



The Latino Scientific Mind:

Empowering our Spanish-Speaking Learners in the Science Classroom

by María Díaz, 2016 CTI Fellows

Albemarle Road Middle School

This curriculum is recommended for 7th grade science and all students considered English Language Learners.

Keywords: English Language Learners, bilingual education, visual, success, vocabulary, Latino/a, Mexico, Water Cycle, Air Quality, Simple Machines.

Teaching Standards: See [Appendix 1](#) for teaching standards addressed in this curriculum unit.

Synopsis: It is evident that there has been a largely increasing number of Latino/a students enrolling into predominately English speaking schools with limited to no prior English. Despite the evident increasing numbers of English Language Learners (ELL), education still struggles to meet their needs. This curriculum unit addresses the barriers ELL students face in education towards academic success. Additionally, this unit guides ELL students through 3 CMS units with emphasis on visual learning. Students gain an understanding of content through a global perspective of content by comparing Mexico and the United States' air quality and the influence of simple machines on Aztec civilization.

I plan to teach this curriculum unit the upcoming year with approximately 112 in 7th grade science.

I give permission for the Institute to publish my curriculum unit and synopsis in print and online. I understand that I will be credited as the author of my work.

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María Díaz

Curriculum Introduction

Rationale

I immigrated to the United States at the age of 4 from Mexico with my family of 7 brothers, 6 sisters, mom and dad. No one in my family at the time had legalization to enter the United States, only my dad had a visa. My family members and I had no prior knowledge of English or the customs in America before coming. My father's hope for the family was to learn English and hopefully this would lead to a greater chance at being successful. Starting school knowing no English and emerging into an all English traditional school was frightening and anxiously inducing. Many times the educational process felt uncontrollable, unobtainable, confusing, and bluntly unrealistic. Especially, because most of my peers and parents at home spoke no English. The only English I heard was at school. Therefore, when it came to focusing on actual content the process became even more difficult. In my case, this left a feeling of detachment from the educational system, teachers, and others willing to help me connect with school. This led me to misbehave and lose interest in the classroom. My detachment ultimately led to poor grades, low reading and math scores, repeating grades, and anger at the educational system. Additionally, my teachers, peers, and mentoring staff did not relate to my culture, much less know about it. The way I understood and valued school was not entirely the same views my teachers had. This created a greater gap between education and my relationships with teachers and peers of a non-Latino decent.

I recall going through elementary school and feeling less intelligent than my friends. That feeling followed me through middle school and high school. I felt as if I was always trying to catch up to a false representation of what I was supposed to be and always in conflict with who I actually was. This conflict resulted from always being grouped in the low performing group and feeling as if teachers didn't see me as a valuable asset. I have always and to this day, struggled with English both in writing and vocal form. I blame this struggle on never truly building a healthy confidence for my ability to be successful in the classroom. I was blessed with a hard working family with many members going on to college and graduate programs to use as role models and resources. However, I

acknowledge that not all Latino/a immigrant families have the resources necessary to break a cycle that they have been grouped in.

My role as a Mexican teacher in the classroom is to influence students who identify as Latino/a or Hispanic to break repressive cycles of not believing they can be successful both in and out of school. My focus is to challenge the systems that oppose them towards becoming successful assets in a society that doesn't always work for them. Many times, while teaching content I realize that the lessons my Latino/a students may take away from me are not so much content rather life lessons; lessons that minority women can have a positive role in society. Not everyone who comes into the United States undocumented will remain undocumented forever. Immigrants migrate for the right reasons and not every representation shown by society about immigrants are entirely correct. I write this curriculum unit with the intention of challenging the achievement gap, ourselves as teachers with biases and misconceptions, and empowering our Latino/a students to become successful.

After attending the seminar sessions for my seminar choice, "Tracing the Legacy of Hispanic Cultures," I have a more profound value for the Latino history and its importance in the classroom as it relates to my own personal experience. I identify as Mexican-American along with many of my students, but I am and want to become more aware of other Latin cultures and histories outside of my own to connect more personally with all Latino students. I encourage other teachers to also take the same approach in their classrooms when teaching ELL students. Becoming more aware of Latino history will allow teachers to more effectively connect to their ELL students and give them a sense of importance and bring more value to science. With all this in mind, it is imperative that ELL students have the resources to easily emerge into the educational system both academically and socially. I hope this unit aids teachers in that manner. Most importantly, this curriculum unit is so versatile it can benefit students with learning disabilities, students that need more remediation, whole class to increase cultural awareness and bring pride to Spanish. These lesson plans do not have to be used only for ELL students.

Lastly, please be aware that I have been a resident/citizen of the United States for over 20 years and my Spanish comes from my culture and family. I have not had any formal education in Spanish. Therefore, please be advised that my Spanish may be different to Spanish in another Latin American country, area, or culture. That is the beauty of Spanish!

School /Student Demographics

Albemarle Road Middle School currently enrolls 1,198 students. The school consists of 64 full-time teachers with a student-teacher ratio of 18:1. 42.6%, approximately 510 students define as Hispanic and/or Latino/a. There are more males (52%) than females (48%). Albemarle Middle is a Title 1 school, all students qualify for free and reduced lunch. The school is located in a predominately low-income neighborhood.

Class sizes vary depending on grade level and content. I teach 7th grade science to 110 students, with class averages at 30. Currently, I have 2 ELL students, compared to last year I had 12. My methods have changed drastically considering that the ELL students I had last year had one or more years in the United States. My ELL students this year have recently immigrated to the United States, no more than 3 months. This means there is a central focus on basic vocabulary to improve their understanding of content. 17% of students in Albemarle have limited English proficiency. I write this curriculum unit with the intention of closing the achievement gap for my ELL students and all other ELL students that may benefit from this resource.

Unit Goals

Students will be given a variety of resources for each standard addressed to make learning easier and empower them to take on a more active role in the classroom despite language barriers. The following curriculum unit focuses on building 7th grade science content knowledge in standards, 7.E.1.2, E.1.6 and P.2.4, for ELL students in all levels of English proficiency. See appendix 1 for a full description of teaching standards.

Specifically, the unit emphasizes on the following objectives:

1. Create an outlet of resources for teachers to use for ELL students that will enhance learning in the science classroom based on the CMS 7th Grade Science Curriculum.
2. Activities that emphasize 7th grade science vocabulary that aid Spanish speakers in narrowing the scope of words to learn the most essential.
3. Activities will focus on visual representations to make learning more beneficial both in science and all other content.
4. Create science lesson plans that incorporate bi-lingual instruction.
5. Provide activities that are influenced by Mexican culture and widen the teacher's and student's knowledge of Latin cultures.

Instructional Tools

Peer-to-peer interactions: The teacher purposely groups students according to native language and knowledge comprehension. It is important to note that grouping ELL students does not mean putting all ELL students together but rather grouping ELL students according to English language proficiency. Teachers must make sure ELL students will be challenged with someone that requires them to speak more English rather than Spanish only during content interaction.

Student Presentations: ELL students are given ample opportunities to present their work in a variety of platforms to enhance their science content comprehension and communication skills. Activities can range between small groups or peer-to-peer interaction. Presentation of student content knowledge does not necessarily have to be written or presented to the whole class, rather can be visually influenced. ELL students can express their knowledge of the content through illustrations. Students that are not ELL can try to interpret their understanding and see if it matches the ELL student thinking.

Classroom activities: Teacher purposely creates activities that allow ELL student to be successful. Activities that ensure ELL students feel successful in the content and classroom can include less complicated text, shortened assignments to allow ample time for the student to translate the information mentally. It is important for the teacher to recognize that an ELL student will take longer to analyze information and answer questions because they have to interpret and translate the information. Therefore, teacher has to allow more time to complete assignments.

Technology: Teachers use a variety of websites to allow ELL students to interact with science content. Websites can include videos, audio, and visuals. This allows students to take charge of their learning independently and at their own pace. Also, while encouraging ELL students to translate any words unknown to them via a translating website approved by the teacher.

Assistance and Aid in the classroom: Teachers will purposely allow ELL students with assistance during assessments. During formal assessments that do not allow the teacher to modify the assessment for ELL students; the teacher can allow students with their prior work to create a cheat sheet for the test or other forms of aid that will allow

them to succeed. Teachers can inform students that any completed work will be used during any assessment to encourage students to complete any class work.

Information Presentation: When teacher presents content for the first time either in a power point presentation, white board, or other resources the teacher uses, it must include the Spanish version of vocabulary terms or key concepts. For example, if the term atmosphere is bolded in the presentation, immediately following the English bold term would be the Spanish bold term as well. Teacher selects the most important terms to translate in the presentation. This not only adds a sense of value to the Spanish speaking students, but builds a sense of community within the entire classroom. Additionally, teachers can differentiate between students and allow ELL students to work independently and at their own pace separately on presentations.

Informal/Formal Assessments: Assessments are differentiated to allow ELL students to succeed. When creating assessments for ELL questions should be direct and include visuals. Assessment do not always have to be in the traditional multiple choice format. Assessments for ELL can be matching a term with its corresponding illustration. Having them draw a poster of what they have learned for the unit and more visually influenced assessments. Example: verbal assessments are great when listening to what the student has learned.

Content Research

It has become increasingly evident that the number of Latino/a population in the United States is continuously growing. The largest notice in these increasing population numbers has been in education.¹ Minority student numbers have increased vastly that they are now the educational majority in a system that is not designed to benefit their educational needs². The majority of incoming immigrants make up 64% of the immigrant community and are of Mexican descent.³

Traditionally, government funding and policies were catered toward white students with middle and high class affluent backgrounds. Those same systems of education are currently attempting to educate minority students who are typically in low and middle class households.⁴ These systems of education are long overdue for change. These systems need to benefit and adapt to the educational needs of a diverse group of students and not target one particular group. If the answer were that simple, why has it not been changed? Simple, when minority students fail to succeed academically, the system of education is not held accountable rather the students and their families are blamed for a

lack of interest in education and involvement.⁵ Considering the previous, it is indispensable that teachers create the greatest change within the walls of their classroom and rely more on their role as bridges for the educational gaps.

Furthermore, the educational majority of Latino/a students in U.S schools are also majority made up of English language learners (ELL).⁶ These students bring with them cultural and social barriers that prohibit them from succeeding in a traditionally only English educational system. Teachers with classrooms consisting of one or more ELL students hold a special responsibility to know a few factors in and outside the classroom that ELL students may face when considering their academic success.

Factor 1: Parental Involvement and Student Success

First factor is parental involvement of immigrant ELL students. Laura M. Gonzalez et al. acknowledged that parental involvement in a student's academic journey will hold great power and influence their educational outcomes.⁷ The influence of parental involvement is more evident when it has worked towards closing the educational and achievement gaps for students.⁸ There is, however, a factor critical for consideration. Parental involvement largely depends on the availability of the parents. The availability of parents is hindered by many factors; minority, particularly immigrant, parents experience more factors compared to other parents. While more affluent families have more flexibility to adjust their schedules according to their child's academic needs, school functions, and can build relationships with their child's teachers; parents of ELL students do not.⁹ On the contrary, immigrant parents juggle socio-cultural economic barriers that hinder their level of involvement. ELL parents attempt to learn and adapt to the American culture while helping their children also adapt. They typically do not have flexible jobs that allow them to be more involved during regular school hours. Also, immigrant parents typically either have longer work days or more than one job, with both parents working long hours or days.

Furthermore, I urge teachers to step outside of their biases when thinking why parents of ELL students are less involved. This means that teachers need to step away from the assumption that these parents do not care for their children's success or daily academics, rather they struggle daily simply understanding the system. Laura M. Gonzalez et al. supports the idea that "school personnel take a deficit-oriented view" of parental involvement by assuming they do not find interest in becoming involved.¹⁰ However, based on their research although parents may not show involvement, they are consistently asking questions regarding school and provide moral and emotional support for their child to be academically successful.¹¹

Another factor to consider regarding parental involvement is that many times if the student does not know English, the parent will not either. If the parent feels they cannot communicate effectively they will not reach out for resources for social-cultural reasons. Reasons such as coming off incompetent, uneducated, embarrassed for their lack of understanding, feeling like a burden, and more. Paru Shah agrees that psychological factors affect the level of parental involvement. Shah also adds that minority groups endure more feelings of hopelessness and thus it affects their levels of involvement.¹²

Additionally, when parents do seek to be involved, schools lack the resources to help those parents. In other words, when parents comes to an open house-speaking very little English, the school often does not have an interpreter available for those parents. Those parents leave feeling unproductive, unvalued, and a sense of hopelessness. This does not cultivate a sense of gratitude, much less give them the impression the school system cares about their involvement or opinions as a parent. Yet, parents are blamed for their lack of interest in their children's success and the cycle continues. The question stands, how do schools increase parent involvement for the Latino/a population? Some suggestions are finding parental motivators, providing interpreters for school functions, open the line of communication between school personal and parents to be more versatile (phone, e-mail, text, after hours), and provide bilingual form of communication.

Factor 2: Conflicting Views of Success between Teachers and ELL Students

The second factor is perceived teacher success vs. ELL student success. In other words, teachers hold their own perceived idea of how successful an ELL student will be in his/her classroom and in their future academic goals. However, ELL students also have their own perceived idea of how successful they will ultimately be. These two perceptions do not always coincide. As educators we are wide aware of the implications low expectations can have on student outcome. Our expectations of students influences our behavior, motivation, and desire to want to continuously work with them. If teachers hold lower expectations for ELL students, their outcomes will come out affected; not because the students were not successful, rather, because of lower teacher intervention. Edmund T. Hamann and Rodney Hopson write that because of lower expectations from non-minority teachers, students are not given the assistance necessary to ensure they are academically successful.¹³ Also, take note that most public schools consist of non-minority teachers in the classroom for which students have limited access and representation to those minority teachers. Generally, Latino/a students are considered less intelligent than their non-Latino/a counterparts by teachers, an assumption that hinders the student's and teacher's relationship and student success as stated above.¹⁴

Moreover, teachers hold Latino/a and ELL students accountable for school wide low test scores, high achievement gaps, and lower levels of college readiness numbers.¹⁵ This is due to ELL students experiencing lower teacher expectations than their counterparts. In one particular study, teachers were asked what percentage of Latino/a students they thought were planning to attend college, teachers responded with a low 25%. However, when students were asked if they were planning on attending college, 73% of them wanted a degree higher than a high school diploma.¹⁶ This raises the question whether teachers are to hold some portion of accountability for ELL students not fairing as well as their counterparts in the classroom and outside the classroom? Do ELL students feel valued or acknowledged, or do they see role models in their classrooms? These types of expectations not only hinder their academic success, but also their psychosocial wellbeing. It is imperative that as educators we reflect on our expectations of different groups of students and hold them to the same high expectations.

Factor 3: Resources in Education for English Language Learners

The third factor is the accessibility of educational resources for teachers, parents, and ELL students. They have limited access to educational resources because of cultural and language barriers. The challenge teachers have with teaching ELL students properly, lowers their opportunity to become proficient in end of year exams which lead to lower levels of reading and language comprehension. These outcomes can lead to a lower numbers of Latino students becoming college ready after high school.¹⁷ Despite that a large number of Latino students are attending higher learning institutions after high school, they require more remediation in math and reading and require more resources and aid in succeeding at the college level.¹⁸ Therefore, it is imperative that teachers are extremely intentional in their teaching strategies that serve the ELL population and begin to prepare these students for college. Teachers and students can learn a variety of strategies and resources that will aid in the student's best learning outcome and lessen the student's negative mental state during their emersion into a full English-speaking school.

Additionally, ELL students while in the classroom experience education through the lens of White America. Classrooms lack multiculturalism.¹⁹ Many public schools are generally multicultural with minorities making the majority of the population, yet the curriculum is taught through the lens of white people and their experiences in America. Rarely are minorities represented in classrooms. The few times minorities are represented in classrooms they are negatively portrayed or seen as a submissive group. ELL students need to see themselves in the curriculum. Why should education be important for them if they never see themselves in it? Teachers need to implement more positive images and empowering representations of Latino/as in America and their lasting influences in creating a cultural America.

Even more so, Latino/as are marginalized in many ways socially and economically. It is important that teachers with ELL students not fall victims to this marginalization. In particular, is the emphasis of students learning only the English language. Schools have a large emphasis on pushing English down ELL student's throats while unintentionally discriminating them for their Spanish language.²⁰ ELL students bring so much cultural and social knowledge with them, but are shut down to adapt, assimilate, and only learn about American customs and English.²¹ Teachers that teach ELL students can emphasize the importance of learning English for their success in America, but also highlight the importance of becoming bilingual and culturally aware. This means teachers implement methods that allow ELL students to practice their bilingual skills. Teachers can teach the curriculum, but implement bits of cultural pride for Latino/a heritage, customs, and traditions.

Administrators, teachers, and parents have been challenged to find successful methods and strategies for how to ensure students with limited English are successful. It is apparent that a different approach to teaching is essential for ELL students to be academically successful. An approach that is student centered and is highly influenced by a variety of cultures and backgrounds that promotes inclusion and diversity.

Teaching Strategies

7.E.1.2 Water Cycle

Teaching Standard: 7.E.1.2 Explain the cycling of water in and out of the atmosphere and the atmospheric conditions that relate to weather patterns on earth.

Purpose: Students will know that there is a limited amount of water on earth and is recycled continuously through the water cycle.

Essential questions: How does the sun play a role in the water cycle?

Materials:

- Bilingual Water Cycle PowerPoint
- Water Cycle Guided Notes
- Water Cycle Sorting Game
- Water Cycle Assessment

1. Students are introduced to the water cycle through a bilingual PowerPoint. The PowerPoint includes major vocabulary terms and illustrations for each both in English and Spanish. Teacher encourages students to read through both to build a connection between the terms. Students complete the Water Cycle ELL Guided Notes while going through the Bilingual ELL Water Cycle PowerPoint. Refer to [List of Materials for Classroom Use](#) for the full PowerPoint and Guided Notes.
2. Students work independently to complete the Water Cycle Sorting Game after completing their guided notes. This activity requires students to cut out sorting cards and create headings out of key vocabulary terms for the water cycle. Underneath each heading students place definitions, illustrations, and descriptions.
 - Round 1: Students work independently until completed.
 - Round 2: Students work with a partner to complete.
 - Round 3: Students compete against their partner for the fastest time in completing the sorting game. Best 2 out of 3.

Students complete as many rounds as possible until there are no mistakes with the sorting game and student feels they have a good understanding of the water cycle. Teacher discretion is needed for this activity. Additionally, there are many ways this activity could be implemented to students. As groups, independently, in pairs, or as a class.

If students are struggling with the sorting game, they can refer to their guided notes or PowerPoint to guide them while working independently before working with partners. Refer to [List of Materials for Classroom Use](#) for the full printable Water Cycle ELL Sorting Game. After students are done with the game they go ahead and glue the answer key to their composition notebook, piece of paper, or in some form of outlet they can always refer back to.

3. Students complete the unit by completing the Water Cycle ELL Assessment. The assessment requires them to describe what is occurring in the image of the water cycle with no labels. Students have terms they are required to use in their descriptions. Students label all aspects of the water cycle and use key terms they learned in previous activities. Students are given ample time to complete. It is the teacher's discretion whether to allow students to use any resources completed during the unit. Refer to [List of Materials for Classroom Use](#) for the full printable Water Cycle Assessment.

7.E.1.6 Human Impact on Air: Comparing The United States and Mexico

Teaching Standard: 7.E.1.6 Conclude that the good health of humans requires: monitoring the atmosphere, maintaining air quality and stewardship.

Purpose: Students will know that it is a human responsibility to monitor the air quality to ensure human health. Students will become aware of the consequences of poor air quality on the environment, atmosphere, and their health. Additionally, students will learn preventative measures towards becoming active advocates for their health and good keeping of the atmosphere through daily practices.

Global Perspective: Students will compare the air quality of Mexico to that of the United States.

Essential Questions: How do humans impact global warming?
How does the air quality of Mexico compare to the air quality of the United States?

Materials:

- KWL Air Quality Chart
- Bilingual ELL Air Quality PowerPoint
- Air Quality ELL Guided Notes
- Air Quality Mexico vs. the United States
- Air Quality ELL Propaganda Poster
- Air Quality ELL Assessment

1. Students complete the Air Quality KWL Chart before covering content. This gives students the opportunity to show prior knowledge and have a platform to ask any questions they may have regarding global warming and their comprehension levels. Note, students should only complete the portions K (What I know) and W (What I Want to Know) in their charts. Students will complete the L (What I Learned) portion of their charts at the completion of this unit. The teacher saves all KWLs to reference later in the unit. Refer to [List of Materials for Classroom Use](#) for the full printable Air Quality KWL Chart.

2. ELL students learn content through a bilingual presentation of major key terms specific to major content, Bilingual Air Quality ELL PowerPoint. Students complete guided notes while going through the presentation requiring them to fill in the blanks inserted in the guided notes. See [List of Materials for Classroom Use](#) for the full printable Air Quality ELL Guided Notes and Bilingual ELL Air Quality PowerPoint.

3. Students further their understanding of content by watching a series of short videos of Mexico's air pollution and government actions towards promoting better air quality and the United States air pollution and human health concerns as a result of air pollution. After students view all videos, they are given a bubble map comparing and contrasting air quality between Mexico and the United States. See appendix 2 for the full printable document: Air Quality Mexico vs. the United States. Note, many videos can be translated or have subtitles to aid students in understanding content in videos. On the right bottom hand corner of the video there is a CC icon or a Settings icon that will allow students to choose language and settings for captions.

4. Students apply their knowledge by creating a propaganda poster which advises people of global warming and brings awareness to global warming. This propaganda poster reinforces the visual learning cues ELL students thrive in and allows them to inform others of their knowledge of the content. Students work independently. Students will include a short paragraph describing their poster with proper vocabulary learned in the unit. Take note that many students will not know what a propaganda poster is or the structure of one. Therefore, a brief explanation of characteristics and criteria for propaganda posters will be included in the directions. Refer to [List of Materials for Classroom Use](#) for the full printable document: Air Quality ELL Propaganda Poster.

After finalization of their propaganda posters, students share with a small group/partner their work and explain their illustration. Note, students should be paired with someone that will require them to speak some English and Spanish and not only their native language.

5. Teacher provides students with their KWL Air Quality Charts they completed at the beginning of the unit. Students correct any misunderstandings in the K section, answer any questions they had in the W section, and complete the L section of the KWL Chart.

6. Students finalize the unit through an assessment that incorporates their understanding of global warming and the impact of humans on the issue by explaining, labeling, or describing an illustration. Students are given the opportunity to use all resources they have worked through to complete the assessment. Teachers must ensure students are given ample time to complete the assessment. Refer to [List of Materials for Classroom Use](#) for the full printable: Air Quality ELL Assessment.

7.L.2.4 Simple Machines and Aztec Civilization

Teaching Standard. 7.P.2.4: Explain how simple machines such as inclined planes, pulleys, levers and wheel and axels are used to create mechanical advantage and increase efficiency.

Purpose: Students will be able to explain how simple machines such as inclined planes, pulleys, levers and wheel and axels are used to create mechanical advantage and increase efficiency.

Global perspective: Students will learn about Aztec architecture and the role of simple machines in their civilization.

Essential questions: How do machines make it easier to do work?
How influential are simple machines in the creation of Aztec civilization?

Materials:

- Bilingual Simple Machines ELL PowerPoint
 - Simple Machines ELL Guided Notes
 - Simple Machines Matching Game
 - Aztec Pyramids and Simple Machines
 - Simple Machines Assessment
1. ELL students learn content through a bilingual presentation of major content specific information. Students complete guided notes that reinforces key terms and form a connection between key terms and content when going through the presentation. Guided notes have missing words and blanks to allow students to

connect the English term with the Spanish term. Refer to [List of Materials for Classroom Use](#) for the complete Bilingual Simple Machines ELL PowerPoint and Simple Machines ELL Guided Notes.

Students are given a series of photos displaying simple machines and their corresponding bold terms (Simple Machines Matching Game). Students match the photo with the simple machine term. Students first cut out terms and photos. Then students work independently to complete the activity once. Students are then paired to complete the game once. Afterwards, one student is the timer and the other will be playing the game. Students will compete for the fastest time, best two out of three. After students are done with the game they go ahead and glue the answer key to their composition notebook, piece of paper, or in some form of outlet they can always refer back to. Refer to [List of Materials for Classroom Use](#) for the full printable document: Simple Machines Matching Game.

2. Students are challenged at a deeper level by first reading about possible ways the Aztecs built pyramids. Students are then given a series of Aztecs building pyramids and asked to circle any simple machines in the pictures and label them with the corresponding simple machines. Students work independently to complete the activity. After they have completed the activity, they are paired to check and correct any mistakes. Refer to [List of Materials for Classroom Use](#) for the full printable document: Aztec Pyramids and Simple Machines.
3. Students are given the Simple Machines Assessment. The assessment is structured as a multiple choice format. Each questions has an illustration of each simple machine and 4 answer choice. After students choose their option, they are asked to explain why they choose any particular response. It is each teacher's decision whether to allow any resources during the assessment. However, assessments have been modified to meet ELL student needs. [Refer to List of Materials for Classroom Use](#) for the full printable assessment: Simple Machines Assessments ELL.

Acknowledgements

I want to dedicate this unit to all students that have impacted me daily as a teacher. They have taught many countless life lessons. Without them I would have never been aware of the many blessings I have and have had. Additionally, I want to thank all who have contributed through editing, resources, seminars, and help in bringing this curriculum unit together.

Appendix 1: Teaching Standards

Essential Standard 7.E.1

Understand how the cycling of matter (water and gases) in and out of the atmosphere relates to Earth's atmosphere, weather and climate and the effects of the atmosphere on humans

Clarifying Objective: 7.E.1.2 Explain how the cycling of water in and out of the atmosphere and atmospheric conditions relate to the weather patterns on earth.

This curriculum unit addresses phases of the water cycle both in English and Spanish. Each phase is described and illustrated for students to understand in a bilingual classroom. Teaching strategies in this curriculum do not cover cloud types as result of the water cycle.

Clarifying Objective: 7.E.1.6 Conclude that the good health of humans requires: monitoring the atmosphere, maintaining air quality and stewardship.

Students learn major vocabulary terms are and how they intertwine with the monitoring of Earth. Major themes are global warming, greenhouse effect, and all related to air quality. Students learn about air pollution and what causes it.

Essential Standard 7.P.2

Understand forms of energy, energy transfer and transformation and conservation in mechanical systems.

Clarifying Objective: 7.P.2.4 Explain how simple machines such as inclined planes, pulleys, levers and wheel and axels are used to create mechanical advantage and increase efficiency.

Students learn about all 6 types of simple machines through guided lessons and heavily depending on visuals. Students learn about major vocabulary terms related to simple machines. Additionally, students learn simple machines through a historical context of Aztec pyramids. This lesson applies real life scenarios.

List of Materials for Classroom Use

Hyperlink to a Google drive for all resources: [CTI Student Resources](#)

- 1.** Bilingual ELL Water Cycle PowerPoint
- 2.** Water Cycle ELL Guided Notes
- 3.** Water Cycle Sorting Game ELL
- 4.** Water Cycle ELL Assessment
- 5.** KWL Air Quality Chart
- 6.** Bilingual ELL Air Quality PowerPoint
- 7.** Air Quality ELL Guided Notes
- 8.** Air Quality Mexico vs. the United States
- 9.** Air Quality ELL Propaganda Poster
- 10.** Air Quality ELL Assessment
- 11.** Bilingual Simple Machines ELL PowerPoint
- 12.** Simple Machines ELL Guided Notes
- 13.** Simple Machines Matching Game
- 14.** Aztec Pyramids and Simple Machines
- 15.** Simple Machines Assessment
- 16.** Computer/ Internet Access
- 17.** Color printer (optional)
- 18.** Composition Notebook/ 1 Spiral Notebook

Student Resources

Water Cycle Resources

<https://www.youtube.com/watch?v=ncORPosDrjI&t=43s>

This video breaks down the water cycle for students to easily understand. It can also be auto-translated to Spanish with subtitles. Great for ELL, IEP, and any other student who may need additional help.

<http://water.usgs.gov/edu/watercycle-kids-adv.html>

This website allows students to click on icons to further explain each step, process, or key term. Students can double click outside the margins of the picture and click “Translate to English”. When the popup window comes up click “Options” in blue next to “This page has been translated”. The window will give options for language options. Choose “Spanish”. The page should be translated. This option works for any other language preferred that is available for the translation.

Air Quality Resources

<https://www.youtube.com/watch?v=Sv7OHfpIRfU>

This video explains content in terms of how a child understands it to be. It can also be auto-translated to Spanish with subtitles. Great for ELL, IEP, and any other student who may need additional help.

http://dnr.wi.gov/org/caer/ce/eeek/teacher/aireverywhere/aae_2010_crossword.pdf

Crosswords puzzles allow students to interact with vocabulary terms while defining and learning them.

Simple Machines

<https://www.brainpop.com/games/simplemachines/>

BrainPop allows kids to apply simple machines into a game format. Very interactive, great for all students.

Teacher Resources

Unpacking Standards

Teachers should refer to the unpacking standards for each unit addressed in this unit. Lesson plans, student activities, and worksheets were created to address the unpacking standards instead of the CMS Curriculum Guide.

BrainPop: <https://www.brainpop.com/>

BrainPop is a educational website that supports all content and middle school grade levels. It is great for teachers as a resource for students that are low, IEP, ELL, or all. Teachers should check with their school for free access.

Flocabulary: <https://www.flocabulary.com/subjects/>

Flocabulary is a great resources for students to apply knowledge in a fun way. Flocabulary incorporates content into hip-hop songs. Amazing resources for all students and is available for all content areas. Teachers should check with their schools for free access.

NearPod: <https://nearpod.com/>

NearPod allows teachers to teach in and out of the classroom. Students follow and interact with lessons on their own devices at the teacher's pace or independently. Great for students who need additional assistance or are high achieving students and need little monitoring or for self-paced student learning.

Britannica Pathways: <https://pathways.eb.com/>

Britannica Pathways allows independent learning while researching. Highly analytical. Great for high achieving students in all science content.

Notes

- ¹ Cuevas, Hispanic Acculturation in the U.S., 12.
- ² Unknown, New Education Majority, 82.
- ³ Cuevas, Hispanic Acculturation in the U.S., 12.
- ⁴ Unknown, New Education Majority, 82.
- ⁵ Unknown, New Education Majority, 82.
- ⁶ Unknown, New Education Majority, 82.
- ⁷ Gonzalez et al., Parental Involvement in Children's Education, 16.
- ⁸ Gonzalez et al., Parental Involvement in Children's Education, 16.
- ⁹ Gonzalez et al., Parental Involvement in Children's Education, 16.
- ¹⁰ Gonzalez et al., Parental Involvement in Children's Education, 16.
- ¹¹ Gonzalez et al., Parental Involvement in Children's Education, 16.
- ¹² Shah, Motivating Participation: The Symbolic Effects of Latino Representation, 16.
- ¹³ Contreras et al., Teacher Perceptions, Practices, and Expectations Conveyed, 185.
- ¹⁴ Burroughs, Raising the Question #10, 57.
- ¹⁵ Contreras et al., Teacher Perceptions, Practices, and Expectations Conveyed, 185.
- ¹⁶ Contreras et al., Teacher Perceptions, Practices, and Expectations Conveyed, 185.
- ¹⁷ Burroughs, Raising the Question #10, 57.
- ¹⁸ Burroughs, Raising the Question #10, 57.
- ¹⁹ Rubin, Engaging Latino/a Students in the Secondary Classroom, 130.
- ²⁰ Rubin, Engaging Latino/a Students in the Secondary Classroom, 130.
- ²¹ Rubin, Engaging Latino/a Students in the Secondary Classroom, 130.

Bibliography

Burroughs, Nancy. "Raising the Question #10 Non-Native Speakers of English: What More Can we Do?." *National Communication Association* 57 (2008): 289-295. doi: 10.1080/03634520701851573.

Burroughs reports on differences in obtaining education between racial groups. She discusses the level of readiness Hispanics have in obtaining higher educational degrees. However, when Hispanics do attend college they need more remediation and resources to be successful at the college level. Teachers can be a resources for Hispanics and ELL students while in their classrooms to prepare them to be more successful in college.

Contreras, Frances., Stritikus, Tom., Torres, Kathryn., and Diaz Karen O'Reilly. "Teacher Perceptions, Practices, and Expectations Conveyed to Latino Students and Families in Washington State." *Revisiting Education in the New Latino Diaspora*, edited by Edmund T. Hamann and Rodney Hopson, 185-206. Information Age Publishing, INC, 2016.

Compares teacher expectations for Latino/a students to the expectations of the students themselves. Teachers hold Latino/a student's accountable for low numbers in college readiness numbers, low-test scores, and low performance. This challenges teacher's own perceptions and biases for particular racial groups.

Cuevas, Josh. "Hispanic Acculturation in the U.S.: Examining the Relationship Between Americans' Ethnocentricity and Education." *Journal for Critical Education Policy Studies* 12 (2015): 309-337.

Cuevas speaks to the difference in Hispanics between non-native and native and their ability to assimilate and accommodate to the culture in the United States. He speaks about population increase numbers, with it composing mostly Mexicans. Lastly, he speaks about the lack of education on their ability to assimilate. Educating ESL students is ultimately the key to aiding them in their success.

Gonzalez, Laura M. , Borders, L.DiAnne., Hines, Erik M., Villalba, Jose A., and Henderson, Alia. "Parental Involvement in Children's Education: Considerations for School Counselors Working with Latino Immigrant Families." *Professional School Counseling* 16 (2013): 185-193.

Parental involvement is investigated to emphasize the importance parents have in student success. This article highlights many reasons for why Latino/a immigrant parents are not as involved as their counterparts and ways in which school personnel can increase parental involvement.

Rubin, Daniel Ian. "Engaging Latino/a Students in the Secondary English Classroom: A Step Toward Breaking the School-to-Prison Pipeline." *Journal of Latinos and Education* 13 (2014): 222-230. doi: 10.1080/15348431.2013849601.

Rubin focuses on behavior issues teachers have with Latino/a students in the classroom, but takes a critical lens on why there are behavior issues with those students. With an increasing number of Latino/a immigrants to the United States there are increased Latino/a ELL students. Teachers lack the ability to cope with the cultural changes and implement them into their classrooms. ELL students need to feel they are a valued asset.

Shah, Paru. "Motivating Participation: The Symbolic Effects of Latino Representation on Parent School Involvement." *Social Science Quarterly* 90 (2009): 212-230. doi 10.1111/j.1540-6237.2009.00612.x

Shah speaks to parental involvement in student success. Minority students on average fair less than their white counterparts in academics. Also, parental involvement has a positive influence on teacher expectations and perceptions of students. There are many factors to what hinders minority parents from becoming involved.

Unknown. "New Education Majority Attitudes and Aspirations of Parents and Families of Color." *Education Digest* 82 (2016): 55-61.

The Education Digest explains the difference in education between white students and minority students. It speaks towards creating a different educational system that benefits all racial groups.