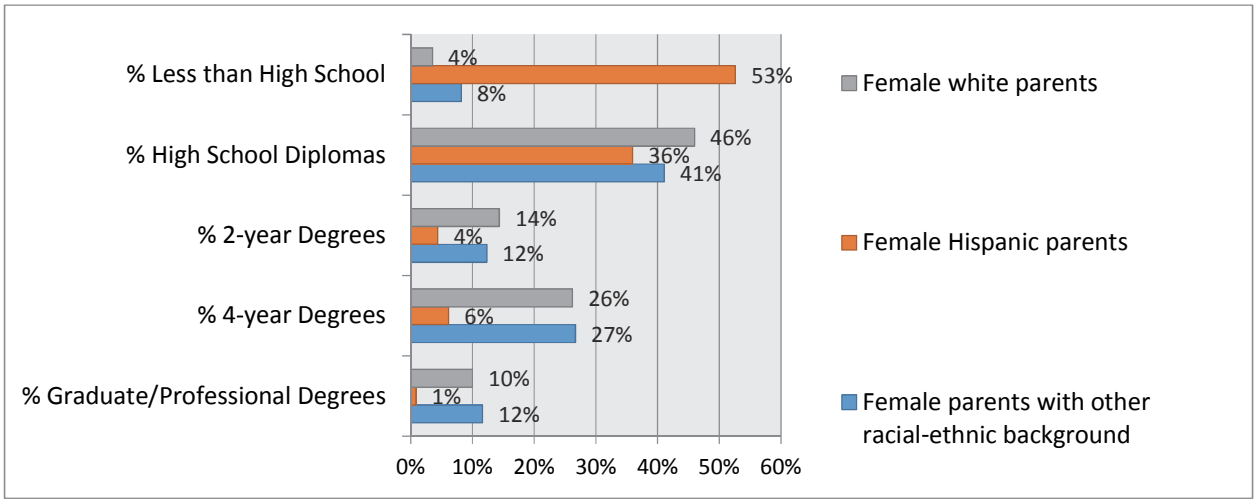
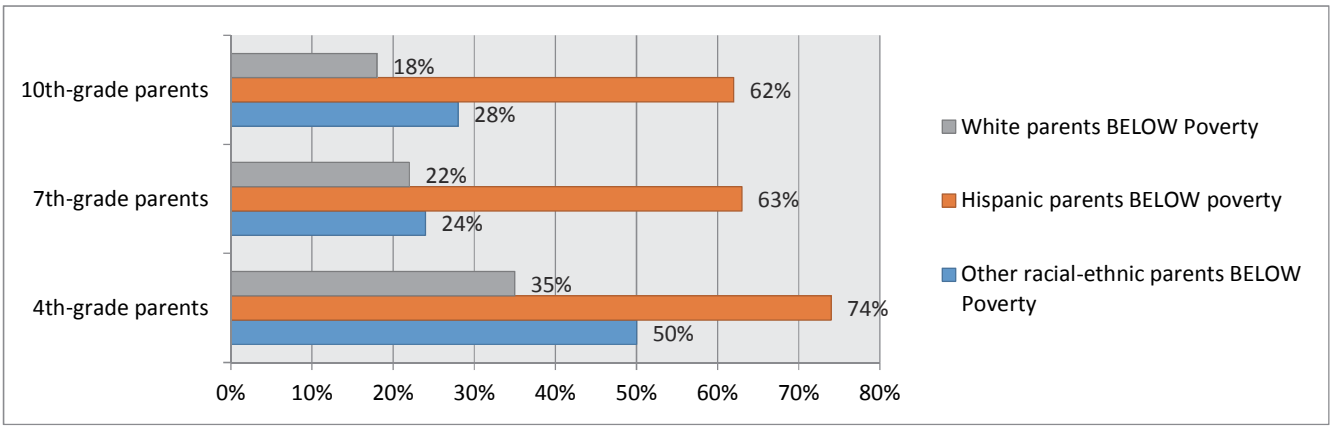



**FIGURE 3**
**PERCENT OF HOUSEHOLDS EARNING BELOW-POVERTY INCOMES**




Almost 30% of the Jerome County's respondents had one or more children in K-12 education, and another 4% had children who were not yet in the K-12 system. Of these parents, 86% were sending their children to traditional public schools, 7% had children in private schools, a small number (2%) had children in a charter school, and the remaining 5% of parents were homeschooling their children. Over 73% of K-12 parents said they volunteered at least once a year at their schools. Our 2011 focus group with Latino parents revealed their commitment to their children's education though they struggled with how to support their children academically due to language and cultural barriers.

**FIGURE 4**
**10TH GRADERS' PARENTS' EDUCATIONAL ATTAINMENT AND LEVEL OF ATTAINMENT THEY WOULD LIKE THEIR CHILD TO HAVE MORE TIME TO BE INVOLVED IN THEIR STUDENT'S EDUCATION**

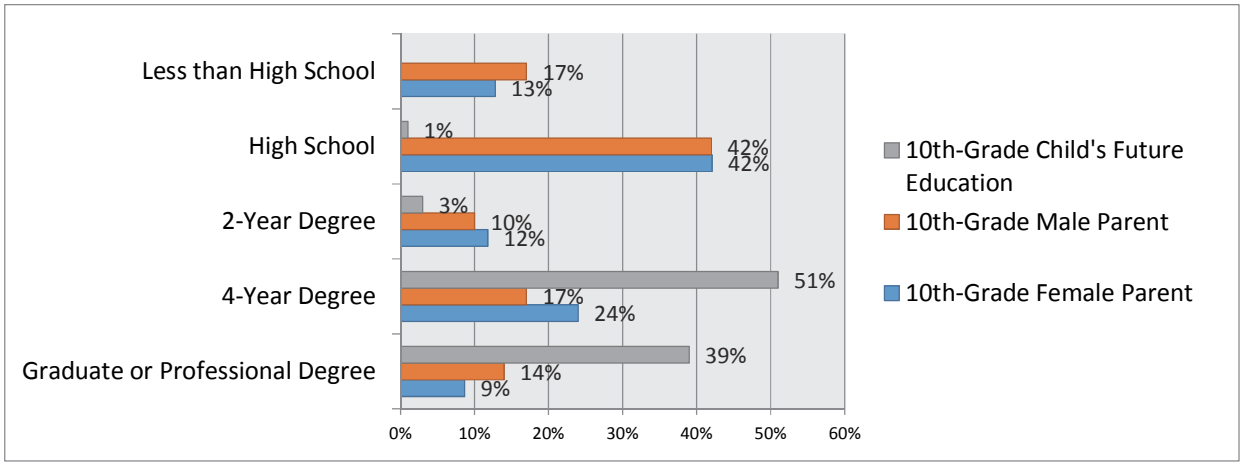



**FIGURE 5**
**PARENTS DESIRE FOR MORE INVOLVEMENT IN THEIR CHILD'S EDUCATION**

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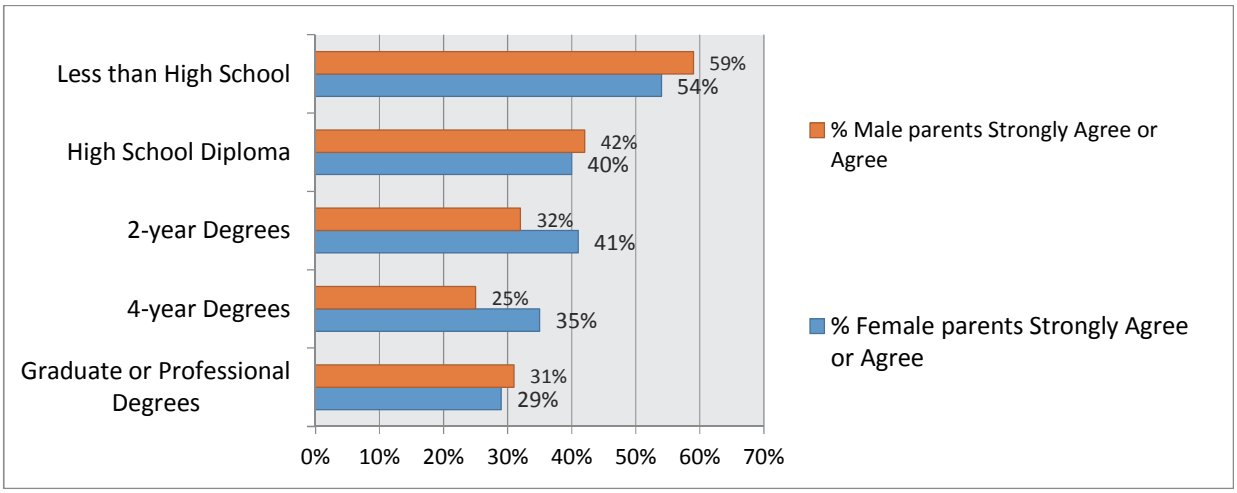



A large number of K-12 Jerome County parents (77%) felt they had the appropriate skills to help their children with homework in general, yet almost as many (71%) said that they at least occasionally felt their math and science knowledge made it difficult to help their children with math and science homework. About half of the parents (53%) did not have as much time as they would like to be involved with their children's education. More than a fourth of parents (27%) in Jerome said their financial situation interfered with their ability to be engaged in their child's education. Even though a good number of parents wished they could do more to support their children's education, a large number of them (79%) said their children performed "above average" or "excellent" in math. However, Jerome County was among the rural communities where individuals were less knowledgeable about college preparation. Most notably, Jerome County's respondents were less confident than respondents from other counties on which classes a student should take to be successful in college and less sure of how to help someone apply to a four-year college. Jerome County's respondents were also asked to agree or disagree with the statement, "Science can come into conflict with my religious beliefs." Of the respondent types, 88% of those with no

children and 63% of those with children not yet in school were more likely to disagree with this statement. Parents with K-12 children (62%) and parents whose children completed K-12 (54%) were more likely to agree with the statement. When tested with the "culture of science" questions, gender proved to have a significant effect on two of the "culture of science" questions. Men held less trust in science, were less likely to support schools' discussing humans' impact on global climate change, and were more likely to agree that community members rely too much on science and not enough on religion. When Jerome County's respondents were asked to what extent they agreed or disagreed with the statement, "Scientific knowledge changes so rapidly, it is hard to know what to trust," a majority (68%) agreed.

**FIGURE 6**
**PARENTAL PERCEPTION OF DIFFICULTY BEING INVOLVED IN THEIR CHILD'S EDUCATION**

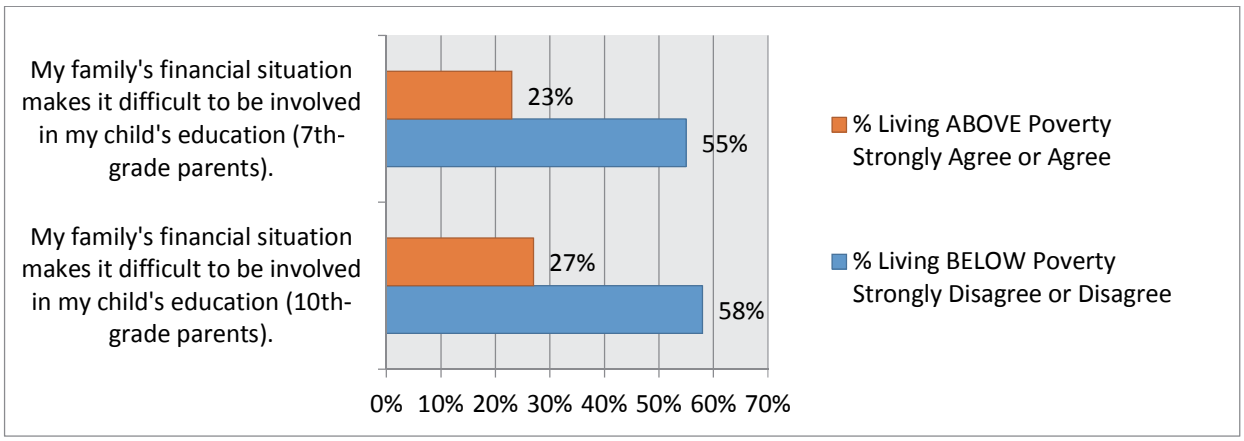
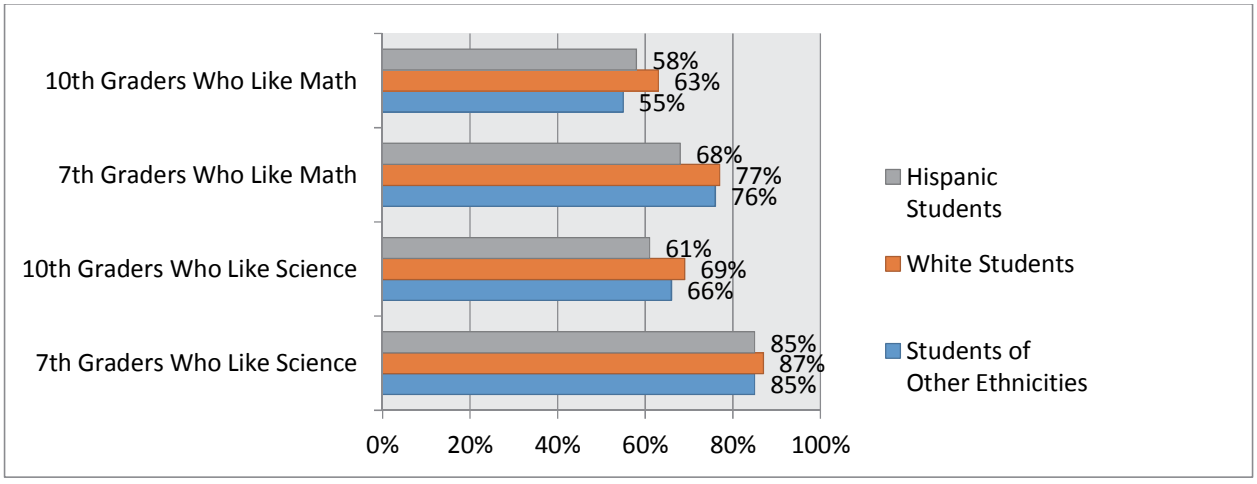



**FIGURE 7**
**STUDENTS' INTEREST IN MATH AND SCIENCE**

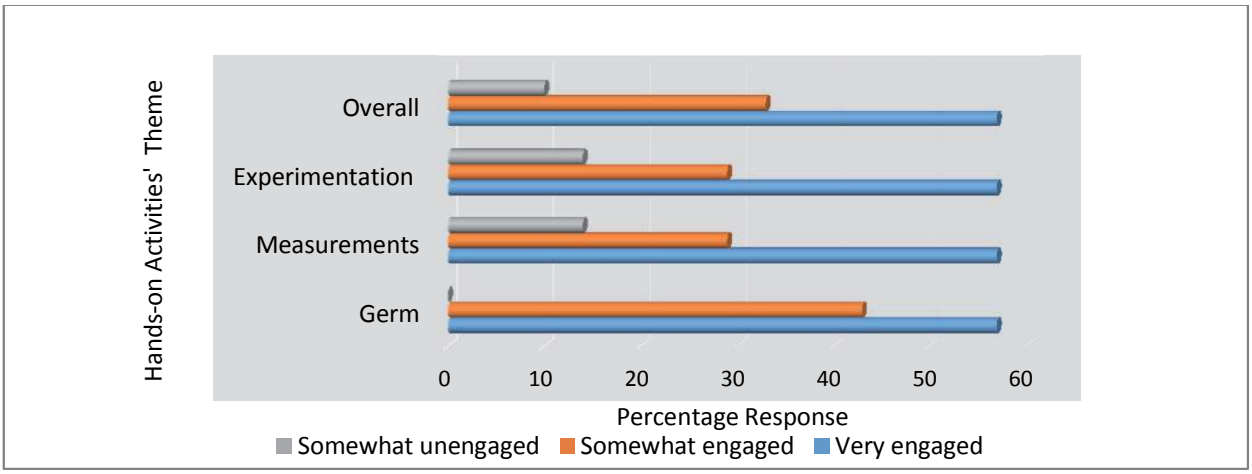


**Pilot Intervention**

*Interest and Engagement*

Direct assessment (observation) during camp activities demonstrated 100% child engagement and 92% understanding of the hands-on activities that were non experimental in nature. For measurement and experimentation themes there was some levels of disengagement. The lowest engagement and understanding was observed with the lessons on predicting, measuring, and comparing weights of marshmallow and marbles, which had a 75% engagement and the lesson on container shape and liquid volume which had only 50% engagement. These lessons belonged to the experimentation theme. Reduced engagement in these two activities may be partially explained by the limited supplies for each child to experiment with allowing for distractions. For example, 5 to 8 children shared one balancing scale and two measuring jars; thus, some of the children participated in this activity by observing rather than actually doing it.

**FIGURE 8**
**LEVEL OF CHILDREN'S ENGAGEMENT IN HANDS-ON ACTIVITIES AS PERCEIVED BY TEACHERS**




Parents were asked to indicate the level of their children's interest in math and science before and after the camp. About 74% of the parents reported that their children were very interested in math and science before the camp and the percentage increased to 80% after the camp (Figure 9). Similarly, when parents were asked to indicate their children's level of excitement before and after the camp, almost 63% reported very excited before the camp compared to 87% after the camp, however, the differences in responses before and after the camp were not statistically significant. Ninety three percent of the parents reported feeling that the math and science activities were helpful to their children's learning

Of the 27 activities conducted, more than half of the children preferred the following hands-on activities: measuring temperature and weight in the measurement theme; demonstrating the speed of germ spread and identifying different types of germs in the germ theme; and demonstrating float and sink and evaporation in the experimentation theme. Overall, all of the children preferred four activities out of 27, and of those four, almost half the children preferred the "Germ Speed" activity. The "Germ Speed" lesson involved filling balloons with confetti and glitter, pumping air into the balloons, and popping them to release the glitter into the air to demonstrate what happens when someone coughs without covering their mouth. This activity took place outside and each child had a balloon. More than a 25% of the children preferred the "Composite Color" activity, which involved making secondary and tertiary colors from primary ones. "Sink and Float" and "Germ Matching" received equal preference (Figure 10).

**FIGURE 9**
**LEVEL OF CHILDREN'S INTEREST IN MATH AND SCIENCE BEFORE AND AFTER THE CAMP AS PERCEIVED BY THE PARENTS.**

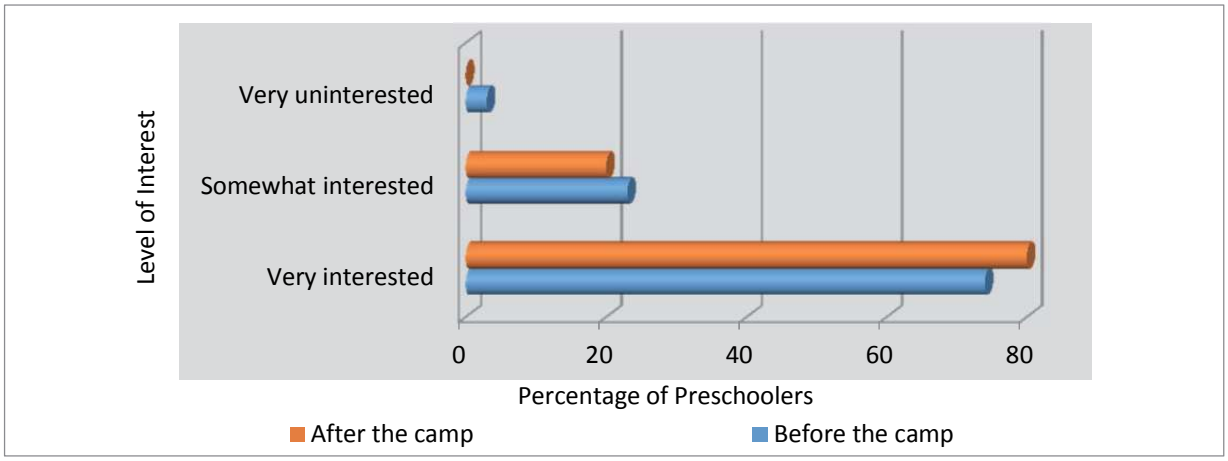
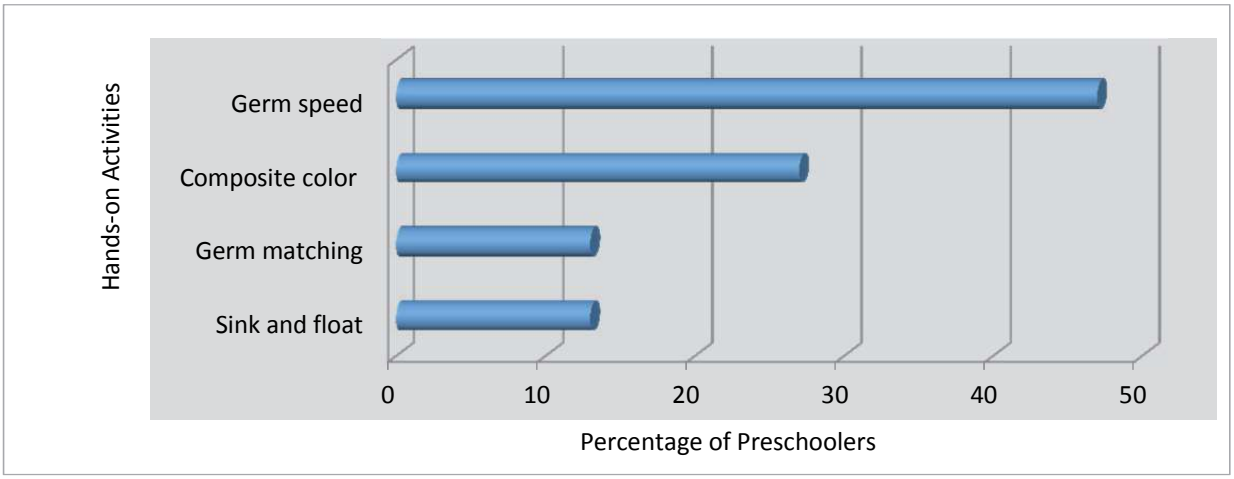



**FIGURE 10**
**OVERALL MATH AND SCIENCE ACTIVITIES AS PREFERRED BY THE PRESCHOOLERS.**




*Parental Experience*

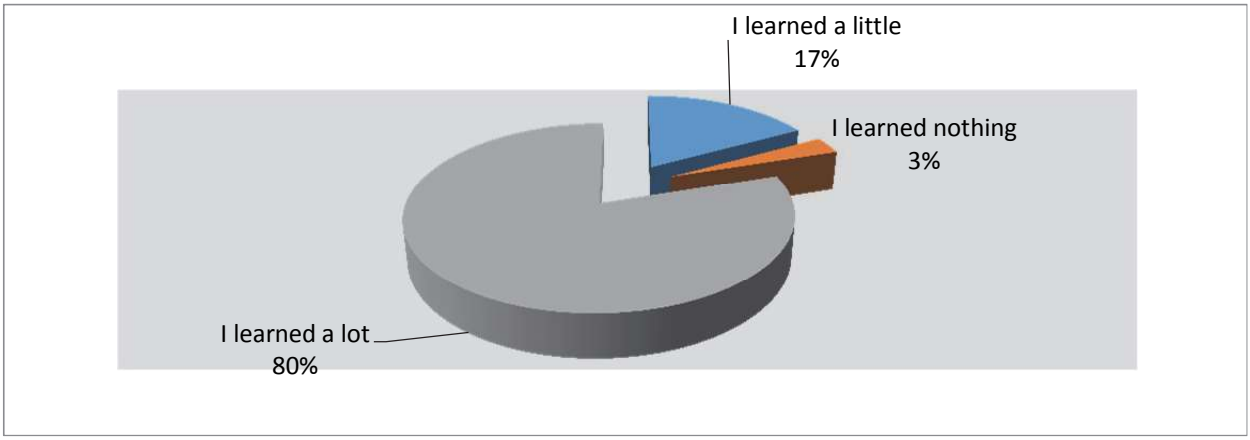
Out of 37 parents/guardians that sent their children to the camp, 30 responded to the survey. All surveys were offered in both English and Spanish so that language would not be a barrier to responding. Eighty percent of the parents were mothers and the rest were father figures. In two situations (7%), both parents were involved and in two situations the male figure was a boyfriend or an uncle. More than half of the male parents (57%) had no high school diploma, compared to 47% of female parents. More than 30% of the parents were single, either never having been married (27%) or separated (6%). The average number of people per household was 5, and the number ranged from 2 to 9 people. This is almost twice Idaho's average household size

*"Sometimes it's hard [to support your children in school] because a lot of parents do not speak English, or teachers don't speak Spanish. But one should keep an eye and educate their children. If your child likes math, or likes another course, in whatever they like, even if it costs you _me (it is hard) or costs money you have to do it for your child and find a way to help them."*
Quote from the Latino parent focus group discussion in Jerome

according to the 2007-2011 censuses (United State Census Bureau, 2012). Despite large family sizes, only 23% of the households had fulltime jobs. In addition, the majority (54%) of these families made between $10, 999 - 24,999, which is 2 to 4 times less than the Idaho median household income of $46,890, based on U.S. Census of 2012. Seventy percent of the parents were Hispanic, which is higher that the state average of 11.6% Hispanic population. Sixty seven percent of the respondents were Catholics.

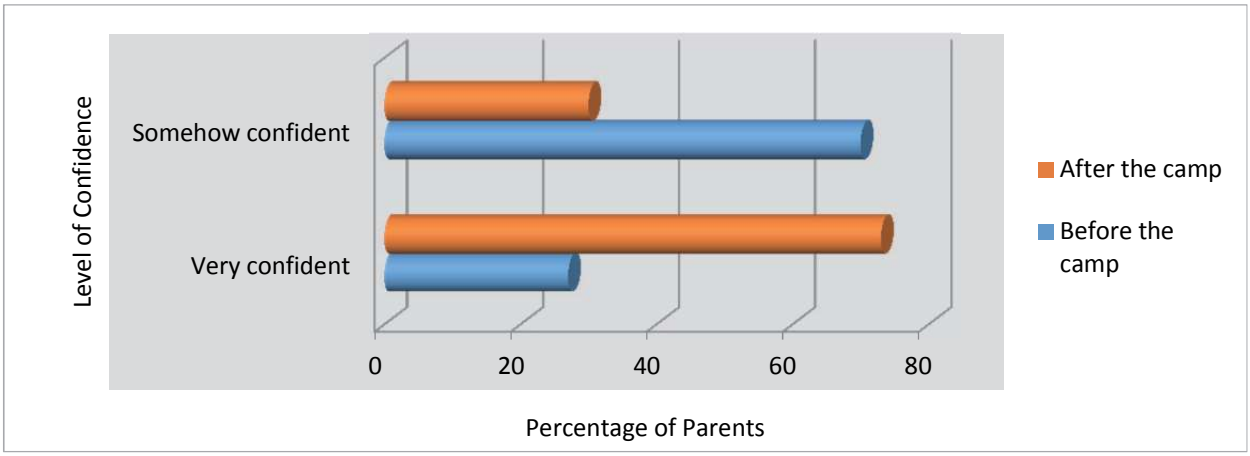
When asked in surveys about camp activities with their children, about 80% of the parents said they learned a lot, 17% percent said they learned a little bit, and only 1 out of 27 parents responded that they learned nothing (Figure 11).

**FIGURE 11**
**HOW MUCH PARENTS LEARNED FROM THE CAMP.**




Pre and post-camp surveys indicated that 44% of the parents' confidence level increased from somewhat confident to very confident and this difference was statistically significant ($p = 0.003$). When asked if they are likely to send their children to another camp, 93% of the parents responded very likely.

**FIGURE 12**
**PARENTS' CONFIDENCE LEVEL BEFORE AND AFTER THE SUMMER CAMP.**




*One year follow up surveys*

One year after the summer camp, the Head Start teachers reported that 20% of the children still remembered the math and science concepts from the camp, 33% somewhat remembered, and 46%

remembered them extensively. Of those who still remembered math and science concepts extensively, 80%, 40%, and 20% remembered germ, measurement, and experimentation concepts, respectively. The teachers also observed a large increase in the participation of parents in the Head Start program. While some parents joined the Head Start policy council and extensively volunteered in classroom activities such as dental hygiene, others participated in education-related conversations with school staff.

## DISCUSSION

Hispanics comprise the fastest growing demographic among school age children in the U.S. and the same trend is occurring in Idaho. In addition to cultural differences, Hispanic families in Idaho also experience greater poverty levels and lower educational attainment than their white counterparts. This means that more Hispanic students are First-Generation College Students (FGCS). Education is clearly linked to economic prosperity, and with STEM jobs in demand, science and math education are critical to improving the socio-economic status of communities with high Hispanic populations. However, Hispanic students underperform in math and science in Idaho. Each year, Idaho's public school students take the Idaho Standards Achievement Test (ISAT). ISAT scores show lower proficiency among Hispanic students in all subjects, especially science. Only 43% of Hispanic 5th, 7th, and 10th graders are proficient or advanced in science, compared to 72% of non-Hispanics. Only 66% of Hispanic 3rd-10th graders are proficient compared to 82% of non-Hispanics (Idaho State Department of Education).

These students face challenges that white students with higher socio-economic status may not. According to a report released by ACT/COE (the Council for Opportunity in Education (COE) (2013) and ACT/CEO (2014), about a quarter of high-school graduates who took the ACT in 2013 met all four of its college-readiness benchmarks, in English, reading, mathematics, and science. But students whose parents did not go to college fared quite a bit worse: only 9 percent of them met all four benchmarks. Ramos-Sanchez and Nichols (2007) report that first-generation students are more concerned about their finances, feel less prepared for entering college, and overall lack a basic understanding about the expectations of college than do their non-first-generation peers. Engle and O'Brien (2006) report that lack of financial resources and family encouragement negatively affects first-generation students from going to college.

This appears to be true for Hispanic parents in our study. While they have high aspirations for their students' academic future, they expressed concern with time to help them, their own abilities in math and science, and the financial burdens of college. These obstacles result in FGCS students deciding not to pursue higher education or arriving at college underprepared and overly committed such that a large number of these students do not complete a bachelor's degree. Those who do complete the degree are less likely to complete a degree in a STEM field.

Additionally, Hispanic students may have to deal with cultural conflicts when considering STEM careers. In our study, Jerome County parents with children K-12 or older tended to feel more conflict between science and their religious beliefs and a large percentage of the sample indicated a certain degree of distrust in scientific knowledge. This suggests a need to further investigate what aspects of scientific knowledge seem most at odds with their beliefs and values in order to address these in any proposed interventions. At the same time, identify cultural elements that can be instrumental in increasing the understanding of scientific knowledge.

We hypothesized that introducing children to science and math concepts early would provide lasting benefits in terms of their understanding of concepts and their interest and comfort level with science and math. Initial evidence from the pilot intervention suggest that interest of Hispanic children in science and math can be increased early in their childhood and that the concepts are retained to some extent. However, longitudinal studies are needed to assess the lasting benefits of this approach. Future interventions would likely be more effective if sufficient resources were available to keep all students occupied rather than having to alternate working with the materials. Literature suggests that one-time events without follow up activities throughout the academic year may not have lasting effects. The UI team collaborated with Head Start teachers to develop and deliver hands-on bilingual STEM activities to the children, actively involving the teachers in the development of science and math materials and camp

activities. Involving the teachers throughout the process was done with the understanding that they would likely continue to use these materials during the academic year and disseminate the activities to other preschools in the area. We are proposing future pre-school interventions in Hispanic communities that occur more frequently and have curriculum intentionally infused in the pre-school academic year activities. Assessment of this approach should include teacher observations, parent observations, and student achievement in science and math in grades K-3.

From our studies and other research, we suggest that involving parents in Hispanic youth education could help them feel more comfortable helping their students with science and math and could improve their level of comfort overall with science and scientists. In addition to engaging the parents in the camp activities, the pilot intervention was intentionally conducted with Head Start teachers at the Head Start facility in Jerome. There already exists a sense of trust between parents/guardians and the Head Start school because of the partnership that exists between the two and the Head Start teachers speak Spanish. This likely contributed to the positive effects seen with parental engagement and continued participation in their children's education throughout the school year. We know that the parent-teacher communication gap interferes with students' of color's academic experience and achievement. Attempts by both teachers and parents to close the gap are met with different challenges. Teachers lack the knowledge to integrate parents in their children's education, have received little training in strategies for working with diverse parents, and possess skills that are limited to handling what they perceive as difficult parents (LaRocque et al., 2011). On the other hand, parents are constrained by cultural mores, linguistic barriers, and a lack of understanding practices, procedures, and policies that govern school and education systems in general. Understanding and closing this gap would benefit from research that explores avenues for parent integration into the school system and cultural relevancy training for educators.

## CONCLUSION

Parent involvement and early childhood experiences can positively impact a student's interest in and achievement in science and math. These factors appear to be especially important for Hispanic students who are facing additional barriers such as poverty, language, and cultural differences. Programs that address parental engagement and early learning for Hispanic students need to consider the cultural context of the families and the perceptions of the community about science and scientists in order to be relevant and effective. Working with already established and trusted organizations can reduce the trust issues when delivering interventions. Longitudinal studies that track student interest and achievement and parental involvement throughout elementary school and research that investigates cultural values that conflict with traditional education systems are logical next steps.

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