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# Empowering Latino Students to Pursue a Degree in Astronomy/Physics

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## **Abstract**

Empowering Latino students to pursue careers in astronomy/physics is possible if we find the correct way to help them. Astronomy can help our planet, and physics teaches us how to appreciate our earth and everything around us. Currently, Latinos are underrepresented in these careers. This senior capstone examines the different ways that schools could empower Latino students to pursue careers in astronomy/physics. Through the use of literature review, interviews with two teachers and one astronomer, and an anonymous survey of students, the result findings indicate that introducing careers in astronomy/physics to Latino students at a young age could spark their curiosity that would lead them to pursue careers in science even though it may pose a challenge for schools to do so, but that could spur curiosity for them to explore more careers in science.

## Introduction and Background

Astronomy and physics are two sciences that, in the future, will have many job opportunities. There are job opportunities for these two sciences, but not many know about them or what they are. The Latino population does not get enough exposure to these sciences. If we can help the pipeline and include more exposure to Latinos to understand astronomy and physics, we can potentially increase the Latino population in those careers. I don't recall learning at a young age what astronomy or physics was. I was scared of the sky because I didn't understand it. I learned about astronomy and physics until I was in community college. I would like to help elementary students learn this in school, which can potentially help increase the Latino population in these careers. "Although 13% of the US population is African American or black, and 17% is Hispanic (US Census), the representation of these two groups in physics and astronomy is much lower. For this reason, African Americans and Hispanics are considered under-represented minorities (URMs) in physics and astronomy" (American Institute of Physics (AIP), 2014, para 1). I want Latinos to know that careers for these disciplines exist and are achievable. Currently, Latinos are underrepresented in the fields, but if we change the approach, we can change the numbers.

There can be different ways to approach a subject that not many know about or want to learn. If we can find a way to help students get there, they will understand and spike curiosity. "They handed out lollipops, which satisfied his sweet tooth, and they talked about engineering, which appealed to his curious mind" (Boston University Today [*BU Today*], 2021, Para. 2). In this sensation, they introduced engineering with a candy that left a memorable mark and got children interested. Other activities can be added, like creating science fairs in schools or having art projects that teach the subject can all spark curiosity. There is another way to approach a

student; we must find it.

Astronomy studies celestial objects like; stars, planets, comets, nebulae, star clusters, and galaxies. Astronomy also connects and helps evolve physics, chemistry, meteorology, and motion in celestial objects. “Theoretical astronomy is oriented towards the development of computer or analytical models to describe astronomical objects and phenomena. The two fields complement each other, with theoretical astronomy seeking to explain the observational results, and observations being used to confirm theoretical results”(Tucson Amateur Astronomy Association [TAAA], n.a, para. 3). There are a lot of subjects that fall under astronomy; astronomers work with computers and telescopes.

Physics is considered to be one of the hard sciences, but it is amazing. Physics comes from the Greek word *Physik* which translates to “knowledge of nature.” “Physics, then, means studying nature at its most base level - matter, behavior, and motion, energy types, time and space, and their actions and interactions (1)” (Manson, n.a, para. 2). Physics can be as simple as collecting data of someone’s speed to as complex as understanding how our world and universe behave. Today physics overlaps with many other sciences like; astronomy, chemistry, and environmental science, amongst others. Physics is so amazing that it has calculated the distance between the Earth and other celestial bodies outside our solar system.

As a future educator myself, I will try my best to find a way to give Latino students the opportunity to learn astronomy and science. My minor is science. I have learned various things, and I find it intense but exciting. I would like to allow students to understand astronomy and physics; that would be the only way they would know if they actually enjoy it. I was lucky to learn astronomy and physics and be able to participate in two different NASA and NCAS internships, and I would love to let children know that all that is achievable. If I could teach

others about astronomy and physics, they might have the same passion for them.

Given the importance of astronomy and physics, my research is based on seeking the answers to the following questions. My primary research question is: How do elementary schools empower Latino students to pursue careers in astronomy and physics? To seek the answer to this question, I will be asking the following series of questions.

1. What is astronomy and physics? What does the field of astronomy and physics entail?  
Why is it important in general and specifically to Latino students?
2. What does the research say about the numbers of Latinos in astronomy and physics? How are they compared to some other ethnocultural groups?
3. If the numbers of Latinos are disproportionate as compared to other racial groups, what could schools do to empower them to pursue careers in astronomy and physics?
4. What could teachers do to promote Latino students to pursue a career in astronomy and physics?
5. Are there resources for Latino students should they choose to pursue a career in astronomy and physics?

Astronomy and physics are sciences that can teach a person so much about our planet and other planets. I would like to help Latino students learn about astronomy and physics and help them pursue a career in science. To answer my primary research question, as well as the rest of the questions, I will be conducting four interviews and three different types of surveys. I will also attach data from a presentation I did a few months ago.

### **Literature Review**

As mentioned above, weeks of research was conducted, interviews, and surveys to be able to answer the primary research question and secondary research questions. The following section will be dedicated to the results of my research and to answer my questions. The section explains how schools and important to the Latino community to help them get involved in astronomy and physics. It will explain what astronomy and physics is and how it is important to learn, also how these sciences branch with other sciences in the world. It will explain how to encourage students be interested in astronomy and physics and pursue a degree in these sciences.

***Schools are vital in engaging students in astronomy and physics.*** Elementary schools have a few programs encouraging Latino students to pursue a career in Astronomy and Physics. These programs help students have an understanding of what these sciences are, but there is more to be done because even with these programs now in place, students still don't understand much about the subjects. "We also touch on the world of the Mayan people today, and emphasize the participation of rural Mayan-speaking youth--including females--from rural communities in the restoration of their archeological sites, and their commitment to the preservation and revitalization of their scientific knowledge that has endured for thousands of years" (Peticolas L. M., Pg., 425). Some programs have a different approach they result in educating the student on their ancestors and teaching them how they used astronomy to create amazing things like the Maya calendar. This helps the Latino population engage more because they are learning that their ancestors practice this science many years ago. If astronomy and physics were added in daily lessons or weekly lessons, that would be a better way of retaining information at a young age and creating curiosity in a young mind that wants to learn more.

The Hartnell College Site noted that-NASA Minority University Research and Education Program (MUREP) Aerospace Academy is designed to inspire a more diverse student population to pursue STEM post-secondary degrees and careers; engage students, parents/adult family members and teachers in first-

hand learning experiences involving emerging technologies/high-tech applications, STEM practices, and establishing a supportive community; and educate students utilizing rigorous STEM curricula, designed and implemented by NASA, and utilizing effective evidence-based strategies employed by leading STEM professionals and agencies (Hartnell College, n.d., para. 1).

NASA Minority University Research and Education Program (MUREP) started a program in elementary schools; the program currently has three programs that introduce Astronomy and physics to university students. The programs are NASA (astronomy), Coding, and Robotics (physics). The program was offered to students that come from the Latinos community, and about 90% are Latinos. The program has a curriculum that is set to help teachers and leads to teaching the students. The teachers and leads, prior to teaching the subject, have a training and get all materials to the students. This is a good program, but it does have downfalls because students learn minimal about the subject, and since the program is on Saturdays, there is not a significant amount of children that want to attend since they already went to school all week.

***Astronomy and Physics explained.*** Astronomy research early records began in the Assyro-Babylonians around 1000 BCE. The observations were based on celestial bodies and recorded their periodic motions and movements. Even as they recorded this, they still had no idea how far away the astronomical bodies were. In the third century, Greek astronomers attempted to use astrometry to estimate the cosmetic scales of our sky. Astronomy brought new library books that talked about the subject and brought interest to the community.

Aristarchus of Samos was one of the few supporters of the heliocentric system, identifying that the Earth traveled around the Sun rather than the other way around. A proficient mathematician, he tried to assess the relative distance of the Sun and the Moon from Earth, by measuring the angle between them when the Moon appears exactly as one quarter. With the help of trigonometry, he determined that the Sun is 18 to 20 times more distant from Earth than the Moon. He had the right idea, but the measurement was not very precise; current data show that the Sun is about 400 times more distant than the Moon (European Space Agency [ESA], 2019, para. 6).

With our current data, we have learned more about astronomy. It is an exciting and

fantastic topic. I believe that if we teach our Latino students this at a young early stage, we can explain it to them, and we can possibly have future astronomers. Astronomy is the study of celestial objects, and that study is so extensive because you can learn about other planets, comets, black holes, other stars (like our sun), moons, and nebulas. Each topic has so much that a person can learn, there are astronomers that specialize in one thing, and that is what they do for the rest of their careers.

Physics in early civilization was limited to astronomy, although not as we understand it today. Different civilizations (Egyptians, Mesopotamians, Greeks, Mayans, and Aztecs) have a complex understanding of the stars. Each civilization would examine the heavens and predict the motion of the sun, the moon, and the stars; this was just the beginning of understanding the universe. Mason (n.d.) asserted that:

The 20th century was the beginning of modern physics which would incorporate many discoveries and theories and give birth to some of our most celebrated scientists such as Marie Curie (for her work with radioisotopes), her daughter Irene (who discovered artificial radioactivity), Max Planck (who began developed quantum theory), Vera Rubin (who discovered Dark Matter) Albert Einstein (who revolutionized physics with his Theories of Relativity which solved and corrected a few problems that had bugged various physicists for generations) and Professor Stephen Hawking for a wide range of discoveries, solved paradoxes, and complex theories particularly those relating to the nature of Black Holes (13). This is also the age of space exploration, calculating the size of our solar system and distance to nearest stars and other galaxies. Through mathematical measurements and physics, we have been able to calculate that the size of the visible universe at around 200 billion galaxies. It's even been used to attempt to calculate the potential number of civilizations in the universe. Known as The Drake Equation, it uses mathematical modeling based on what we know about the physical aspects of solar systems, the number of planets, and the relative size of "The Goldilocks Zone", coming to a conclusion of potentially millions.

Physics can teach us about the earth. It can be complex and a bit more understanding. Physics also helps us understand a significant issue that is happening in our world, which is climate change. As I mentioned before, physics shows up how it can be helpful along with other sciences. Physics helps climate change, renews energy, pollution, human health, satellite technology, and seismology, among others. With a degree in this, a person can choose different fields in this science.

***Motivating students.*** As future educators, we have to find a way to help the Latino population feel encouraged on these topics. “In order to attract, recruit and retain underrepresented minority students to pursue Astronomy and related fields, we must ensure that there continues to be a well qualified pool of graduate and undergraduate students from which to recruit” (Norman, D., 2009, Para. 1). If the root of how to motivate them, we can help the encouragement. There have been teachers that find a way to help the younger students understand these challenging topics. There are programs where children can try to do them, but they have to be guided by a teacher. NASA has a project where students can create a science fair and present it to their classmates. The one that NASA offers gives instructions and guidelines. This is a great opportunity, but as mentioned before, it has to be guided by an adult. “How do you do a science fair project? Your science fair project may do one of three things: test an idea (hypothesis), answer a question, and/or show how nature works” (NASA Science, n.d., para, 1). This project sounds amazing, and it can be performed in any school grade. The younger students can create something that interests them. Older students can create something more complex and display it to the school and the public. Students, when they are young, have more imagination and curiosity that can lead a student to want to learn more about astronomy and physics, leading to a career in that path.

## **Methods and Procedures**

Since the beginning of my semester, I knew what I wanted to do my research on and dedicate my capstone project to, and I knew I wanted to focus on Latino students astronomy and physics. After going over a few ideas with Dr. Thao, and completing my prospectus, I was able to come to a conclusion about what began my research. To answer my research question posted

in my introduction, I gather and examine data like articles and books related to my question. I used Onsearch on our school website library, and it was hard to find what I was looking for finally, I was able to refine the words, and that was how I could find what I was looking for. Besides the articles and books, I dedicated several hours to creating surveys, interviews, and a presentation. The surveys were for students, and the interviews were for the teachers and an astronomy professor. I was also able to present a PowerPoint for a class dedicated to the solar system, and they gave me their feedback on a survey.

My methods and procedures for this senior capstone project included a literature review, an interview with an astronomy professor (See Appendix A), a student survey about astronomy and physics (See Appendix B), Interview questions with three elementary school teachers (See Appendix C), Survey with a second-grade class about the solar system (See Appendix D), and finally; Solar System presentation (See Appendix E). The students were from the city of Salinas the majority were Latinos. The teachers were also Latinos and attended the same school the students did. The astronomer works in a Salinas local college and she is not Latina.

I was able to remain in contact with my astronomy professor from community college, and I worked with her on different occasions even if I no longer attended that college. She has been kind to support me. She agreed that I could interview (See Appendix A) her, but on paper only because she had a busy week. She was kind enough to let me work with her and ask her questions about her journey and her career. I was able to create the questions on a Google doc and send them back to her. This took me a bit because I was not sure how I wanted to ask the questions. I wanted to make sure I was able to ask the correct questions. This was a bit of a challenge because I did know that I wanted to cover as much information as possible. The

purpose of this interview was to learn more about the advantages and disadvantages of becoming an astronomer. I wanted to see her opinion on how we can empower Latinos to pursue a degree in astronomy and physics. She was able to answer all of my questions and give me her point of view on the topic, which was great.

I also remind in contact with a school friend that became a school teacher. I asked her If I was able to send surveys to her students (See Appendix B), and she said yes; she got me in contact with her colleagues, and they also were able to fill out the surveys. The students were all able to answer and gave me their honest answers. This survey was challenging to put together because I wanted to make sure I was able to ask the correct questions to the students. The only thing I asked to know about them was their grade level because I wanted to see if age made a difference in their interest in astronomy and physics. The point of this survey for the students was to understand if students had been exposed to astronomy and physics. I wanted to see the result of how many students know what these subjects are and if they would like to learn about them or if they needed more information about them.

The same teacher that helped me with the surveys with their class was able to fill out an interview survey for them. This survey also was a challenge because it was hard to put together what I wanted to ask. The purpose of this interview/ survey was to know if the teachers were interested in teaching the subjects if proper training was done that gave an opportunity to help students learn more because, without adult guidance, it can be difficult for a child to learn about these topics. The teachers were kind enough to reply, and that gave me an idea of how we can encourage students to help them.

The last student survey (See Appendix D) was to know if we add astronomy and physics to a daily lesson would students be more interested. The students were given a lesson on

astronomy at the beginning of the school year. This survey focuses on that lesson and if they enjoyed the lesson. The survey was a challenge because I wanted to make sure I was able to ask the correct questions to the students. I wanted to make sure I got what my intention was, to be able to see what the students retained. I was hopeful that the students remembered and were able to remember the content of the survey. The results were impressive. The last Appendix (E) is the lesson I gave the second-grade class about astronomy. This will help me know if the students enjoy material like this one.

### **Results and Discussion**

Throughout my research from my literature review, interviews, student surveys, and lessons, my findings did provide me with the belief that we can help Latino students pursue a career in astronomy or physics. My results shows that we can help Latinos succeed in a degree under astronomy and physics it also shows that there is a lot that we have to do in order to help the Latino community achieve this. This section will demonstrate what I found under our questions and how we can help. The section will be focused on the questions of this research and what was found.

1. *What are astronomy and physics? What does the field of astronomy and physics entail? Why is it important in general and specifically to Latino students?*

As mentioned before, astronomy and physics are two essential science fields. They both help us understand Earth, along with allowing us to help Earth and make sure we keep our planet safe for many years to come. “No other science can get away from physics (or chemistry) because all matter is made up of molecules” (Mason, n.d., para. 6). Physics is the study of how matter acts. We can't get away from this science because it is important to understand how it

works. Whereas astronomy entails different branches. A person can lead into different branches to pursue a degree. “Observational astronomy is focused on acquiring data from observations of celestial objects, which is then analyzed using basic principles of physics. Theoretical astronomy is oriented towards the development of computer or analytical models to describe astronomical objects and phenomena” (TAAA, n.d., para. 3). These branches lead to other options, like studying black holes and how they develop. The other option is to work with a computer and design how a distant planet might look with the data collected. The reason why it is important to Latinos is that the Latino population is so undermined in these careers.

2. *What does the research say about the numbers of Latinos in astronomy and physics? How are they compared to some other ethnocultural groups?*

Bringing more Latinos to careers like these ones will allow companies to have a more diverse team that can come up with solutions. As a company owner, you don't need a person that knows it all. You need a person that is willing to find the solution. Different minds bring different answers. “The United States is becoming more and more diverse, but the representation of some minority groups in physics and astronomy lags behind. Although 13% of the US population is African American or black, and 17% is Hispanic (US Census), the representation of these two groups in physics and astronomy is much lower. For this reason, African Americans and Hispanics are considered under-represented minorities (URMs) in physics and astronomy” (American Institute of Physics [AIP], 2014, para. 1). The data collected in these articles shows that Latinos in physics represents about 2.7 % of the population in this department. In astronomy, the number of Latinos in the department is smaller, it is about 2% of the population in the department. Other ethnocultural groups have careers in these departments because they have

more exposure to science, and parents can afford to pay for a child to learn astronomy and physics. I was able to find a science camp in Monterey County. “Campers participate in a variety of fun and engaging hands-on projects like designing their own air rocket, making clay shuttles, and designing a spacesuit” (Space Explorers Camp, n.d., p. 2). The camp teaches the students to learn about astronomy, but the program costs \$350.00 USD. Sadly, not many Latino parents can afford a significant amount of money like this. “The underrepresented minority workforce (adults age 25-64) is growing the fastest, but these are the same workers who are most likely to be under-educated for positions in the fields of science and technology (Norman, D. 2009, Para. 2). Latinos are the working race, the pursue a trade job most of them need to take care of their families so education is not in their mind they need money to be able to provide. That leaves careers in science out of the question.

*3. If the numbers of Latinos are disproportionate as compared to other racial groups, what could schools do to empower them to pursue careers in astronomy and physics?*

Schools play an important role in this. “Formal astronomy classes are rarely offered to K-12 students until perhaps their last one or two years of high school, however astronomy remains an important gateway science because of its ability to capture the imaginations of people of all ages (Ward et al, 2007, AANM, 2001)” (Norman D., 2009, Para. 4). If they could create programs that help Latino students learn, that would let the students know that it is possible and fun. “All students, including those with underrepresented minority backgrounds, need to be engaged in science inquiry at early stages in their schooling careers with knowledgeable and experienced science teachers” (Norman D., 2009, Para. 5). The school could start by having a science fair that is done one time a year. This science can be set to astronomy and physics. Only

that way, students can study the topic. The schools can place students from 1-3 places and give them a medal and a prize. That will motivate them to learn, and a child that learns something new feels proud of learning it. That can spark an interest in the field. The schools can also start after-school programs that teach students about astronomy and physics.

There are after-school programs already in place for students that need to stay a little longer or if the students need help with homework. During that time, their students can learn about these sciences and create their own science projects.

4. *What could teachers do to promote Latino students to pursue a career in astronomy and physics?*

Since astronomy is not a requirement when you are attending college, many teachers don't know about astronomy. If we give teachers the opportunity to learn about astronomy, they will /get students interested in the topic. That can lead to learning about these sciences from the student since most students find their teachers' opinions important. "A team from the College of Education and Human Development and the College of Sciences is teaming up with San Antonio ISD to create a teacher professional development program that would train in-service teachers to become high school computer science teachers with support from a \$999,556 three-year grant from the National Science Foundation" (University of Texas at San Antonio [UTSA], 2022, para. 2). If we give more education to teachers that can lead to more teachers being interested and want to guide the students to learn astronomy and physics leading to more Latinos on pursuing a career in these sciences.

5. *Are there resources for Latino students should they choose to pursue a career*

*in astronomy and physics?*

Not much resources are available, except from Hartnell. This program is easy to access for students and parents, mainly for Latino students who attend this program. Even though it reaches students, but it is not enough. All students attend school from Monday to Friday, and most don't want to attend on Saturdays. It doesn't mean that the program doesn't work, but the timing can be hard on the students and the parents. If the parents have to work, maybe they can't pick them up early. The program provides a general understanding to the students, and that does spark their interest in astronomy and physics.

### **Problems and Limitations**

There was a few problems and limitations I encountered while researching my capstone project. The first one is to find peer review articles. This issue was hard since I was not able to find many peer review article I was to look for regular article online. I hard to word my search differently and use as many research places as possible. This was stressful since I was not able to find more. The problem is that there is not much research on this topic so that makes it really difficult to find peer review articles that can back up my paper and that is hard because this is a problem that is happening in out community.

The second problem I encountered was that I was not able to meet with the teachers I interviewed in person. That was a bit of challenge because the teacher are the of education for children. They are the ones that educate and dedicate their time to helping students learn new material. I was not able to meet with the teachers that responded to my surveys because they work and attend school and that is the same thing with me. Because, I was not able to meet with the teachers for the recommendations I was not able to get full responses from them on the

survey question they all just responded short and they did not reply in full sentences too that was hard. I believe that if I was in person they would have replied in full sentences instead if just yes or no on the paper.

The last limitation was that I wanted to reach more students. I was not able to do so I was not able to get that many students to reply to survey. If I would have had more students reply to survey that would have helped more on the data side. Sadly I was not able to. That gave me a small amount of responses in that survey. The less amount of students that reply to the survey the less about of data collected and that makes it a little hard to see all the data.

### **Recommendations**

I have a few recommendations to help Latinos choose a career in astronomy and physics. One recommendation is funding for the schools; there are companies out there that are willing to help with the cost or give grants for schools to use. Some of the funding can be for all the material needed, some for the training, and lastly, for the teacher to get paid for the time they will be investing in these programs. We have to think that all teachers have a personal life outside of the school grounds, and they need to be compensated in other to be able to help in the schools.

A second recommendation is to help parents help their children with these sciences. If we can help the parent have a basic understanding of what the children will be learning, the student will feel more comfortable learning something new. The parents can attend in person or online to a meeting. The meeting can be healthy one time before the students start the program. The parents may also have a point of contact if the student does not know something or needs help on a topic. The parent would also be able to help the student and would be content they are able to help.

The last recommendation is to help Latino students pursue a career in astronomy and physics, and the most important, in my opinion, is to add the programs to the school curriculum. If we add them to the school curriculum, we can access more minds and interests. A few months ago, I went to school in my hometown. I was asked to present an astronomy presentation. I was excited to do that. I created a PowerPoint presentation that talked about The Solar System. The presentation explained all the basics about our Solar System and the planets. The presentation was done during class time, so all the students were in class, I was unsure if they had any interest in the topic of it; they actually wanted to learn it. The students engaged in the presentation they loved it. The presentation ended up being longer than expected because the students had so many questions. If we add these sciences to the daily teaching, we can get more students interested and want to learn more about it as they get older. That may increase the Latino population in astronomy and physics.

### **Conclusion**

To conclude my research, the results from the primary research question, “How do elementary schools empower Latino students to pursue careers in astronomy and physics?” I think that schools can help them pursue a career in astronomy and physics if we change a few things. “One way to do this is to expand funding for programs that partner Astronomers and teachers to other educational institutions, not just schools, in minority serving areas. For example, community-based after school programs should be included in funding programs. These facilities, engage the same youths and families year after year thus providing the continuity needed to engage and retain student interest in science” (Norman D., 2009, Para. 9). Elementary schools can help; they just need to make some changes and more astronomy and physics in their daily teaching. The

schools find that there is the basics of school are literature, math, history, and a small amount of science. Schools need to add more science projects to engage students in science and get them interested in learning it. Most students find science boring, but if they have fun while learning, they will want to learn more about science.

Latinos are underrepresented in many careers, but astronomy and physics are the lowest. If we find a way to help, students learn, we can bring the numbers up. Latinos are hands-on individuals that would love to learn new hands-on activities. Astronomy and physics have many programs that go under that. Helping Latinos know this will bring a more diverse team to companies that can potentially help with significant issues or create new projects. Astronomy and Physics hold the jobs of the future; let's help the careers by making them more diverse and open to more people that don't know much about them.

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## Appendix A

### Dr. Moth Interview

Thank you, Dr. Moth, these questions are going to be for my capstone at CSUMB. I will be adding them as a part of my research.

When did you decide you wanted to be an astronomer? And was there something or someone that helped you along the way?

I decided that I wanted to be an Astronomer when I was 6 years old. This was because I had a lot of questions that I was curious about when I was a child, and no one could answer them. The grownups in my family told me that when I grew up, I can study and find out the answers. The reason why I was curious about astronomy since I was young was because my Father used to bring me to the library, and he imposed a rule on me to check out at least 3 nonfiction books. The only nonfiction that I was interested in was astronomy. But because of the rule he imposed, I was exposed to and became interested in astronomy at a very young age. So that is how I decided from a young age to study Astronomy. I wanted to get the answers to my childhood questions.

Do you believe that if we had more programs available for students to learn about astronomy/physics, we would have more students pursuing a career in these sciences?

Yes, I do believe that. I think that people are naturally curious about space but are not taught about it much in school and are not aware that they can even pursue a career in it. Physics is offered in high school, but not much astronomy is covered in that course. If they cover it more in the physics classes, then more students would be exposed to it. In addition, Astronomy is not usually offered as a major in College. If it was offered as a major at more Colleges, there would be more students pursuing it as a career.

During your education, did you encounter Latinos in the program to become astronomers, and if so, how many?

During my undergraduate years at UC Berkeley, my classes were so large that I didn't really pay attention or know my fellow classmates. But during graduate school, at the University of Florida, I did encounter a few Latinos in the graduate school program. There were 4 graduate students (one from my year and 3 others who were a few years younger than me).

Do you believe you made the right decision to become an astronomer? And if yes, why?

Yes, I believe I made the right decision. Astronomy is one of my passions in life, and by pursuing a career in it, I was able to follow my passion and answer questions from childhood that I wanted to know. I also am very happy that my path took me to a career in teaching astronomy as it allows me to pass on my passion to others. It was not an easy path, but I am glad that I did it.

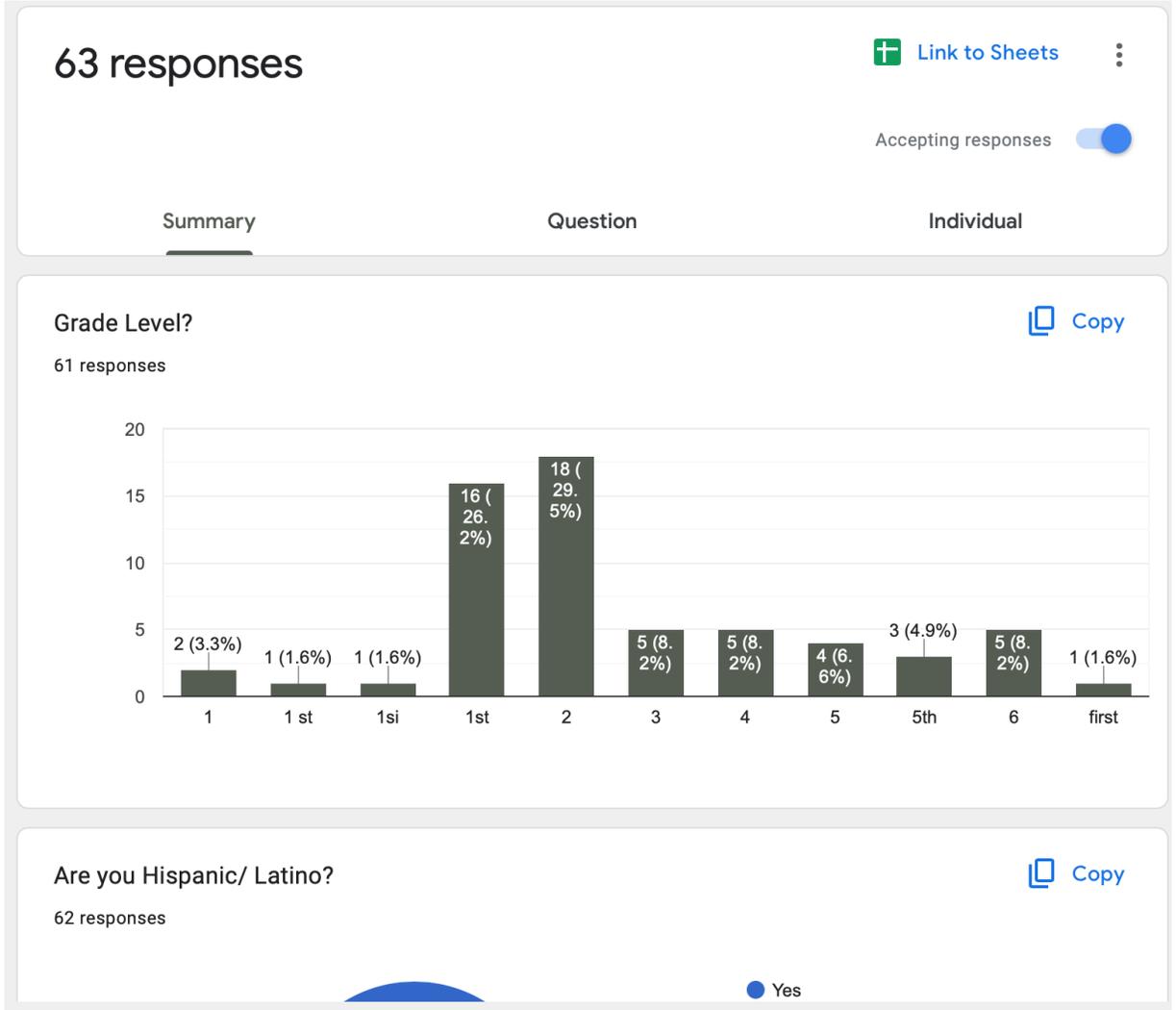
Do you have any tips for students that would like to become astronomers?

My tip is to never give up on your goal. If you really want to be an astronomer, don't give up, even if the classes you take are hard, the research is hard, and you have self-doubt in your abilities. Keep focused on the end and career goals, and once you reach them, all the hard work and stressful moments will be worth it. You will be proud that you overcame the challenges and are pursuing what you love.

This form was created inside of Cal State Monterey Bay.

Google Forms

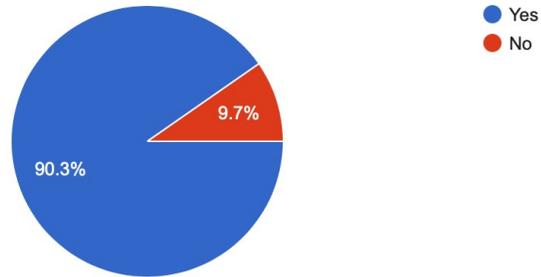
## Appendix B



Are you Hispanic/ Latino?

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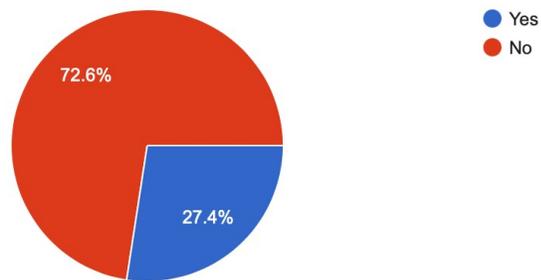
62 responses



Do you know what astronomy and physics are?

 Copy

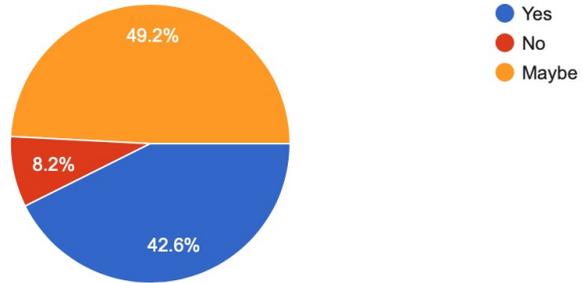
62 responses



Would you like to learn what astronomy is?

 Copy

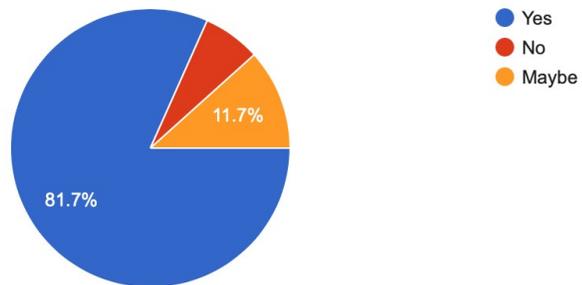
61 responses



Would you like to know what physics is?

 Copy

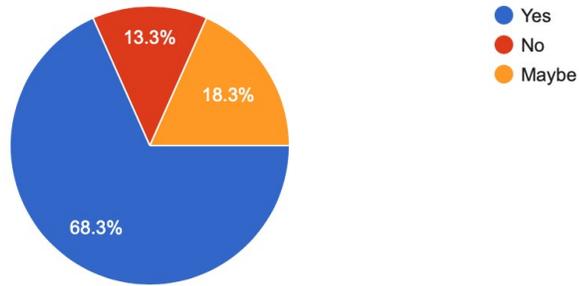
60 responses



Would you attend an astronomy class?

 Copy

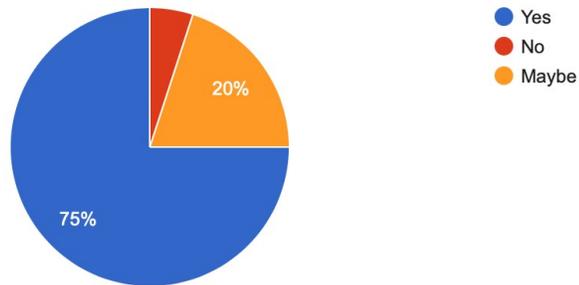
60 responses



Would you like to attend a physics class?

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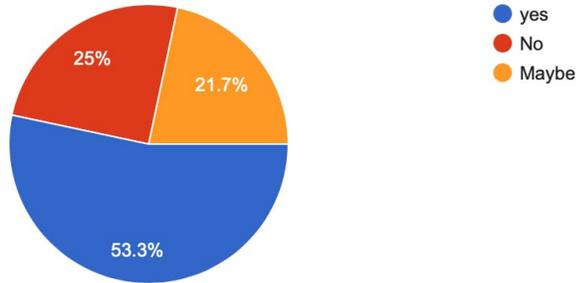
60 responses



### Would you like a job in astronomy?

 Copy

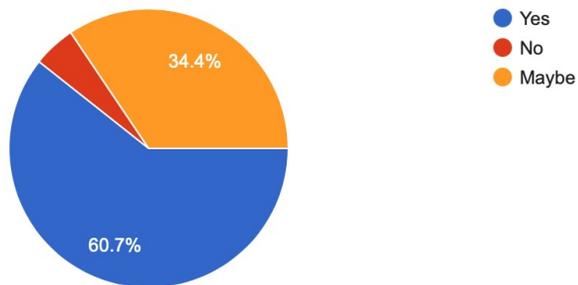
60 responses



### Would you like a job in physics?

 Copy

61 responses



## Appendix C

Questions Responses **3** Settings

The grade you teach?

3 responses

2nd

5th & 6th SPED

1st

As a student, did you know what astronomy or physics was?

3 responses

Yes

No

No!!!!!!

As a student, did you know what astronomy or physics was?

3 responses

Yes

No

No!!!!!!

If you had the opportunity to teach your students about astronomy and physics would you do it?

3 responses

Yes, if I had more knowledge about them.

No

Definitely yes!

Did you know that Latinos are underrepresented in astronomy and physics careers?

3 responses

I was not aware

I did not but I had an idea

Do you believe that if we teach the young generations about astronomy and physics, we would have more Latino community following that career choice as they get older?

3 responses

Yes

Definitely

No!

If you had the opportunity to get training for these sciences, would you take it to add it regular curriculum?

3 responses

Yes, I would.

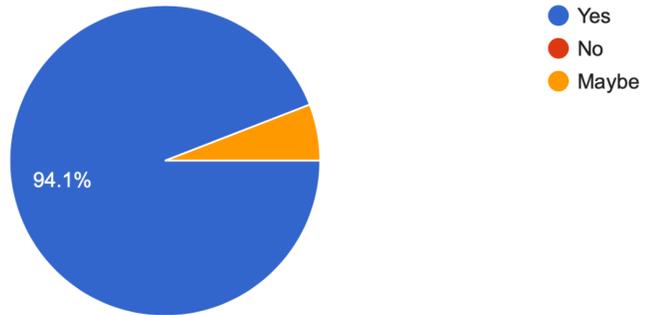
Yes

yes!

## Appendix D

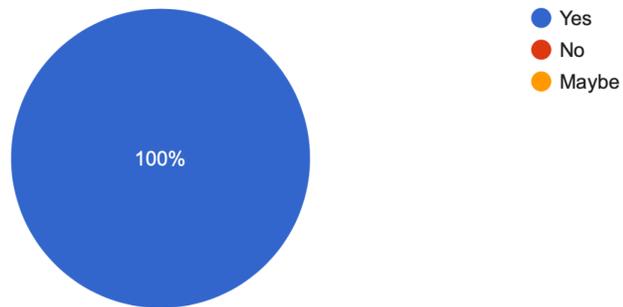
Do you remember the Solar System presentation?

17 responses



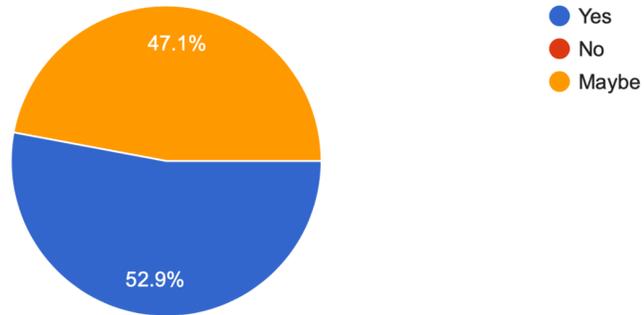
Did you like learning about the sun and planets?

17 responses



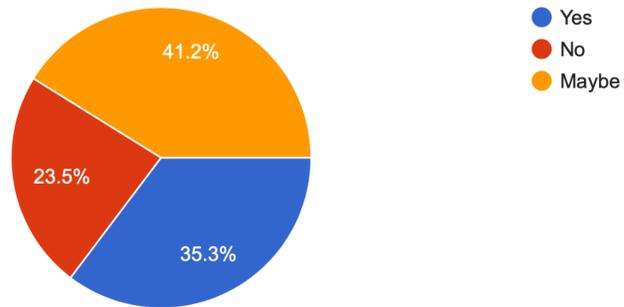
Would you like another presentation like this one again?

17 responses



Do you still remember some stuff from the presentation?

17 responses





## What is The Solar System

- The Solar System is where we live
- Our planets (us) orbit around the Sun
- That makes our solar system (with other stuff)





What is the sun made of?

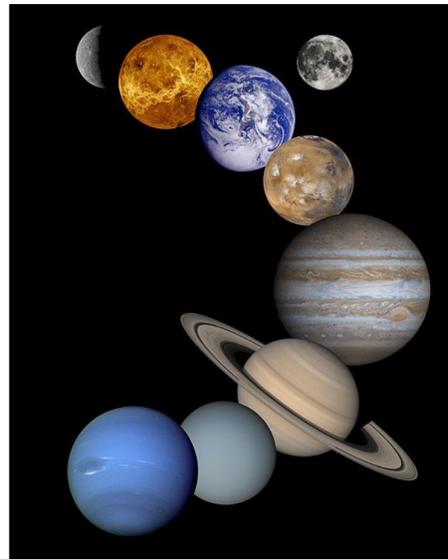
- The sun is a STAR!
- The sun is made of gases they are called **hydrogen and helium**
- The sun holds itself with its own gravity.



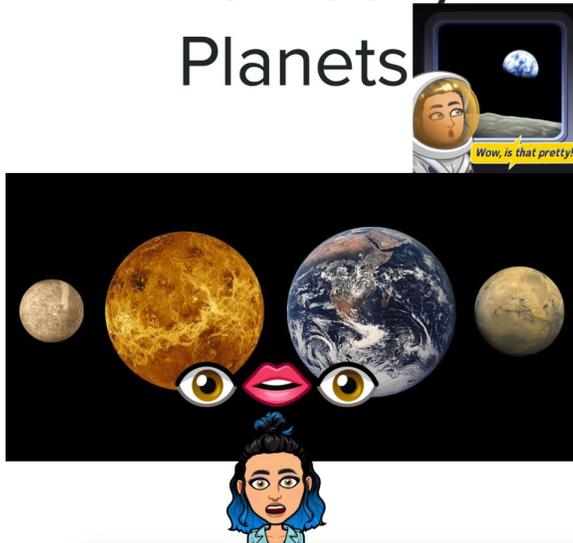
## The Planets

What is a planet?

- A planet is a round BIG ball!!
- The first 4 planets nearest to the sun are rocky planets, what do you think they are made of?
- The last 4 planets are gassy planets, what do you think they are made of?



# The Rocky Planets

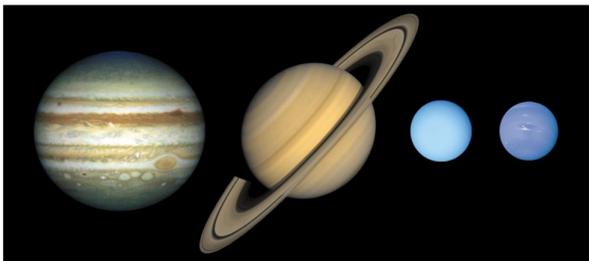


The rocky planets are all similar in a way, they are made of ROCKS! But, at the same time de are different.

- Mercury: Closest planet to the sun, the smallest planet, it orbits the sun in only 88 earth days.
- Venus: second planet from the sun, hottest planet, a day is longer than a year
- Earth: We live here! The only planet in our solar system that has life!
- Mars: Has 2 moons, similar temperature to earth, has icy water, has volcanoes and little robots humans sent up there.



# The Gassy Planets



Jupiter: The biggest planet in our solar system, the red dot is a storm, it has over 72 moons!  
Saturn: Rings are made of dust and ice, made of gas, it can float on water cause it's made of gas  
Uranus: Coldest planet in the solar system, has rings, has 27 moons  
Neptune: Coldest planet in the solar system, mad of gas, has rings



THANK YOU!



Questions??

