

INTRODUCING STEM EXPERIENCES TO HEAD START CHILDREN IN JEROME COUNTY

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1. The Innovation Summary

The University of Idaho (UI) team composed of Spanish and Environmental Science instructors and faculty conducted a three-day summer camp that introduced 27 bilingual math and science hands-on activities to Head Start children in Jerome County, Idaho. The camp with a total of around 35 participating children, took place in the Head Start facility on June 11, 12 and 13 of 2013. Each day was divided into morning and afternoon sessions with each session offering separate concurrent classes. Each class was led by the UI team in collaboration with a Head Start lead teacher, an assistant teacher, a high school mentor and a Spanish speaker. An assistant Head Start teacher was paired with a UI team member, and a lead Head Start teacher was paired with a high school mentor. This arrangement seemed logical and efficient as the teachers understood children's pedagogical needs and behavior. Daily observation; direct observation, and surveys were used to assess the performance of the camp and the math and science activities.

Jerome was the ideal location for the innovative project because of its large (34%) and young (29 years median age) population of Hispanics, suggesting a future increase in the Hispanic population. This increase spurs a need for the creation of bilingual STEM-related materials to enhance STEM fields' education in the region, in particular to aid children of Hispanic descent in their educational progress. For many Latinos living in the Jerome region, language and cultural barriers create additional impediments, and this project created and supplied bilingual math and science learning materials as an effort to break down these barriers. Since research suggests that early childhood is an appropriate and important time to introduce individuals to inquiry, exploration, and the utilization of science concepts, UI chose Jerome Head Start as they supported this project and already had in place a bilingual program for both English and Spanish speaking children.

2. Description of Personnel and Community Partners

The camp had seven collaborators: two Head Start Lead teachers from Jerome, two Head Start Assistant teachers, two high school students, and an elementary teacher whose job was to assess the camp's performance. The composition of this team included members of different races, education levels, ages and number of years they had lived in the community.

3. Budget Summary

The budget for this project was \$8738.14: \$7991.14 from the MICRON Foundation and \$747.00 from the UI Department of Modern Language and Culture. The money was used to buy learning

materials for the camp, pay for the UI Team transportation, pay per diem for the UI team and community partners, and feed the preschoolers.

4. Summary Evaluation of Program Objective and Goal

The goal of the project was to contribute to the institutionalization and integration of STEM innovation into the Jerome school system by introducing bilingual (Spanish/English) STEM activities to Head Start 3-5 years old children, teachers, and parents through a three-day summer camp. The camp enabled school age children as well as community members to view science and math as an integral part of their lives rather than a seemingly complex subject and unattainable field of study conflicting with beliefs and values.

4.1. Math and Science Learning Materials

One goal/intent of this innovative project was to increase the availability and accessibility of bilingual STEM learning materials for the Jerome Head Start Program. The UI team developed curriculum and a manual that included 27 hands-on activities known as “lessons” used at school and two at-home family activities. The activity manual for teachers was written in both languages to acquaint (or expose) the teachers with vocabulary before conducting the classes. It was important that all children be exposed to, listen to, and understand the STEM vocabulary in both languages to be able to participate in the activities. Collaborators assessed the effectiveness of the activities and the learning materials used in the camp, and of the responses indicated ‘very effective.’ The materials used for each activity were donated to the Head Start Program to be used throughout the academic year, giving the teachers the opportunity to continue teaching the summer camp STEM concepts in the classroom.

4.2. Math and Science Activities

Another objective was to cultivate the idea that math and science is not a difficult and alien subject matter, but is a natural part of everyday life. In order to accomplish this goal, the UI team developed practical and relatable math and science materials. Each day, the children participated in nine hands-on activities that were categorized by theme (measurements, germs, and experimentation) for ten to twenty minutes per activity. The activities were developed to enable the children to think, conduct experiments, and find their own solutions. These hands-on activities also gave the children the opportunity to actively explore and interact while learning to understand the concepts. Math and science activities were undertaken inside and outside the classroom environment. The children were able to engage in the activities and most of them felt comfortable saying the different words in both languages, this also helped them feel comfortable to express themselves with the UI team and collaborators. The groups were separated so that each group of children had both a Spanish speaking and an English speaking teacher to encourage the children to say the words in both languages. Overall, the children preferred the same 4 activities out of the 27. These activities were more engaging and had enough materials for each child to perform the activities by themselves.

For each activity, the collaborators assessed the percentage (100, 75, 50, and 25) of children that seemed engaged and showed understanding of each lesson. The children demonstrated 100

percent engagement and understanding of the activities, mostly on the activities that required them to actually use their hands rather than the passive activities when they had to watch and listen.

Parents were also asked to indicate the level of their children's interest in math and science before and after the camp. About 73% 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. Similar to excitement, when parents 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. Furthermore, 93% of them found the math and science activities were helpful to their children learning.

4.3. Parents Involvement

One of the objectives of the project was to increase Head Start parents' knowledge and advocacy of STEM education. Children took home bilingual STEM learning materials to increase parents' support for their children's academics and augment parents' understanding of science and math. The project sent two activities home for parents' participation. One activity demonstrated how plants absorb water and the other dealt with hand washing. Parents were asked to indicate how much they learned from the math and science activities sent home. About 80% reported that they learned a lot and 17% percent learned a little bit. The activities sent to the parents helped the family work together and learn in an easy way some science and math concepts. According to the parents' interviews, they preferred the activities that were sent home, and also pointed out that those activities were easy to understand and deliver. The activities sent home also had instructions in both languages so parents could also acquire the used science and math terminology. The activities sent to parents went in sequence with what the children learned in the summer camp that day, facilitating the children's and parent's view of how science is part of their natural lives.

4.4. Community Partners Involvement

The UI team collaborated with Head Start teachers to develop and deliver hands-on bilingual STEM activities for the children by actively involving the teachers in the development of science and math materials and camp activities. The project sent the Jerome Head Start lead teacher to Moscow to participate in the development of these hand-on activities. All the collaborators participated in the four-hour activity training session a day before the camp started. During the camp, the collaborators were allowed to make adjustments to the activities accordingly. The goal of this exercise was to increase the likelihood that the teachers would continue to use these materials during the following academic year and disseminate the activities to other preschools in the area. The project assessed how adequately the collaborators were prepared to participate in the camp. Only 15% felt 'very prepared' and the remaining 85% indicated feeling less prepared. When asked when they had felt unprepared, six of the seven collaborators felt that they did not have enough time to read and understand the lessons before the camp started; and only one felt unprepared to deal with children in general.

4.5. Improving Math and Science

Both parents and collaborators were asked to describe specific ways the community could improve children's interest and ability in math and science. The average response was to

increase access and availability of math and science activities not just in the classroom but also in the community.

4.6. External Assessment

The external examiner strongly agreed on the following: the innovation was relevant to the Head Start children; the camp content was meaningful to the students; the camp content was related to the skills and knowledge children needed; the camp motivated children to want to learn more about science and math; the handouts/supporting material were effective; the venue was conveniently located to publicize the camp well; and the catering was of a good standard. The examiner agreed that the duration of the camp was right for the children and the camp was well organized. The external examiner marked the following as excellent: the clarity of the camp activities; the level of engagement with the children; the structure of the presentation; the relevance of the camp to STEM needs; the venue; and the catering. When asked about the best aspect of the camp, the examiner said, “Children engagement and the high level of interest in all of the activities.”

5. External Proposal

Although the UI team has not submitted any proposal for external funding, it does underscore the significance of undertaking another camp that will incorporate the following recommendations: experimenting on all the activities before the camp; sending more activities home; reviewing the camp activities with the parents so that they can help to enhance their children’s STEM concepts when they go home; inviting the parents to participate in the camp; and adding one more day to the camp with additional hands-on activities for the children.