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UNIVERSITY OF CALIFORNIA SAN DIEGO

Demonstrating Scientific Understanding through ASL and English Imagery

A thesis submitted in partial satisfaction of the requirements for the degree Master of Arts

in

Teaching and Learning: Bilingual Education (ASL-English)

by

Moises Jaramillo

Committee in charge:

Gabrielle Jones, Chair
Bobbie M. Allen
Tom Humphries

2019

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The thesis of Moises Jaramillo is approved, and it is acceptable in quality and form for publication on microfilm and electronically:

Chair

University of California San Diego

2019

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DEDICATION

If anything, everyone in your life is an educator.

To my students, no words can express my thanks to you for the learning opportunities that helped me build the confidence and skills needed to become a well-rounded teacher. I am grateful to each of you helping me achieve this educational goal.

To my masters teachers, thank you for opening the classroom doors, and providing me with tidbits of knowledge and wisdom while trusting me, the classroom wouldn't be a place of chaos with me taking over the reins for a short period of time.

To my professors, I cannot thank you enough for imparting your knowledge and wisdom in the world of ASL English Bilingual education, and more importantly, encouraging me to feel the joy in my progress as well as challenging me to see myself in the end.

To my friends, I appreciate you cheering me on "almost being done". Our conversations during these times always created a much-needed laughter but more importantly, life should be about celebrating our accomplishments in small ways.

To Elena, for being in my corner and supporting me to recognize I am capable of more than my thoughts. I am thankful for your patience, honesty and love.

Lastly, to my family. To my sister and brothers, our conversations were always moments of inspiration. Thank you for your encouragement and support. To my parents, who immigrated into the United States at such a young age, your sacrifices, love, support, and hard work are a reflection of who I am today.

I share this educational achievement with you all.

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ABSTRACT OF THE THESIS

Demonstrating Scientific Understanding through ASL and English Imagery

by

Moises Jaramillo

Master of Arts in Teaching and Learning: Bilingual Education (ASL-English)

University of California San Diego, 2019

Professor Gabrielle Jones, Chair

The purpose of this thesis is to give new light in the role of using American Sign Language (ASL) to express scientific concepts as little research has been done in order to change STEM instruction within the Deaf and Hard of Hearing classroom. The curriculum consists of three units and seven lessons centralizing around the human body system. The three goals of this curriculum focus on increasing content knowledge in explaining how body systems are interdependent and influence our everyday lives, by creating ASL imagery of body systems, in two different styles (descriptive and expository) using media. Implementation of this curriculum was done in a period of two and a half weeks, based on the evidence presented from field notes, student vlogs, work samples and individual presentations; students showed significant growth with increase of scientific content understanding by utilizing significant ASL structures in media. All three curriculum goals were met.

Introduction and Overview

Science is the ability to make sense of the world and its phenomena. How we see the world is influenced by our experiences as human beings. To describe scientific understandings requires language and experience and therefore the human mind plays a major role in synthesizing scientific phenomena in a tangible way. Creativity with language in Science, Technology, Engineering and Mathematics (STEM) education content areas is what allows individuals to navigate their understanding, digest abstract information and present their knowledge through multimedia. Through imagery, students are able to explain abstract ideas into concrete examples.

As a Deaf person, the world is seen from a visual lens and experienced using spatial representation via American Sign Language (ASL). ASL uses space to describe relationships between scientific concepts whereas the English language is often linear. The difference in both of these languages influence our processing of content areas. Textbook science information is written in English following the order of a spoken language used by hearing instructors. Deaf individuals do not have access to scientific textbooks presented in ASL, therefore synthesizing information from English science textbooks is not sufficient. To allow Deaf students to digest science information via a visual lens, they should naturally use ASL.

This curriculum predominantly focuses upon creating a paradigm shift in learning science by using a bilingual framework in ASL and English. Students will break down the use of imagery in science (multimedia, pictures, graphs) and analyze concepts through hands-on experiences. They will analyze patterns of imagery used in scientific writing and translate those concepts into ASL. Students will take advantage of technology to videotape themselves signing

scientific concepts and make sure they are clearly understood by their Deaf peers. With this curriculum students undergo an enduring life-long learning practice in understanding how the creative use of ASL as a visuospatial language, carries weight in our scientific understanding of the world.

At the end of this curriculum, students will:

1. Increase content knowledge in explaining how body systems are interdependent and influence our everyday life.
2. Create ASL imagery of body systems using evidence to demonstrate a body is a system of interacting subsystems.
3. Create ASL videos in two different styles (descriptive and expository) explaining a body system using media.

Through collaboration of ideas and discussion of scientific concepts, students will demonstrate their understanding through ASL imagery and how English text is represented. These concepts will be self-recorded and captioned with the goal of compiling a rich library of resourceful and accessible videos both in ASL and English to be used over a span of multiple years for the purpose of empowering and motivating Deaf students through peer-to-peer learning. This goal is to foster continued scientific pursuit.

The purpose of this thesis is to give new light in the role of using American Sign Language (ASL) to express scientific concepts as little research has been done in order to change STEM instruction within the Deaf and Hard of Hearing classroom. The curriculum consists of three units and seven lessons centralizing around the human body system. The first two units focused upon understanding interrelationships between distinct body systems and the third unit a transfer of knowledge onto the implications of everyday health. The three goals of this

curriculum focus on increasing content knowledge in explaining how body systems are interdependent and influence our everyday lives, by creating ASL imagery of body systems, in two different styles (descriptive and expository) using media. Implementation of this curriculum was done in a period of two and a half weeks, based on the evidence presented from field notes, student vlogs, work samples and individual presentations, all three curriculum goals were met.

Our current society seeks candidates that are highly skilled STEM content areas. Teacher education programs all over the United States are aiming for meaningful (authentic) learning through tapping into students' interests by implementation of real-life problems through the Next Generation Science Standards (NGSS). NGSS emphasize spiraling up on conceptual understandings as the student progresses through each grade level to build a solid STEM foundation. STEM instruction focuses on student's critical thinking and problem-solving skills. As a student teacher, I have not seen those advances implemented in STEM in Deaf and Hard-of-Hearing classrooms. There is a lack of focus on critical thinking skills in ASL STEM. There is a heavy emphasis on English language learning and there is no guarantee that Deaf students are acquiring English at birth. This lack of language results shows cognitive delays in academic performance (Strong and Prinz, 1997) and students do not learn the structural differences between English and ASL. Deaf students have a tendency to become heavily reliant upon literal translation when reading English text into ASL without recognizing the cultural and linguistic structures of ASL. The challenge with teachers not being fluent in ASL (Shantie & Hoffmeister, 2000) does influence the instruction of any STEM subject. Mathematics for example, instead of focusing upon mathematical concepts, the teachers simply demonstrate the computational aspects of math instead of discussing the important terms and concepts and describing its effect

using language. This is also problematic in itself as students undergo challenges when facing step-by-step problem-solving skills.

Reminiscing about my STEM upbringing, as a mainstreamed student with an interpreter, there was a heavy reliance on reading directly from an English textbook as a class. As I would come across abstract scientific terminology, my interpreter used initialized signs or fingerspelling, which eventually served as a memorization technique in my studies. This trend continued throughout high school in which I struggled quite frequently with science contents such as biology, anatomy, and chemistry. When I became an Exercise Science undergraduate, I took control by devising certain signs to represent abstract concepts, such as enzymes, mitochondrial functions, and chemical bonds. In turn, these signs helped me understand such concepts in depth which set the foundation for my studies as an undergraduate. Looking back at my experience with STEM, the critical difference from all of my years as a Deaf learner, was the opportunity to use my ASL creativity to express scientific concepts three-dimensionally in ways that the English language can't. In turn as a result, I developed not only a strong language base but also a solid scientific knowledge foundation.

The first reason for why ASL STEM is not widespread is due to the persistent focus on English language literacy being a priority over scientific literacy in Deaf education. Research has shown Deaf students have an average reading level of fourth grade (Allen, 2002). Although Deaf students may use ASL in a social setting, the majority of them struggle with decoding and comprehending scientific textbooks in English and without a firm understanding of the concepts in their first language ASL, the transfer of languages will not be successful. Thus, meaningful scientific instruction must be paired with graphic organizers and rich visuals to address students' reading difficulties (Wang, 2011).

Visual learning for Deaf children incorporates using multimedia resources to enhance understanding. The science textbook often may have abstract text in English, often found over 4th grade reading level, and are seldom supported with visuals. For instance, the process of respiration explained in human beings involve anatomy and chemistry. Reading textbooks can be taxing for students who do not understand the syntax of English nor do they “see” the relationships between concepts and how they interrelate. Some simple two-dimensional diagram does not full help Deaf students understand the respiration system. Hence, Deaf students are overwhelmed into trying to decipher scientific concepts. According to Osborne and Wittrock (1983), “to comprehend what we are taught verbally, or what we read, or what we find out by watching a demonstration or doing an experiment, we must invent a model or explanation for it that organizes the information selected from the experience in a way that makes sense to us, that fits our logic or real world experiences, or both” (as cited in Yore, 2000).

Furthermore, Yore emphasizes (2000) students need explicit instruction in remediating their struggles with science literacy through unique reading strategies such as:

1. Assessing the importance of text-based information and prior knowledge,
2. Generating questions to set purpose,
3. Summarizing
4. Inferring meaning,
5. Monitoring comprehension,
6. Utilizing text structure,
7. Reading and reasoning critically,
8. Improving memory,
9. Self-regulating to fix comprehension failures and,
10. Skimming, elaborating and sequencing.

Although these strategies are heavily emphasized upon English skills, Osborne and Wittrock (1983) do not emphasize language use of ASL to mediate abstract concepts; hence, a language that is fully comprehensible to them.

By maximizing the visual multimedia resources available, students can discuss and describe scientific concepts in ASL using imagery techniques such as metaphorical analogies, the use of classifiers, which provides additional information such as shape, size, and type of action; the use of space, which includes establishing location of such objects and making it come to life; and fingerspelling for the purpose of labeling scientific terminology. Engaging with other Deaf individuals within the field of science and teachers alike, will help students build on their use of ASL in science. Not only does the advantage of ASL having a 3D perspective to describe science, this approach in utilizing ASL to demonstrate scientific concepts may in fact facilitate reading comprehension in English. Transfer of knowledge in one language facilitates knowledge of another (Cummins, 1979). Students will have opportunities to also find imagery in English and hopefully make comparisons between both languages. However, due to time constraints employed by the school (e.g. end of school year activities, testing) I focused on expressing scientific ideas using ASL imagery and not the English counterpart.

The second reason why there is a lack of ASL STEM development nationwide is lack of national standardized ASL STEM vocabulary and curricula. Reis, Soloveny et. al, (2015) claims that the “lack of STEM concepts not having an agreed upon ASL sign that often times variate from one classroom to the next” causes an inconsistency of sign use, therefore affecting comprehension. Without a standardized ASL STEM database for scientific concepts, there is the risk of distributed misconceptions in English. Students are tasked with understanding complex scientific English words without understanding them in their own language, ASL.

The role of ASL in expressing scientific concepts has not been researched and ASL pedagogy has not been determined in order to change STEM instruction in the classroom. The nature of science can be described “visually” in ASL, when describing experiments, making

hypotheses, drawing conclusions and even more so describing abstract concepts such as DNA. Because, many science concepts do not have an agreed upon ASL sign, the variation of signs shift from one classroom to the next (Reis et. al, 2015) as teachers typically fingerspell vocabulary and concepts instead of signing and incorporating ASL imagery in descriptions of concepts. In addition, variations in signs “may place an unnecessary cognitive processing overload on Deaf children, who must adapt to different signs used by different instructors (or peers) while learning the already challenging vocabulary of a subject such as science (Lang et.al, 2006). Wilson and Emmorey (1997, 1998) stated that performance drops when to-be-remembered signs have similar hand shapes or are temporally long, or when subjects are required to perform a repetitive movement with their hands, such as fingerspelling. While fingerspelling has been proven to serve a critical link in word learning linking print with sign (Hapstonstall-Nykaza and Schick, 2007), fingerspelling scientific terms alone does not provide students with the opportunity to build a strong scientific understanding especially when there is a lack of agreed-upon scientific ASL signs. Given this dilemma, research by Lang et al. (2006) mentions that “single signs may benefit students by understanding certain concepts.”

Yore (2000) explored the metacognitive awareness of science reading in middle-year students (grades 4-8) and found that they had trouble with fully comprehending the text in English. With explicit comprehension instruction in meaning making through ASL, students improved their metacognitive awareness and science reading comprehension (Yore, 2000). As a student teacher, I noticed students are challenged to think critically in English but not in ASL. Students need to raise their conversation levels to more complex discourse in ASL.

The Next Generation Science Standards will be an opportunity to implement critical thinking skills in ASL. Deaf students can benefit from inquiry science, which is based upon

active students-centered learning that begins with a cycle fueled by a question that are fueled by their natural curiosities that are strengthened with scientific understanding through experiments and formation of ideas (Bresser and Fargason, 2013). Wang's (2011) empirical study on science education for Deaf and hard of hearing students revealed that integration of inquiry science with linguistic and metacognitive analyses did promote development of higher order thinking in Deaf and hard of hearing students while traditional text-based science instruction did not as it predominantly focuses upon English text, a problem for students with disabilities as many of whom are struggling readers. With inquiry science, students benefit higher order thinking skills from what Gega (1991) mentioned, students being given appropriate instructional strategies to develop scientific literacy in which they "organize their thinking into concepts, generalizations, sequences and other patterns that broaden and keeping their understanding throughout their lives (McIntosh et. al, 1994).

Finally, the third reason for why ASL is not promoted in science learning, is the lack of encouragement on using ASL on a discourse level to promote collaboration amongst Deaf scientists in discussing scientific ideas. This curriculum aims at providing the space for Deaf collaboration to criticize, analyze and synthesize scientific information through feedback from each other. To engage students in critical thinking, small group discussions formerly known as jigsaw discussions will provide a space for an in-depth analysis in using ASL to convey scientific ideas through means of using classifiers, use of space, and vocabulary. Students will gain collaborative skills through opportunities in which they analyze and apply ASL structures to appropriately convey scientific ideas. Collaborative sessions also allow students to gain ability of facilitating discussions in which different viewpoints may occur, a skill that is necessary for the real world.

After this curriculum, my hope is that students will be interested in the STEM job market. Only “9% of Deaf individuals receive a bachelor’s degree in a science related field” (Garberoglio et al., 2017) which is largely attributed the “struggle to attain STEM bachelor’s degrees because of their reading comprehension of STEM materials” (Trussell et al, 2018). It is our duty as educators to constantly empower our students with opportunities to develop academic language development using ASL rather than imposing expectations that they are able to acquire academic language ability merely based upon their social ASL language skills. Teachers have the responsibility to model academic language using ASL skills that builds on the students’ social language. Many teachers do not have the academic language they need in order to model and develop academic language using ASL. It is our moral obligation as educators to reinvent the wheel on our pedagogical practices.

The purpose of this curriculum is to promote an appreciation for scientific ideas in American Sign Language and to maximize imagery to help comprehension. With ASL as the foundational language of instruction, Deaf and hard of hearing students will be able to describe the functions and relationship of scientific concepts using ASL parameters and visual imagery. As students exchange their understanding of science using ASL, students will then transfer that knowledge in navigating English expository texts improving their scientific literacy in both languages.

Linguistic, Pedagogical and Sociocultural Rationale for a Bilingual Approach

Linguistic

With the rapid change in globalization and the world being more bilingual than not, in Deaf education in America, American Sign Language has been perceived as a problem “interfering” with learning English. Studies have shown the opposite, learning ASL fosters

English literacy development (Marschark, 2001; Strong & Prinz, 1997; Padden & Ramsey, 2000). Having visual access to sign language protects Deaf students from language deprivation which in turn will impact cognitive development. It is their right to be exposed visually to a natural sign language as early as possible.

Deaf education requires an effective balanced bilingual education where linguistic interdependence is in place. Cummins (1979) emphasized the need for proficiency in one language as foundation to acquiring a second language. Although there is no written form of ASL, mapping strategies and associative learning can take place between ASL and English (Hoffmeister & Caldwell-Harris, 2014). Studies show that students who had developed strong ASL proficiency had a stronger likelihood of developing sufficient English literacy skills (Strong and Prinz, 1998). In addition, as per Corina and Singleton (2011) mentioned that “exposure to a visually based culture and language might promote greater flexibility and resilience in the mental faculties processing language and social information” (as cited in Silvestri and Wang, 2018). For that matter, my goal is to provide a rich Science environment where ASL is the language of instruction, a necessary resource during STEM instruction. It is time to refocus our energies on content knowledge rather than focus on developing spoken language, a dominant role in Deaf education held for far too long and most likely the cause for students’ low academic achievements. This is what Humphries (2013) calls “ASL schooling” where ASL is a full-fledged accessible language of instruction. The medical and educational perspective of Deafness is now replaced with a more positive outlook of Deafness where American Sign Language provides linguistic, cultural, social, and cognitive development (Allen, 2002).

Pedagogical

The primary goal in bilingual classrooms is to strengthen students' proficiency in both English and ASL using bilingual strategies. Bilingual tools such as chaining, code-switching, chunking, and fingerspelling will help Deaf students become more empowered bilinguals and able to navigate the world on their own. Garcia and Baetens Beardsmore (2009) once mentioned that bilingual individuals do not always have the same skill set in two languages. We will have students who may have different English or ASL language proficiencies and the goal is to become proficient in both. Chaining is a technique for emphasizing and highlighting the connection between English text and ASL especially when new vocabulary is introduced (Humphries and MacDougall, 2000). A scientific concept will be fingerspelled then shown the ASL sign equivalent then pointed to the printed English word. The instructor will connect the printed or written word in the text with the ASL signs. When Deaf students are given practice using chaining strategies, their comprehension of both languages improve in which choice of signs are based upon context of English words in a sentence supported by visual representations in stories. Hapstonstall-Nykaza and Schick (2007) found that Deaf children who incorporated more fingerspelling in their daily and academic language were able to transfer over the language capacity into written English through a process called fast-mapping.

The use of scaffolding is a critical strategy to provide additional support through reinforcing language development (Galotti, 2017). Visual supports in the classroom, such as graphic organizers, image representations, captioned movies/videos and use of technology in the classroom (e.g. Promethean Boards, Flipcharts, VL2 Storybooks) are an essential tool for young Deaf children to help them connect imagery with concepts in English and ASL. Other scaffolding strategies is through peer discussions and use of concept mapping. Peer to peer

discussions are highly useful especially when an emergent language user is engaged with a native language user. The use of concept mapping in understanding scientific concepts “stress causality, functionality, application, and hierarchical relationships” (Yore, 2000) which may establish students’ foundation in presenting scientific concepts through ASL. Thus, both individual foster each other’s academic and language understanding.

In response to the Next Generation Science Standards, many science education programs are adopting an inquiry-based instruction approach which promotes “active, student-centered learning in which they make observations, predictions, asking questions and constructing explanations of natural phenomena by communicating their ideas to others” (Bresser and Fargason, 2013). In summation, science education has shifted from “knowing that” to “knowing how”. Wang (2011) has addressed how little research has been done on how to make science accessible for learners who have language and/or reading difficulties can be done through inquiry science. Wang also recognizes that “traditional text-based science instruction is obtained through printed texts” which is problematic for many Deaf students who are struggling readers. An approach to this dilemma can be remediated through introduction of “performance literacy”. Performance literacy is defined as captured information through speech and/or signing per Tyner’s (1998) framework addressed in Wang’s (2011) scholarly article. This reconceptualization encourages students to embrace and delve into strengthening their academic ASL skills as opposed to print literacy. Academic ASL skills involves the use of space, metaphorical analogies, classifiers, fingerspelling for labeling to explain scientific concepts clearly.

Sociocultural

The culture the child grows up in contributes to internalizing language within through socialization. Vygotsky emphasizes the importance of language acquisition through social interaction (Galotti, 2017). Gauvain (2005) who states that children who have a sincere connection with adults, siblings, and peers will make their social interactions more meaningful, leading to an increase in their learning and memory (as cited in Galotti, 2017). Deaf children born to hearing parents may experience barriers in forming natural linguistic acquisitions (Schick, Marschark, and Spencer, 2006). Research has shown children who acquire ASL from their Deaf parents show similar vocabulary size with their hearing peers at the same age (Woll & Morgan, 2012). In fact, the use of ASL has been documented to promote linguistic, communication, cognitive, academic and literacy development as well as social-emotional growth and identity formation (Nussbaum, 2012). While this accounts for 10% of Deaf children, 90% of Deaf children are born to hearing parents in which lack of resources and other constraints (e.g. sociocultural, financial, resources) may prevent parents from using American Sign Language with their child. This area of need has been recognized and undertaken by such organizations as Language Equality and Acquisition for Deaf Kids (LEAD-K).

Therefore, having Deaf teacher role models in the classroom becomes an inspiring way to encourage Deaf children to grow linguistically and reach content mastery. In a research synthesis on “Role Models as Facilitators of Social Capital for Deaf Individuals” (Cawthon et al., 2016) found that language development was “an important and freestanding developmental process that role models may play a role upon”. One study (Watkins et al, 1998) explicitly made the link between having role models with greater language gains, young children demonstrated greater language gains in both ASL and English expressive and receptive language when interacting

with role models. This study is essential in the early years for language impact to occur. Deaf role models are therefore a critical motivational strategy to increase language levels in future classrooms. Deaf role models serve as agents of empowerment for those Deaf youth who do not have access to such resources (Stanton-Salazar, 2011).

Areas of empowerment can range from language development, identity development, and psychosocial development. A given example on how role models play a role in this curriculum will entail involving students breaking down Marlon Kuntze's ASL video "How One Breathes." Using Kuntze's visual interpretation as a resource, students will learn to see how ASL can be structured academically into sharing an abundance of scientific knowledge through a deconstructing and constructing process. This curriculum will assist students to participate and evaluate science terms in ASL and explain phenomena in ASL to help them gain confidence in themselves as signers. Student empowerment motivates them and allows them to be in control of their own success both with language and content knowledge.

Review of Existing Research

With new implementation of Next Generation Science Standards (NGSS), science instruction uses a continuum from mostly textbook-teacher approach to student-centered classrooms. With a student-centered classroom, students are active in discovering answers and solutions to their scientific inquiries. They delve into the actual procedure a scientist would do by observing and describing objects, asking questions, acquiring knowledge and constructing their explanations to name a few. In addition, a student-centered classroom can have a "positive effect on student achievement" for those learning English as a second language. (Bresser and Fargason, 2013).

The standards integrate three dimensions of learning:

1. Science Disciplinary Core Ideas
2. Major Effective Practices
3. Cross Cutting Concepts

With these standards in place, “students develop important critical-thinking skills that will cultivate the great thinkers and innovators of tomorrow and promote a better educated public” (www.ngss.nsta.org). The integration all three dimensions will allow opportunities for authentic learning experiences that promote language development through content learning, as the dimensions of learning are in relation to one another. Through the process of inquiry science, students are able to achieve the NGSS standards through a cultivation of discussion within the classroom in their words.

Bresser & Fargason’s book, “Becoming Scientists” (2013) is an excellent guide for my curriculum on how to “integrate eight of the NGSS science and engineering practices that will allow underrepresented students in STEM, to become successful analytical thinkers”. These practices focus on developing critical thinking skills by asking questions, formulating thoughts and ideas through observations, constructing their explanations through data collection all while engaging in a continuous ongoing process on communicating information.

In addition to critical thinking skills, research by Wright (2010) has shown “discovery or inquiry-based science instruction is an effective means for helping English Language Learner (ELL) students, successfully learn science concepts and develop English language skills” (Bresser & Fargason, 2013). The emphasis on using language to learn science is an important factor in thinking about how to design this curriculum. For most Deaf students, they are learning English as their second language placing them in the same category as ELLs.

For deaf students who are learning content knowledge through English as their second language, Wang (2011) identified twelve different research journal publications centralized around science instruction for students who are Deaf and hard of hearing. While there are different forms of instructional strategies such as traditional text book approach to inquiry science; Wang identified five distinct studies which show the inquiry science approach was the most effective for Deaf students; “in a study by Stoddart and colleagues (2002) reviewed the integration of inquiry science with linguistic and metacognitive analyses and confirmed that science inquiry promotes the development of higher-order thinking skills in students who are Deaf or hard of hearing. One of the main problems found in Wang’s literature review was the challenging reading level of scientific materials that is not accommodating to the present reading level of many Deaf students. Wang (2011) cites, “it has been generally acknowledged that students who are Deaf or hard of hearing are at risk for reading difficulties and that sometimes the reading difficulties are coincident with overall language deficits.” Hence, Wang introduces the concept of blending “performance literacy” along with inquiry science. Performance Literacy is an accessible medium for students to access information that has been typically available in print. With performance literacy, students “can be taught skills and/or have numerous opportunities to work with such captured information” for instance, synthesizing scientific concepts via ASL (Wang, 2011). When students are given opportunities for performance literacy, “(they) should be able to develop a level of thinking skill that commensurate with that of typical readers and writers working in the print mode” (Paul & Wang, 2012). There are several limitations to integration of performance-literacy and inquiry-based science education such as the dearth of constant science signs representations, not all students have a wealth of ASL skills, and the lack of “science information in performance literacy resources available to

educators (Wang, 2011). However, as educators we have to reinvent the wheel in achieving the ultimate goal for our students in which they are able to share their scientific understanding at a deeper level with the community.

While a blend of performance literacy and inquiry science is relatively new and powerful, the author is correct to believe that a lack of ASL curricula resources requires us as educators to actively be a part of the ever-growing STEM field. While there is a dearth of resources available, several resource centers are leading the charge in this field. For instance, ASL Clear online platform provided by the Learning Center for Research and Training at the Learning Center for the Deaf, in Framingham, Massachusetts is of critical importance. ASL Clear provides STEM related ASL vocabulary words, their definitions, and more importantly a sign that represents the concept along with different areas of focus in each STEM related category (Hoffmeister & Reis, 2015). Another resource, DeafTEC by Rochester Institute of Technology, developed a STEM ASL Dictionary to address the “result of signs lacking both semantic accuracy and specificity as teachers and tutors are forced to create technical signs for words or concepts ad hoc” (www.deaftec.org). Although the dictionary itself is still a work in process, it provides classrooms with the opportunity interact with this tool to foster effective scientific discourse in the classroom.

Previous theses focused upon inquiry science, written by former graduates, Elena Mayer (2017), Megan Hicks (2014) and Cynthia Bronson (2007). Elena Mayer’s “Bilingual STREAM: Inquiry of Water through Science and Engineering” (2017) thesis focused upon a bilingual ASL/English science inquiry curriculum on Water through Science and Engineering Practices. Megan Hicks’ (2014) curriculum “Going Green- an Environmental Studies Curriculum for Deaf Learners” had her students develop “Going Green” posters to educate others through a series of

critical thinking units involving pollution. Cynthia Bronson's (2007) curriculum titled "Connecting Science to Terra Firma: Inquiry Based Applications in Life Science for Deaf Students" focused upon utilizing inquiry while students "developed and answered their own ecological questions" with an animal of their studies. In each of these curricula, respective teachers focused on increasing scientific content knowledge through bilingual strategies using class discourse through inquiry science. While these curricula have emphasized content area, these deaf teachers have no doubt used academic ASL to foster critical thinking and as a result, science inquiry has shown to be a success for Deaf students. I will carry on those critical thinking practices, with an emphasis on empowering students to analyze and create complex scientific concepts in ASL through using a bilingual guideline on expository texts. By using their curricula as a model for inquiry led curricula, I also hope to add to the context of what areas of imagery can our Deaf students bring to complex concepts in ASL through developing a successful bilingual framework with contributions from my students. This bilingual framework will serve as a preliminary guideline for decoding expository texts as seen in science textbooks into performance literacy examples recorded by my own students. With this process, students will be able to further deepen their understanding of scientific phenomena.

Key Learning Theories

The following learning theories support the aforementioned pedagogical approaches in supporting Deaf students within a bilingual/multicultural classroom through academic learning and empowerment. This curriculum uses three learning theories: Cummins' language interdependence, Vygotsky's sociocultural theory, Krashen's theory of comprehensible input, and Whole to Part Learning Theory. These four theories contribute to the planning of my lessons in consideration of underlying foundation in improving students' metacognition through a

whole-part-whole learning style that deconstructs expository texts. The whole-part-whole learning style stems from the bilingual framework guideline students will contribute towards measuring their academic ASL performance literacy regarding scientific content explanations. Below I will explain how each of the four learning theories will be apparent.

Cummins' Language Interdependence Hypothesis

Cummins' interdependence hypothesis is supported in this curriculum through using the students' first language (L1) to facilitate proficiency in acquisition of their second language (L2). This is done through using their L1 in class discussions about science content and analyzing the structure of academic ASL to produce clear explanations and descriptions of science concepts. By doing so, students are purposefully encouraged to think critically in turn strengthening their cognitive and academic skills. The analysis of ASL imagery will assist students in applying that knowledge to English text. Students will review expository texts in science textbooks in English and compare them to ASL structures. These expository texts are written in the students' L2. As students analyze expository texts, they will begin to consider how such abstract concepts may be interpreted into complex ASL. Through class discussions, students will contribute to an academic guideline that allows them to decipher such abstract concepts into ASL using a whole-part-whole method. By doing so, students are strengthening their meta-cognition skills in manipulating both languages to express such scientific concepts using performance literacy.

Vygotsky's Sociocultural Theory

Students acquire language through social interactions. This sociocultural view of learning is based upon Vygotsky's "zone of proximal development principle (as cited in Gibbons, 2015). The zone of proximal development targets scaffolding opportunities for the student looking at the child's areas of strengths as well as needs for improvement. These scaffolded opportunities in

inquiry science involve allowing students to engage in peer to peer discussions, using elaborate and comprehensive language to describe phenomena, and extracting information from visual supports for comprehension purposes. More importantly, students will integrate critical thinking skills in their conversations.

It is important to recognize that a Deaf classroom will include a wide variance in language proficiencies, whether it be in English or in ASL. Some Deaf students may be stronger in academic English and weaker in ASL likewise others may be stronger in academic ASL and weaker in English. Students are therefore given plenty of opportunities to develop their cognitive thinking strategies in both ASL and in English Strategic pairing for class demonstrations will not only empower Deaf students to use their strengths with their peers, but also to serve as an evaluative practice for teachers to determine their zone of proximal development. Secondly, teacher modeling and support as well as structured activities will provide the time and place to create a guideline for what an academic ASL rendition of scientific phenomena looks like. Through these instances, Vygotsky states that “social dialogue is gradually internalized...in other words, students learn how to think, not simply what to think” (see Gibbons, 2015).

Krashen’s Theory of Comprehensible Input

Krashen’s (1982) theory on comprehensible input states that in order for a child to acquire language, the input (i) the child receives must be slightly challenging (+1) and the child must be given opportunities to interact/practice with it. In a Deaf classroom, comprehensible input for each child differs due to various backgrounds (e.g. cultural and linguistic) each child brings to the classroom. Despite the sociocultural variation children may have at home, the accessible language for Deaf children is ASL. By capitalizing on the students’ current level of ability (i), the teacher must formulate opportunities to make language comprehensible such as

using bilingual techniques to bridge ASL and English and by providing intensive explanations of vocabulary terms in ASL. Language becomes comprehensible for learners with use of practical demonstrations, pictures/diagrams, realia or drawing on what students already know.

Comprehensible input alone is not sufficient, students must also be given opportunities to use the language themselves. As cited by Gibbons (2015), Merrill Swain (2000,2005) refers to this as “comprehensible output”. Through the process of creating a guideline to how to describe and explain a scientific phenomenon, students are encouraged to explore and investigate the meaning of English text, but also how may it be demonstrated using the right ASL signs. Swain continues to mention that students’ discourse languages becomes more comprehensible, coherent, and grammatically improved.

Whole to Part Learning Theory

With this curriculum, students will have the opportunity to create academic ASL media to demonstrate scientific understanding of the Human Body system through the whole-part-whole learning approach. ASL used in an academic setting differs from conversational ASL in the descriptive and expository nature that incorporating the whole-to-part learning process will allow the deaf learner to navigate his or her thinking from day to day experiences to a complete understanding of the content and attain higher order cognitive development skills (Swanson, R.A. & Law, B., 1993). While the theory itself describes its purpose, there are two distinct main purposes of the “whole”. The first “whole” focuses upon allowing the learner to build a mental representation of the idea that is applicable and familiar to them. Within the confines of the whole, students must understand individual “parts by” detailing the how, what and why and how it ties back to the “whole” - second whole. Through this approach, students do not only have a whole structure but also master each individual part but the relationship” (Swanson, R.A. & Law,

B., 1993). This learning theory paired along with student's current ability in ASL helps facilitate students understanding of scientific ideas through creating ASL media in two forms, descriptive and expository.

Curriculum Description

This curriculum entitled "Demonstrating Scientific Understanding of Body systems through ASL Imagery" has three goals in mind. The three goals of this curriculum focuses on increasing content knowledge in explaining how body systems are interdependent and influence our everyday life, creating ASL imagery of body systems using evidence to demonstrate body is a system of interacting subsystems, and creating ASL Videos in two different styles (descriptive and expository) explaining a body system using media. Scientific inquiry will take place through Units 1 and 2.

The Science content knowledge involves addressing the big picture which is the initiation of the body phenomena. The curriculum begins with a video addressing an applicable everyday question "What body systems are required when you run a mile?" This video will trigger students' prior knowledge and curiosities based upon their personal experiences. In this unit, students will build their content knowledge by being familiar with how cells become building blocks for tissues and organs; how each organ has a purpose for survival and how it plays a role within its subsystem and within a larger system as a whole. In the second unit, students become familiar with each of the 11 body systems by labeling organs involved in structure and explaining the functions of the system as well as explaining the interrelationships between subsystems within the human body. The third unit focuses on applying their content knowledge into real world situations in which they must consider the day to day decisions they make and the implications of those decisions upon their personal health.

Throughout the curriculum, students will have opportunities to think critically about what they are learning from the smallest body part to its larger framework. Their ability to describe and explain those concepts in American Sign Language will be evidence of their synthesizing skills. Given phenomena questions that will elicit further critical thinking about how subsystems play a role in themselves and as a whole. To make sure students are learning and digesting the material, students will become the expert by completing a Body System Project that is used throughout the curriculum. They will select one of the 11 body systems and be given the opportunity to explore, research and provide an explanation of their body system via creating two ASL videos, descriptive and expository form.

Given that this is a bilingual curriculum and students may lack the ability to use ASL on a discourse level, emphasis will be on promoting a rich demonstration of scientific understanding through ASL Text across three units. Students will also use media and resources to create a visually rich PowerPoint that explains the function of their body system, identifies major organs and provide a description of the structure and relationships to other subsystems within. Throughout this project, students will be expected to maintain a positive attitude towards collaboration, with respect and productivity.

To assess students' understanding of how organs work within the system and how subsystems interact with another subsystem, the Human Body Systems Project runs parallel with the Unit Breakdown within the curriculum. The first unit, titled "Investigating Phenomena", focuses on creating descriptive ASL Text with understanding of hierarchical building blocks within body systems, from basic to most complex structures. They are to label various parts and use descriptive elements to make them visually cohesive and refer to the "Descriptive ASL Rubric" for further details.

The second unit, titled “Becoming the Expert”, has four separate lessons in which students will uncover the interrelationships between distinctive body systems such as the circulatory and respiratory system and skeletal and muscular system to name a few. In addition, students also had the opportunity in creating an expository ASL text based upon body system students have chosen to present about in a Science Fair. The development of expository text is supported through the use of the “Expository ASL Rubric”.

The third unit, titled “Implications on Everyday Health”, focuses on uncovering how diseases implicate certain body systems. Students will research a specific disease that affects the body system they have chosen for their project. Students will apply what they know into consideration the everyday implications have upon our personal health specifically the body system they have become an expert within.

In the third unit, students will create a “blended” ASL Text (Descriptive + Expository) on their body system they have chosen to present to their peers at the end of the curriculum during the Science Fair. This unit will cover students understanding the implications on the human body when body systems do not function appropriately and also application of knowledge by identifying distinct organs and systems through a frog dissection.

As mentioned earlier, once the students completed the curriculum, students will have had the opportunity to use ASL on a discourse level by creating ASL Texts through both descriptive and expository forms. In Unit 1, students will have the opportunity to create a Descriptive ASL Text. A Descriptive ASL Text will emphasize a) space and location of signs to align with visual images/video, b) vocabulary specific supported by fingerspelling, c) clarification of big ideas compared to details, all while maintaining a consistent description that provides the viewer with a rich visualization and no room for ambiguity. In Unit 2, as the “experts” students will create

Expository ASL Texts. An expository ASL text, on the other hand, has unique elements: incorporation of descriptive ASL while maintaining a progressive timeline showing the process of the body system from beginning to end, including critical concepts unique to their body systems. Through the curriculum students undergo an understanding that using ASL in a creative approach allows them to understand abstract concepts concretely.

Evaluation Plan

One of the primary overarching goals throughout the curriculum is teaching Deaf students to not only use American Sign Language for communication but also to think critically within science subjects. The curriculum focuses on creating ASL imagery to display knowledge of body systems through two expressive forms: descriptive and expository ASL.

Since there are no national guidelines to what an ASL descriptive or expository texts looks like, this curriculum will gather qualitative data from students who watched a Deaf role model sign a scientific concept and adjust the guidelines for written English text to a more appropriate ASL based approach.

- A descriptive ASL text emphasizes ideas based on a) space and location of signs to align with visual images/video, b) vocabulary specific supported by fingerspelling, c) clarification of big ideas compared to details, all while maintaining a consistent description that provides the viewer with a rich visualization and no room for ambiguity.
- An expository ASL text, on the other hand, has extended elements: incorporation of descriptive ASL ideas in relation to concepts, for example the body system, its parts and how it functions from beginning to end is described within a progressive and sequential timeline. Students describe critical concepts and tie them within a

bigger picture understanding of a body system. Students use their feedback skills through a series of self-evaluations and reviewing their peers work before finalizing their submitted versions.

In the process of doing science inquiry, students will show their understanding of how body systems work and how essential knowing the interrelationships within systems and their respective functions. They will take advantage of visual media (graphs, videos and text) to strengthen explanations in ASL using correct classifiers, use of spatial grammar and connections between objects through movement. By communicating abstract scientific ideas with peers, reflecting upon the form and function of the content, carrying out experiments to describe or explain phenomena, making specific observations, and articulating the outcomes. Throughout the curriculum's three units and eight lessons, students will produce a variety of work products, both individual and collaborative and be evaluated qualitatively.

Students' work samples throughout the curriculum will be generated towards meeting the curriculum goals:

1. Increase content knowledge in explaining how body systems are interdependent and influence our everyday life.
2. Create ASL Imagery of body systems using evidence to demonstrate body is a system of interacting subsystems.
3. Create ASL Videos in two different styles (descriptive and expository) explaining a body system using media.

In order to ensure that the curriculum goals were met, students' work samples will be collected through video samples, PowerPoint slides, and writing samples seen in their science journals.

Students will also be given a project guideline checklist, rubrics for Descriptive and Expository ASL, and a rubric for their presentation.

For the overall content knowledge, to draw out prior knowledge from the students, students will be asked about a phenomenon, “What does it take to run a mile successfully?” This pretest activity determines how much they know about the human body systems and helps the teacher identify general areas of strengths and weaknesses. Their initial responses will be recorded on a paper in writing. At the end of the curriculum, the same question will be asked for students to reflect on everything they’ve learned and to incorporate imagery, good use of spatial grammar and correct classifiers. Their signed videotaped pre and post responses will be compared and analyzed to determine if they have demonstrated critical thinking, use of imagery and making connections between concepts.

Throughout the curriculum English will be a part of their day to day learning but the focus of this curriculum is to strengthen ASL academic discourse. Students will have been given a “Human Body Systems Project” where they research and present about a body system to their peers describing its structure, function and relevance to our lives.

Imagery in English often involves metaphors, similes and personification. These strategies have often been helpful in visualizing concepts and stories. In ASL such imagery falls under the category of “depiction”, first researched by Dudis (2007), “an aspect of ASL, which is the iconic representation of events, settings and objects” (Thumann, 2014). While there are different elements involved in depiction this curriculum focuses upon the use of classifiers, constructive action, and sign choice. These strategies are also helpful to Deaf students to comprehend the complex phenomena. Evidence of imagery will be shown through rubrics. The first collection of data will consist of signing a picture of an organ system and being recorded on

video, then to reproduce in drawing what was signed by a peer. The last video will be collected to look for imagery within descriptive and expository ASL text. Quality of the imagery will be assessed through the use of a rubric.

Students will also be given the opportunity to use ASL creatively in two forms, descriptive and expository. Unlike English writing standards for descriptive and expository essay, ASL takes into consideration the spatial relationships between ideas, use of classifiers to describe the characteristics of organs, fingerspelling English labels in a cohesive narrative video where viewers can visualize how the body system functions. Leading up to this presentation, students collaborated in class discussions in ASL sharing their ideas, observations and performance feedback based on their peers' videos, which allows students to build stronger content knowledge and analytical of their ASL production in creating abstract concepts into visual ideas. In English, they will write their hypotheses, observations, findings, and newly learned content material that is relevant to a distinctive body system.

Implementation

School Context

This curriculum was implemented during my student teaching placement in a 7th grade classroom at a residential suburban school serving approximately 450 students. Some students are housed on campus while others commute from nearby areas of the county and outside areas as well. The campus has a Parent Infant Program, Early Childhood Education center, elementary school, middle school, high school, Alternative Curriculum Education and Career Technology Education in various buildings. At the middle school, there are eight teachers that serve through sixth and eighth grade. The school's philosophy follows an ASL and English bilingual approach.

Class Context

Throughout the day, my Cooperating Science Teachers teaches Period 1 through 6 periods lasting approximately 55 minutes with 7th Period being prep time. The three types of science classes are: Earth Science, Life Science and Physical Science taught from the 6th through 8th grade level respectively. All students are expected to follow class routines and expectations as outlined in the course syllabus. Class routines entail showing up to class prepared with science textbook as well as a book to read for enjoyment. During Wednesdays, students partake in D.E.A.R, a literacy program campus-wide, in which students drop everything and read silently for 20 minutes. Classroom expectations are posted on classroom walls, and for any misconduct, students are to record in a “Behavior Binder” describing which of the following class expectations they did not follow.

Classroom layout involves students table in a “U-Shape” formation facing the whiteboard and a high-rise desk in the back of the classroom near the book library. Teacher uses a lot of effective bilingual strategies such as embedding visuals within her slides, use of technology (i.e. iPads, Document Camera, Projector), and chaining and fingerspelling. My cooperating teacher introduces science passages by signing aloud as well as providing further descriptive information on newly introduced vocabulary. To elaborate on science ideas, she promotes the use of “Thinking Maps” which are categorized into eight different types. Each type serves a distinctive purpose such as comparing and contrasting (Double Bubble Map), classifying main ideas and details (Tree Map).

My curriculum was carried out within the 7th grade Life Science group. Student demographics range between 13 and 14 years of age. All of the students’ families sign or are

ASL native users. Interestingly enough, all four students have Deaf parents. To preserve confidentiality, I use pseudonyms for all students involved in this curriculum.

The students are described as following:

1. Student A: Caucasian, Intermediate American Sign Language (ASL) and Advanced English user, uses ASL at home, Deaf parents, clever bookworm with advanced language skills. Easily gets bored and requires challenge and prompting to be motivated.
2. Student B: Latino, Intermediate ASL and Intermediate English User, uses ASL at home, Deaf parents, mature student who is involved with student council and is an active listener.
3. Student C: Latino, Intermediate ASL and English user, uses ASL at home, Deaf mother, active listener.
4. Student D: Caucasian, Advance ASL and Intermediate English User, uses ASL at home, Deaf parents, mature student who is involved with student council and is an active listener.

Curriculum Implementation

UNIT 1 - LESSON 1: “Investigating Human Body Systems Phenomena”

Reflection: April 29, 2019 (52 minutes)

This opening lesson was taught on April 29, 2019 for the entire 52-minute class period with four distinct parts: pre-assessment, phenomena question, introduction of Human Body Systems and an exit slip. Prior to the launch of this lesson, I explained to the students that they would be asked to do a pre-assessment document regarding the body systems that will allow me to see what they know and areas they could learn from. They were asked to identify the body system from a given diagram, describe its purpose as well as identifying other body systems it is

interrelated with. During this process, I stressed that this document is not graded however, it would be given again at the end of the curriculum to see their growth in knowledge in regard to human body systems. Before handing out the document, I showed what the document would look like via Google Slides and signed aloud directions prior to handing the pre-assessment form out. While I found this to help the students get a general understanding of what was expected, there were a couple of students who needed additional support with writing their responses through American Sign Language responses initially when further prompted.

After collecting the pre-assessment forms, I started the phenomena discussion by asking students what they thought of “running” and what body systems are required for us to run successfully. The responses I received from the class discussion ranged from: muscles, bones, breathing, and the brain. To elicit further responses, I asked the students what allows us to be able to quickly change our directions if we see a hole within the ground. Students immediately said, “brain signals”. While their responses were accurate, it also revealed that there will be many opportunities for us to uncover how different body systems play a role in our bodies.

Afterwards, we discussed about the Human Body Systems Project that would be taking place throughout the next several weeks. I provided them an individual outline with expectations as well as projecting it on the wall via Google Slides. Many questions regarding the project were raised throughout in regard to due dates of certain aspects as well as time allotted for them to work in class.

Before completing the lesson, I gave my students an exit slip “Which Comes First”, which assessed their prior knowledge of complexity. Students were asked to order pictures from least complex to most complex: cell, tissue, organ, and body system. All four students were able

to identify and explain that a cell is the least complex because it is the first and smallest structure to form; and explain that the human body is the most complex because it is the last thing to form.

The lesson objective was met, as students were able to state their knowledge in the importance of body systems to the body and body systems involved with running, as measured by in class-discussions and pre-assessment entries.

Even though it was a successful lesson in establishing expectations as a class for the remainder of the curriculum, in reflection, I realized there were several things that I could have done differently throughout the lesson. Prior to this lesson, the students had just finished a month-long curriculum titled “Hands Off Tobacco and E-Cigarettes” in which they learned the harms associated with tobacco use. Given activities throughout the curriculum, students were exposed to different body systems that were harmed through tobacco use. I could have tapped their prior knowledge to transfer what they knew to the launch of my curriculum. This pedagogical strategy would have provided a nice jump-start to their pre-assessment assignment in which they were to write/sign a response explaining how body systems work and influence their everyday lives. In addition, while students were naturally inquisitive about the human body and Human Body Project, there were many questions throughout the lesson about the project, which interfered with teaching the lesson; my suggestion to alleviate their fears and concerns, would be to hand out blank index cards for students to write their questions down and give to the teacher after class for clarification and review.

UNIT 1 - “Descriptive ASL: A Mini Lesson”

Reflection: April 30, 2019 (52 minutes)

This lesson took place on April 30th for a full 52 minutes. Three of four students were present during this activity: Student A, Student C, and Student D. Initially this lesson was only intended to be 20 minutes, however at the beginning of the lesson, I realized that the lesson would be crucial for my students, culturally and personally based on their body language and responses. I opened this lesson by asking them what “Descriptive ASL” meant to them and how they use ASL in a descriptive manner. My students made connections to describing people based on their body features, describing characters and scenes within stories or personal experiences. Student A mentioned depiction and classifiers in his response. Student C mentioned facial expressions are crucial as well as role shifting. Student D mentioned the importance of sequencing, spatial awareness and classifiers.

Thereafter, I introduced a Descriptive ASL Rubric that was categorized based on: classifiers, spatial awareness, imagery and vocabulary. Student A and D were able to answer what classifiers, spatial awareness and imagery meant to them and shared examples through their responses. I then showed them a short animated clip on YouTube “The Power of Union through Strength” in which three different scenarios were shown: Scenario A: a single crab calls for a group of crabs to form together and protect one another against a sea gull; Scenario B: An army of ants working together against an anteater; and Scenario C: a waddle of penguins working together against an orca on top of an iceberg. Students were then asked to convey each scenario through ASL. Through observing the student’s interpretations, I asked them “If they felt they were adept in ASL”. Student A felt his ASL skills were not strong nor weak, Student C felt her ASL skills were not strong, and Student D felt her ASL skills were very strong.

As a teacher, I assured the students that this activity was not about being skilled in ASL or not, however it was about seeing ASL as a language of power and its ability to convey ideas through a visually descriptive approach in a way where spoken languages such as English cannot. Thus, their Human Body Systems Project will empower them to share their knowledge about their respective body systems through creation of an ASL video.

Students participated in a descriptive ASL activity in which they paired with a partner who drew an image based on the descriptive features of an image that were provided. After this activity students, shared why it's important to be descriptive and clear as possible via a writing slip. Student A's response was "If you don't be clear, the viewers will not understand. Now, being descriptive and clear, the viewers will understand." Student's C response was "If you sign not clear/unclear that people will confusing/messing up/hard to follow/hard to listen." Student D's response was "will never understand if not clear."

The lesson objective and curriculum goal were to get them to incorporate elements of classifiers, spatial awareness, imagery and vocabulary by creating a descriptive ASL video based on a picture of their body system. Students created a descriptive ASL video of the picture of their body system as measured on a videotaped response. Student A's video response revealed that an image of a muscle attached to a bone via tendon, was described using a "claw" shaped classifier in an outer motion, which showed correct spatial awareness. Student B's response showed the nervous system to be described as two "claw" shaped classifiers to resemble the brain with "F HANDSHAPE" in a downward motion to resemble the spinal cord. Student C, who received an image of the digestive system, described the pathway of digestive system using "index" finger tracing pathway on own body including digestive tracts. Student D, who received an image of the circulatory system (systematic and pulmonary pathways), described two different bodies

along with “color” and description of pathways using “open hand” swarming body from arms to legs and face. Student D’s response showed a misconception in which two separate circuits actually lie within a single body, however, used the most classifiers and very accurate spatial awareness in her video description. Interestingly enough, fingerspelling was not used more than once in their video descriptions. The lesson objective and curriculum goal was met as students created a descriptive ASL video of their body system as measured on a videotaped response.

UNIT 1 - LESSON 2 “Respiratory, Circulatory and Lymphatic System and its Interrelationships”

Reflection: May 1, 2019 - May 6, 2019 (52-minute class periods) (104 minutes total)

This lesson took place on May 1st and ended on May 6th with time in between for students to work on their Human Body Systems Project. Prior to the lesson, I accounted for student’s experiences with the respiratory and circulatory system earlier in the month of April as they were learning the harmful effects of tobacco. I made some changes to the lesson plan by implementing activities that involved student body movement that would allow them to develop concrete connections to the systems involved in this lesson. Also, due to time constraints, the lymphatic system was not introduced nor any activities regarding the system were mentioned at any point throughout the lesson being taught.

Unit 1, Lesson 2, Session 1 - May 1, 2019 (52 minutes)

The introduction of the respiratory system began with an in-class activity involving a question posed to the class: “What factors might affect the volume of air a person can exhale?”. Students were given a single balloon in which they blew into and asked to find the circumference using a tape measure in centimeters. After measuring the two attempts, students then found the average of the two measurements and compared with the class. I closely observed the activity and cleared some misconceptions regarding the measurement of the balloon’s circumference as

well as finding the average through demonstrations. For future reference, I would establish a time limit and expectations in advance as students were still fidgeting around with the balloons after they have shared their measurements and averages.

After a while of managing to get ahold of student's attention, we began to discuss the question posed earlier in the activity. Student's signed responses towards the question "What factors might affect the volume of air a person can exhale?" varied among class discussion. Student A's response included "exercise, breath control, and smallness of lungs (referring to lower averages)". Student B's response was "averages depend on the size of lungs, some small and some large." Student C's response included an interesting perspective, "skinnier people in class have lower average, fatter people in class have a higher average". Student D's response was similar to Student's C with the addition of "ability to take in a lot of air". To expand further on their responses, I asked them "what the outcome would be if an individual with smoker's lungs would be", they all responded with "smaller average because lungs are damaged." Given their responses, I began to further assess their knowledge about the respiratory system using their prior learning experiences in the tobacco curriculum as well as using a 3B Torso Dummy Model to show the structure of the respiratory system. Students were all able to identify the lungs, however, were not able to identify other parts of the respiratory system such as the trachea or bronchus. This prompted me to introduce a video to the students that explained the respiratory pathway.

Throughout the lesson, I noticed the class participation came mostly from two students, Students A and D who hence, Students B and C, do not have opportunities to share their responses. I started developing a response to students A and D, "I appreciate your enthusiasm, let's provide an opportunity for all of our classmates to learn and respond equally." I felt it was

imperative to mention this as students are able to regulate and acknowledge that other peers may need extra time to respond to questions posed in the classroom. In consideration of descriptive ASL responses from the students, they lacked a cohesive relationship between the different parts of the respiratory system and the pathway in a sequential manner. Therefore, an emphasis on connecting ideas and parts together in a sequential fashion is needed. This lesson would be continued again the following day.

Unit 1, Lesson 2, Session 2 - May 2, 2019 (52 minutes)

Science class today was a continuation of the respiratory system and giving students time to work on their research projects. Students were asked to recall the respiratory system pathway in a sequential manner form. None of the students were able to recall in a sequential manner however, using their responses, I listed the distinct parts on the whiteboard: mouth, larynx, trachea, bronchus, lungs, bronchioles and alveoli. Student B mentioned “the video from yesterday had good visuals but it was hard to understand.” Using Student B’s statement, I showed them another video, this time in ASL “How One Breathes” by Marlon Kuntze. After playing the video, I handed out blank index cards and asked students “What was clear about the Respiratory video in ASL? What did you like?” Students wrote their responses and shared their responses in class. Although they all felt it helped them understand the respiratory system in depth, their responses also revealed. Student D’s response in class was “I liked the video although he was not very clear. He did not clearly explain how air goes into the lungs. Also, air goes into the blood. How is that possible?” I quickly realized that there was still some confusion how the respiratory system works closely with the circulatory system despite the signer in the video clearly explaining oxygen enters red blood cells as they make their way through the body. Student C said, “The story about the lungs was clear. I understood what was going on inside of

the lungs.” This was a very interesting moment as student C and D both have opposing comfort levels using American Sign Language, one being less confident than the latter.

After showing the video, I demonstrated how the lungs work by providing the students with a miniature model using water bottles and balloons. Prior to handing out the models, I asked the students what the expectations were when receiving the models, the responses I got from them were “don’t play with models, take turns and follow the rules and directions.” After modeling how the model works with all of the students watching, students then had the opportunity to apply their knowledge between the relationships of the lungs and diaphragm through a video recording.

Students’ signing ability varied in this activity as supported with students’ personal statements and presentation (e.g. use of classifiers and use of space). Student A demonstrated appropriate use of classifiers and space to demonstrate two lungs and its structural changes as an individual inhales and exhales. Interestingly enough, Student A signing style was more sequential and concise with very little elaboration on details.

Student B also demonstrated appropriate use of classifiers and space when describing the structure of the lungs, however when asked about the structure of the lung during an “inhalation” phase, students demonstrated the ribs expanding with use of “breathing” sign instead of “C-shaped” classifiers to resemble lungs being filled with air. This was a slight cognitive challenge demonstrated that was later corrected through class discussion using a visual representation model.

Student C showed the same misconception as Student B through appropriate use of classifiers and shape to describe structure of lungs however, minimal description of breathing procedure was provided. Her signed response on breathing applied to the movement of rib cage.

Referring back to the descriptive ASL mini lesson, student C shared that she was not confident in her signing ability.

Student D, compared to the three other students, showed a stronger signing ability with in-depth description of the lung structure as well as volume in the lungs when breathing through appropriate use of classifiers. Student D also described air pathway leading into two lungs. Her confidence in presenting ideas in ASL is very recognizable.

Students were quickly engaged and applied their knowledge through visual representations by making the connection once “the balloon fills with air as I pull on the diaphragm and when I let go, the balloon deflates like our lungs when we breathe out”. This measured their ability to use models to deepen their understanding of how the lungs work. Students were given 20 minutes at the end of the lesson to work on their Human Body Systems project.

Unit 1, Lesson 2 - Session 3 - May 3, 2019 (52 minutes)

Today, we introduced the circulatory system and interrelationship with all of the other body systems. We began the lesson as a class with an activity that helped students understand the purpose of the circulatory system as well as its interrelationship with the respiratory system through total physical response learning. In this activity, three separate squares were taped on the floor; each square was labeled “lungs”, “heart”, and “body” respectively. Within each square, there were blue and red construction paper squares (1” x 1”) that resembled oxygenated and deoxygenated blood. During this process, there was a lot of confusion as to which squares, they were to pick up and where to begin. I showed the students a photo of the circulatory system that was outlined with blue and red pathways. I asked the students what they thought the colors meant. Student B said the squares were blood cells because the heart pumps blood. Adding on

Student B's response, Student D, said that the red squares represented red blood cells which were rich in oxygen, meaning cells carried high amount of oxygen, while blue squares meant blood cells were low in oxygen. Student A added that low oxygen blood cells are called D-E-O-X-Y-G-E-N-A-T-E-D blood cells. After students have shared their responses, I verified their responses by showing two distinct pathways within the circulatory system, red and blue and how it applied to the activity.

Leading back to the activity, students followed the flashing of classroom lights as they began at the lungs by picking up red squares, moving towards the heart and then the rest of the body respectively as each flick of switch occurred. Once students reached the body, they picked up blue squares (deoxygenated blood) and resumed back to the heart and lungs. Students did the same procedure for two minutes. This activity helped visualize the relationship for all of the students as it became applicable for them. Interestingly enough, students were able to visualize the relationship of the respiratory system and the circulatory system by applying their knowledge of the different colored blood cells. In a class discussion, students demonstrated their understanding that as we breathe in, red blood cells are carried to the body while blue blood cells are carried back and escape through breathing outwards.

An important observation that was made through this activity was the lack of fingerspelling in important concepts: O-X-Y-G-E-N-A-T-E-D or D-E-O-X-Y-G-E-N-A-T-E-D blood cell. This is a crucial aspect of presenting scientific understanding as students are able to explain how blood cells transition from one state to another as the body receives oxygen. Students needed to be prompted when they used red squares and blue squares to explain the activity. This prompt helped students develop appropriate use of scientific terminology thus building stronger understanding behind the purpose of the activity.

Unit 1, Lesson 2- Session 4 - May 6, 2019 (52 minutes)

The fourth and final session consisted of finishing up the circulatory system and applying its interrelationship with the respiratory system with creation of an ASL video. Before leading up to the ASL video activity at the end of class, students discussed in depth on the two circulatory loops: pulmonary and systematic. The description of these loops was provided on a handout and discussed in class. The pulmonary loop involves exchanging of gases (oxygen and carbon dioxide) through the alveoli. The systemic loop involves pumping blood to the rest of the body. We discussed about the different types of vessels in which blood flows by arranging them from their sizes and functions: artery, vein, and capillary. The three structures were explicitly differentiated through use of classifier showing variation of diameter in respect to the pathway. All of the students were able to identify the purpose of artery is to pump blood into the body. Students responses revealed a misconception between veins and capillaries as they referred to the veins having a smaller diameter opposed to the capillary, hence wrong classifier use. To clear this misconception, I asked the students to refer back to the diagram and tell me which had a smaller opening.

Another misconception that the students had was the role of the capillary. Students described the capillary as a single function in which oxygen enters the body only, whereas transmission of both gases, carbon dioxide and oxygen, are exchanged. I cleared up this misconception by applying a real-life experience using a guard and a crosswalk. I explained to the student that the capillaries' relationship is similar to that of a guard and a crosswalk. The role of the capillaries is to separate oxygen and carbon dioxide into their roles. Oxygen goes into our bodies, as carbon dioxide escapes through our breathing. I found that providing an applicable and concrete example to the students allowed them to understand the role of the capillaries.

In this lesson, I also introduced the idea of “ASL Sequential Markers in ASL.” I asked the students what they thought the word “sequential marker” meant. Student A mentioned, “the word sequential means in sequence, like first, second, third.” Building off on his response, I asked the class if they ever used those terms with their peers when explaining a story or situation that happened to them. I asked the students if they shared their stories in a sequential manner or in an unorganized sequence? Student D responded, “If stories shared are unorganized, the person watching will be lost and have lots of questions.” Student C added, “Stories should be told in order.” I proceeded with introducing an activity to the student that would have them create an ASL video answering the following prompt “Pretend you are a red blood cell and you have reached the heart. Describe as you have traveled through the different types of blood vessels as you are making your way through the body.” After students completed the assignment, they proceeded to work on their projects for 15 minutes. (Add reflection of student performance)

After the lesson, I discussed ideas for future improvements with Dr. Gabrielle Jones, my professor from UCSD, who observed that day. Throughout this lesson I realized a lot of things could be emphasized.

- Expand on the lesson by introducing a “Flow Map” to help students record and see how blood cells carry oxygen and carbon dioxide while the circulatory and respiratory system is functioning.
- Consider student’s ASL videos as assessment tool showing their level of comprehension and misconceptions as they perform their videos
- Recognize ASL confidence levels and how it plays a role in students' ability to convey ideas through language play

- Decision based on time constraints, other body systems will be covered in mini lab stations to allow students an opportunity to learn about other systems while building a foundation of ASL in descriptive and expository manner
- Creation of ASL video in descriptive and expository manner will be based upon the circulatory and respiratory system as it will provide a single focus to measure growth

Reflection: May 9th, 2019 (52-minute class period)

After consideration of student's performance and misconceptions from the previous lesson on May 6th specifically the direction of flow and object handling. Students showed intermittent ideas that did not occur in a sequential manner when describing a single blood cell traveling through the circulatory system. In addition, Student D's initial performance also revealed misconception of a single blood cell traveling in two separate pathways at once. With these instances, I quickly realized that the students needed a concrete whole-part-whole approach in which they can transfer their knowledge of particular details and apply them as a whole. In today's lesson plan initially was to provide students with an opportunity to use Thinking Maps to strengthen their understanding of the interrelationship between the circulatory and respiratory system. There is a total of eight different types of Thinking Maps which allow students to visualize abstract thoughts through writing concrete ideas. In this lesson, students would use a Flow Map which allows them to explain the processes the respiratory system and circulatory system goes through in a sequential manner.

This lesson was held off as there was a last-minute emergency with two other science teachers which resulted in both classes joining my class. Instead, students were exposed to "Body Worlds Exhibit", a museum that specializes in "informing visitors about anatomy, physiology, and health by viewing real human bodies preserved through plastination" (Body

World FAQ Website). A total of 19 students were exposed to different images throughout this class period that involved them recognizing and naming the different systems shown. Many students found the circulatory system fascinating as they recognized our faces are covered with blood vessels. Naturally, through this discussion there were many instances of students using classifiers to describe what they saw. One student used two “open hand” classifiers swarming all over the head to describe the vast difference of blood vessels found there as opposed to the rest of the body. Another student described the difference between the large and small intestine through variation of “C shaped” classifier to describe the diameter differences as well as the structural differences. One student described the structural make-up of the muscle to be bundles of fibers using interlocked hands to describe the contraction and elongation of muscle fibers. These little instances of creativity affirmed my beliefs that using ASL creatively allows students to demonstrate their scientific understanding. The use of fingers to represent the fibers is what allows the visual representation to be explicit therefore giving strength to ASL imagery.

Reflection: May 20, 2019 (Flow Map of Circulatory/Respiratory System + Sign Video)

This lesson was taught on May 20th, 2019 for 52 minutes. The reason for the large gap since the previous lesson is because we had IEP week from May 13th through May 17th in which students did not come to school during those days. This lesson was initially planned to be taught on May 6th, 2019. In this lesson, students created a Flow Map describing the process and relationship between the respiratory system and circulatory system. Students have had previous experience with this type of “Thinking Map” as there is a school wide encouragement of utilizing these maps to form concrete ideas from abstract concepts as well as language development. After students have completed the Flow Map, students filmed themselves explaining their flow map in ASL. Interestingly enough, I found individual student’s work to

show their comprehension as well as their signed samples although students had different ways of presenting their ideas.

Reflection: May 21st, 2019 (Students work on Project)

Given the time constraints of this curriculum, I allowed the students to work on their Human Body Systems project for the entire 52-minute class period. In this class period, students worked on creating a PowerPoint presentation compiling their research on a specific body system they were assigned to as well as creating ASL media examples explaining how their body systems work. Student A researched upon the Muscular System, Student B researched upon the Nervous System, Student C researched upon the Digestive system, and Student D researched the Circulatory system. Through this class period, I provided students with additional help to ensure they were meeting the requirements of the project per student checklist.

Reflection: May 22nd, 2019 (Presentation of Human Body Systems)

Students carried out their presentations on May 22nd, 2019 for 52 minutes. While students varied in length of presentation time and styles, students were recognized for their hard work and persistence in creating ASL imagery through media, especially with the time constraints of the curriculum and this being the first time ever students had the opportunity to share their ideas in this format. Students were evaluated using the Body Systems Presentation Rubric that was broken down into five categories: Science Content Knowledge, Visual Aid, Organization, Connections, and Clarity of Signing. The score, students could receive in each category ranged from one to four, lowest to highest respectively. Student A presented about the Muscular System, Student B presented about the Nervous System, Student C presented about the Digestive system, and Student D presented about the Circulatory system. After each student had presented, students were asked questions to clarify some misconceptions or areas that they may

have left uncovered. For instance, Student D was asked, “Why is it that our toes may become blue?” Student applied her scientific knowledge by mentioning our toes is the furthest away from the heart, which meant blood supply would be lower and that is also related to low oxygen levels.” Student A was asked the difference between involuntary and voluntary muscles and how it applies to our body. Student A responded, “the involuntary system functions on its own as we have no control over for instance, the heart and our digestion while we can control if we want to pick up a ball or write a paper.” Student B was asked, how does the nervous system remind her of a highway? Student B said, “The YouTube video showed me that messages are sent from the brain to our body at a really fast pace, and there are constantly many messages being sent to control the body to make sure it runs correctly.” Student C was asked what the difference between the large and small intestine were? Student C shared details how the small intestine absorbs food nutrients important for the body, and the large intestine is waste eventually sent out of the body when go to the bathroom.” From my observation and consideration to time constraints, students really demonstrated scientific understanding of their systems through their presentations. If I had an extra amount of time, students would also be able to research more in depth on scientific vocabulary related to their body system in which they could incorporate via fingerspelling in their ASL media creation.

Results of Evaluation

In the following section, curriculum goals were evaluated with the use of student’s progress through work samples. The goals of the curriculum were to:

1. Increase content knowledge in explaining how body systems are interdependent and influence our everyday life.

2. Create ASL imagery of body systems using evidence to demonstrate a body is a system of interacting subsystems.
3. Create ASL videos in two different styles (descriptive and expository) explaining a body system using media.

This section will show evidence to evaluate how goals were met in this curriculum.

1. Increase content knowledge in explaining how body systems are interdependent and influence our everyday life.

In order to measure student's knowledge behind the body systems and their interrelationships, students were given a pre-assessment form that was outlined by six distinct images of respective body systems in which students were to identify the system by its name, explaining its purpose as well as organs involved, and to explain what other systems were involved as well through written responses. Through teacher observations and student responses on the pre-assessment form, revealed a lot of misconceptions, especially the "interrelationships" among body systems as students believe body systems function on their own or do not work closely with others. Student responses were more sporadic than explanatory which could be influenced by numerous factors; time constraints and lack of depth of content in the time frame.

Throughout the curriculum, students were engaged in activities, pertaining distinctive human body systems, such as circulatory and respiratory systems. They researched their body systems for the Human Body Systems project during the assigned time. In many instances, students used previous classroom discussion with regards to tobacco prevention to demonstrate what they knew about the human body instead of showing it in the pre-assessment.

At the end of the curriculum, students presented their project to the classroom, explaining the significance of the body system through its functions and purpose via English print. Students

created an ASL video describing the system through the use of classifiers, spatial location and fingerspelling labels after explaining its concept. Students were measured using the Body Systems Presentation Rubric (see Rubric in Appendix A) and summatively assessed for Science Content Knowledge, Visual Aid, Organization, Connections, and Clarity of Signing. The rubric consisted of a scoring range from 1 to 4. A score of 4 means that the student demonstrated competency above grade standard level, while a score of 3 means that the student demonstrated competency at expected grade level. A score of 2 means that the student demonstrated competency but needed support, while a score of 1 means that the student struggled greatly and needed a lot of support. Score breakdown for the Presentation was:

Table 1: Breakdown of Students Presentation Scores

Student	Science Content Knowledge	Visual Aid	Organization	Connections	Clarity of Signing	Average	Total Score
A	4	4	4	3	3.5	3.7	18/20
B	3	4	3	4	3.5	3.5	17.5/20
C	3	4	3.5	3	3.5	3.4	17/20
D	3	4	4	3.5	3.5	3.7	18/20

After the four students presented their projects, students were given the same assessment (refer to Appendix A) post-curriculum. Students were measured using the Human Body Systems Assessment Rubric (see Rubric in Appendix A) and summatively assessed for Identification of System, Scientific Knowledge, and Summary. The rubric consisted of a scoring range from 1 to 4. A score of 4 means that the student demonstrated competency by identified and explained 5-6 body systems, while a score of 3 means that the student identified and explained 4-5 body systems. A score of 2 means that the student identified and explained 2-3 body systems, while a score of 1 means that the student struggled greatly and was only able to identify one body system. Comparing the pre-and-post assessments, all students showed an increase in knowledge

through their responses along with several areas of gaps that may be covered through one-on-one opportunities.

Table 2: Comparison of Pre and Post Assessment Scores

Student	Pre-Assessment Total Score	Post-Assessment Total Score	Score Difference
A	7.5	9.5	+2
B	8.5	9	+0.5
C	5	9	+4
D	4	9	+5

Based on the evidence presented, students are emerging in their increase of content knowledge explaining how body systems are interdependent and influence our everyday life, therefore goal 1 of the curriculum was met as students showed an increase in knowledge in the limited amount of time.

2. Create ASL imagery of body systems using evidence to demonstrate a body is a system of interacting subsystems.

Because this concept is a new idea captured by video samples of students explaining different body systems in ASL, I created a table that included screenshots from their videos and paired them with images to reflect students' development of ASL imagery. The following table provides an insight into ASL imagery that the students created naturally when given their first assignment in a descriptive ASL mini lesson. Prior to the video, students discussed the importance of classifiers to describe ideas, images and features. This was their first attempt in creating an ASL video explaining their body systems.

Table 3: Descriptive ASL Mini Lesson ASL Imagery Examples

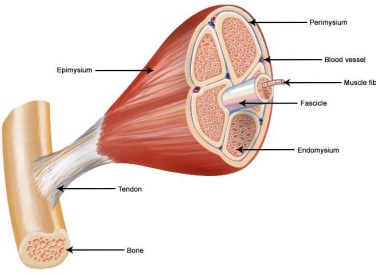
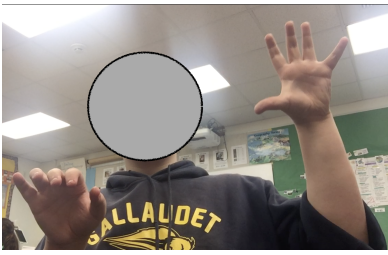

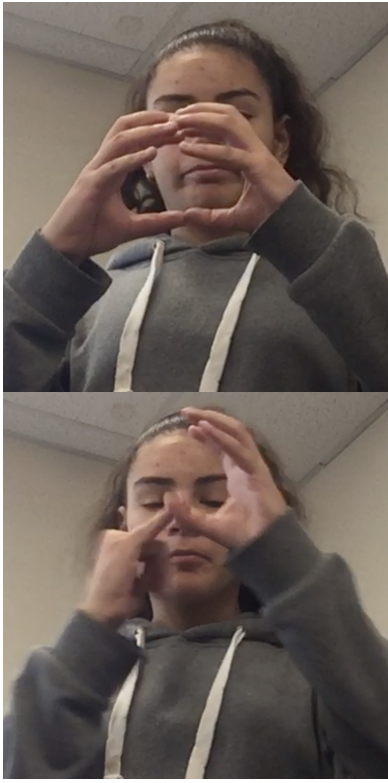
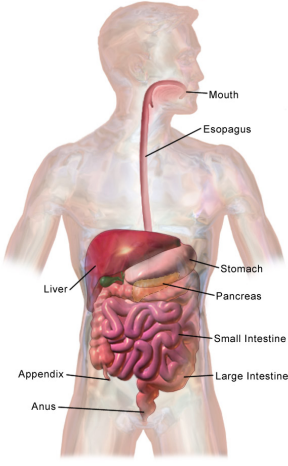
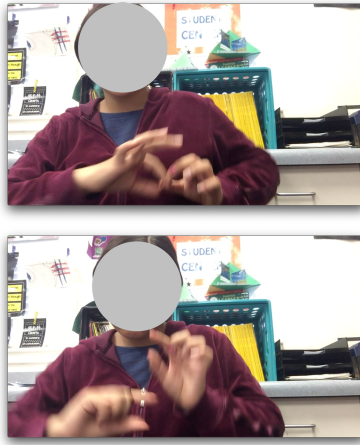
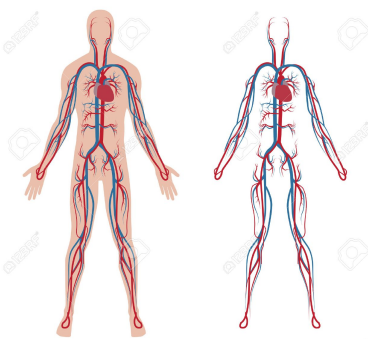
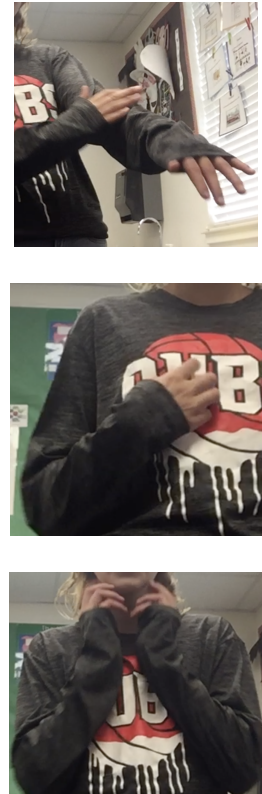
Student Name	Image	ASL Imagery
<p>Student A</p> <p><i>“Student A describes structure of skeletal muscle using right hand to resemble tendon attached to bone and following pathway of muscle structure”</i></p>	<p>Structure of a Skeletal Muscle</p> 	
<p>Student B</p> <p><i>“Student B describes structure of nervous system using two claw shaped classifiers to resemble brain, and right hand “I HANDSHAPE” below brain to resemble spinal cord”</i></p>		

Table 3: Descriptive ASL Mini Lesson ASL Imagery Examples cont.

Student Name	Image	ASL Imagery
<p>Student C</p> <p><i>“Student C describes structure of digestive system muscle using “F HANDSHAPE classifier” hand to resemble intestine starting point and using two “G HANDSHAPE classifiers” to show diameter of intestine and pathway of intestine structure”</i></p>	 <p>Digestive System</p>	
<p>Student D</p> <p><i>“Student D describes structure of circulatory system muscle using open hand classifier to resemble circulatory pathways that go down arm, describing place of importance with heart, starting point, and circulatory pathways follow upwards to head”</i></p>	 <p>CIRCULATORY SYSTEM</p>	

Throughout the curriculum, students created more examples of ASL imagery throughout the curriculum. One such case, in describing the relationship between the circulatory and respiratory system, students each had their own approach.

Table 4: Imagery Examples "Relationship between Circulatory and Respiratory System"

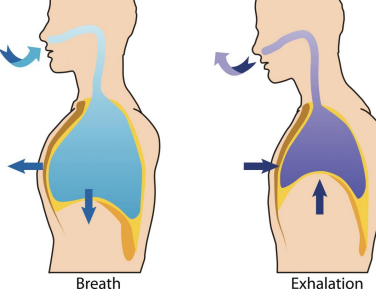
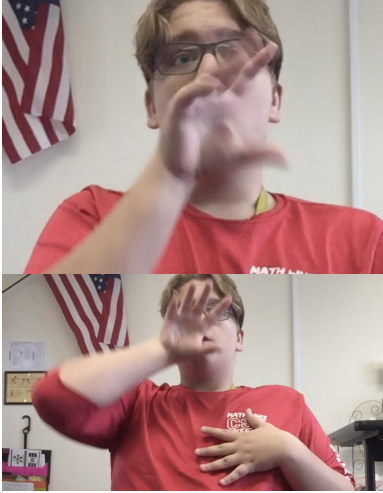
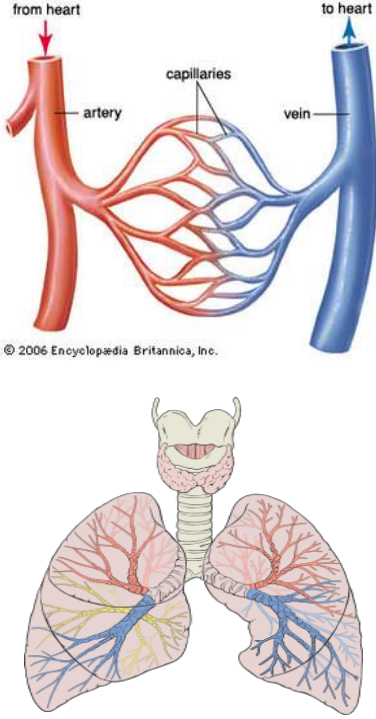
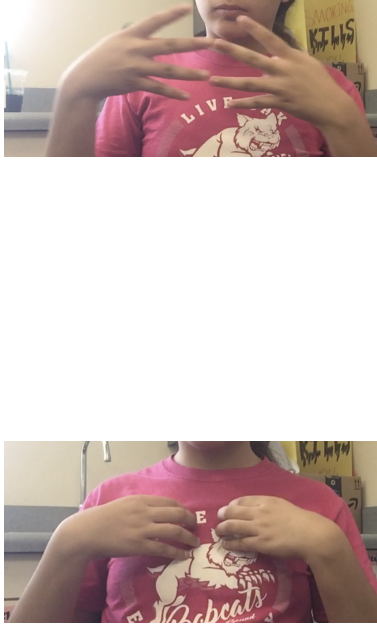
Student Name	Image	ASL Imagery
<p>Student A</p> <p><i>“Student A used a “narrow C classifier handshape” to describe inhalation and an “open C handshape” to describe exhalation along with a left hand resembling the lungs in a compressed manner”</i></p>		
<p>Student B</p> <p><i>“Student B used two hands to describe the structure of capillary as well as lungs”</i></p>		

Table 4: Imagery Examples “Relationship between Circulatory and Respiratory System” cont.

<p>Student C</p> <p><i>“Student C used two hands to describe the blood pathway of heart to occur simultaneously through opposing direction of flow with both hands”</i></p>		
<p>Student D</p> <p><i>“Student D used both hands to describe diameter of blood vessels, bigger diameter resembles artery, as hands become smaller in diameter, resemble vein or even smallest a capillary, bottom figure shows student personifying as blood cell within a vessel, both hands are used to resemble motion as hands travel back and forward”</i></p>		

While many of the students’ video explanation on the interrelationship between the circulatory and respiratory system varied in style, students were able to create samples of ASL imagery naturally, many of them emphasized classifiers in their descriptions. Student D,

specifically used classifiers in a sense describing the diameter of the arteries, veins and capillaries by narrowing the pathway. Student B described the structure of the capillary and lungs through use of both hands. Student C described the blood pathway of the heart to occur simultaneously by using opposing directions with both hands. Student A used a “narrow C classifier handshape” to describe inhalation and an “open C handshape” to describe exhalation along with a left hand resembling the lungs in a compressed manner. Based on the evidence presented in the screenshot samples, students’ ability to create ASL imagery comes across naturally in an unrefined manner. It also revealed their level of understanding of such interrelationships within the body that increased over time specifically comparing students’ ability to describe the functional relationship between the respiratory and circulatory system as seen in their first and last video samples individually.

Throughout the curriculum, students gained a heightened awareness of ASL elements specifically object handling, use of space, and classifiers as measured by teacher observation and the Descriptive ASL Rubric. The Descriptive ASL Rubric assessed for the following: Classifier Use, Spatial Awareness, Imagery, and Vocabulary. Classifier Use refers to students’ ability to describe something that is consistent with object shape or form being described. Spatial Awareness refers to object positioning in relation to object’s structure and relationship. Imagery refers to student’s ability to incorporate metaphor/simile/personification that brings the object to life. Vocabulary refers to correct sign choice as well as fingerspelling important key words that helps viewer build knowledge. These areas were measured a score of 1 to 4. A score of 4 means that the student demonstrated competency above grade standard level, while a score of 3 means that the student demonstrated competency at expected grade level. A score of 2 means that the

student demonstrated competency but needed support, while a score of 1 means that the student struggled greatly and needed a lot of support.

Table 5: Student Performance Task (Descriptive ASL) Comparison

Student A Attempt	Classifier Use	Spatial Awareness	Imagery	Vocabulary
First Attempt:	N/A	N/A	N/A	N/A
Last Attempt:	3	2.5	2	2

Student B Attempt	Classifier Use	Spatial Awareness	Imagery	Vocabulary
First Attempt:	3	3	2	2.5
Last Attempt:	3.5	3.5	2	3

Student C Attempt	Classifier Use	Spatial Awareness	Imagery	Vocabulary
First Attempt:	3	2.5	2	2
Last Attempt:	3.5	3	2	3

Student D Attempt	Classifier Use	Spatial Awareness	Imagery	Vocabulary
First Attempt:	3.5	3	3	3
Last Attempt:	4	4	4	4

Comparing students first and last attempts, students signing styles varied greatly as seen with their ability to demonstrate their scientific understanding through the use of aforementioned areas measured in the rubric. There was growth in all areas, specifically more directionality, use of classifiers, and incorporation of vocabulary. The use of “imagery” had the least amount of growth which is mostly related to curriculum time constraints that did not allow us to discuss how we can use ASL to help viewers visualize concepts. While all students were able to demonstrate appropriate use of classifiers, some students struggled slightly with spatial awareness due to the amount of details that were being added to their videos. One fascinating

connection that I found through this curriculum was how much students' personal experience with sharing academic ASL ideas corresponded with their performance. Student scores corresponded with their personal statements in mini-lesson on Descriptive ASL which an important area is to highlight. Student A felt his English skills were stronger than his ASL expressive skills to demonstrate his scientific understanding. Student B felt ASL skills were stronger than English, but in a conversational setting, she stated that she the use of ASL structure to convey ideas. Student C shared, she is not confident in her signing ability. Student D felt her ASL skills are stronger than her peers at school and has a lot of experience with sharing academic ideas in ASL. Based on the evidence presented, goal 2 was met because the students' portrayed their ability to develop ASL imagery to demonstrate their scientific understanding, specifically their use of classifiers spatial awareness with gradual increase in vocabulary.

3. Create ASL videos in two different styles (descriptive and expository) explaining a body system using media.

Although this curriculum was only taught for two weeks due to time constraints, I really appreciated students' dedication in creating ASL videos explaining a body system especially with being a novel idea. Although as a class, we were only able to discuss the concept behind Descriptive ASL in a mini-lesson, students showed some traits of Expository ASL as they submitted their Human Body Systems Project along with their video as some of them explained the process of their body systems in a sequential manner . As a class, we discussed the importance of facial expressions, presentation of ideas, use of classifiers, and the students also expressed their confidence in using ASL creatively and in academic settings. Students were able to develop stronger sense of directionality and classifier use to convey scientific ideas through ASL based on previous rubric scores presented in the second goal. Comparing their first to last

videos, one important aspect that may have contributed to their score improvement may be contributed to allotting time for students to implement a whole-part-whole writing activity that highlighted key areas that occur between the respiratory and circulatory system. This was done through a writing activity utilizing a “Flow Map”. Students have previous experience with utilizing Flow Maps due to school wide adaptation of “Thinking Maps” which allowed students to turn abstract ideas into concrete concepts. This was a critical addition to the curriculum as noted through student score improvements. Based on the evidence provided, goal 3 was met.

Conclusion

Through this experience of creating, developing, and implementing this curriculum has given me a valuable insight on the importance of emphasizing American Sign Language not only in the sense of bilingual education but as a tool of monitoring the level of comprehension the student has as through creative expressions of academic ideas. The level of comprehension measured by ASL revealed that the language itself is so much more complex as we begin to consider ability to tie in distinct parameters of ASL such as classifiers, facial expressions, space and organization of ideas in a sequential manner especially appropriate for students’ age, level and topic.

Although this curriculum was only taught for two weeks due to the constraints of the end of the school year activities, I quickly realized how dense it was. As I considered the students’ bilingual linguistic ability, and more importantly, their self-confidence in using ASL academically, I did not consider this factor to be an issue when developing this curriculum. Their self-confidence to me was a critical element in middle schoolers since it plays a role in students’ ability to perform videos using ASL creatively and academically to convey ideas. To many of

my students, asking them to create ASL videos explaining a scientific idea was a novel idea. This experience was worthwhile for it allowed students to use ASL language play.

Should this curriculum be implemented again, I strongly encourage teachers to provide ASL mini-lessons throughout the science content areas. In these mini-lessons it is important to highlight specific areas unique to ASL linguistics such as classifiers, spatial relationships, and fingerspelling to label important ideas to name just a few and are essential in developing descriptive and expository ASL text. These mini-lessons will provide small chunks of information that they can digest and will be noticeable as one observes the students' ability and confidence in the language itself. I also encourage teachers to promote the use of "Thinking Maps" to help students interpret abstract scientific ideas into concrete English and pairing with ASL. I found this to be highly beneficial for my students as they described the interrelationship between the circulatory and respiratory system. Last but not least, I challenge all Deaf and hard of hearing teachers in all subjects to provide students plenty of opportunities to express their ideas in ASL academically, descriptively and/or expository. As both forms share vocabulary and spatial awareness, key differences lie in content knowledge and integration of ideas or ability to visualize ideas through emphasis of classifiers. Given this opportunity, students will experience a "shift" as they originally see ASL as a "everyday" language into realizing the ability to convey ideas vividly is made possible through its unique linguistic features in a way written language cannot. That itself, is the power of American Sign Language.

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Appendix A: The Curriculum

Table of Contents

- Curriculum Overview
- Rubrics
- Human Body Systems Project/Student Checklist
- Lesson Plans and Materials

Curriculum Overview

Unit 1: All About Your Body	Unit 2: Becoming the Expert	Unit 3: Everyday Implications on Our Health
Lesson 1: Investigating Phenomena Pre-Assessment	Lesson 3: Skeletal and Muscular System and its Interrelationships Descriptive ASL Video	Lesson 6: Implications on Everyday Health Apply Knowledge
Descriptive ASL Mini Lesson Self ASL Video	Expository ASL Mini Lesson	
Lesson 2: Circulatory, Respiratory, and Lymphatic System and its Interrelationships Descriptive ASL Video	Lesson 4: Nervous and Integumentary System and its Interrelationships Expository ASL Video	Lesson 7: Frog Dissection Application of Knowledge in Frog Dissection
	Lesson 5: Excretory (Urinary) and Digestive System and its Interrelationships Expository ASL Video	

Body Systems Presentation Rubric

	BEYOND STANDARD (4)	MEETING STANDARD (3)	APPROACHING STANDARD (2)	I NEED A LOT OF SUPPORT (1)
SCIENCE CONTENT KNOWLEDGE	All required science information is correctly and clearly presented in cohesion. Terms and concepts are accurately labeled and explained.	Most of the required information is presented. A few slip ups in vocabulary or terms but overall understandable and does not interfere with comprehension.	Some of the required information is presented. Some confusion with facts/concepts are present.	Hardly any required information is presented. Confusion and lack of understanding of the content is evident.
VISUAL AID (movie, graph, drawing, visual display)	Visual aid is creative, colorful, easy to read, and used effectively.	Visual aid is colorful, readable and used somewhat effectively.	Visual aid is lacking color, difficult to read, and not used effectively.	Visual aid is not used at all in the presentation.
ORGANIZATION	Presentation is well organized and easy to follow. Transition between topics is smooth.	Presentation is organized and easy to follow but transition between topics is not smooth.	Presentation is somewhat organized but hard to follow.	Presentation is very unorganized and difficult to follow.
CONNECTIONS	Describes inter relationship with other body system in detail and makes clear connection to everyday life	Describes inter relationship with other body system with example and makes connection to everyday life with an example	Describes inter relationship with other body system briefly <u>or</u> brief connection to everyday life	Does not describe inter relationship with other body system nor makes connection to everyday life
CLARITY OF SIGNING	Presentation is clear and given at a slow pace that's easy to follow, eye contact is made throughout the entire presentation.	Presentation is clear and given at a good pace, eye contact made throughout most of the presentation.	Presentation is not clear and given at a fast pace, eye contact made during some of the presentation.	Presentation is not clear and given at a pace too fast to follow, no eye contact is made throughout.

Descriptive ASL Rubric

Category	Beyond Expectations (4)	Expectations (3)	Meeting Expectations (2)	Need Attention (1)
Classifier Use (How do you describe something?)	Excellent use of classifiers all throughout video; is consistent with shape/form of object being described	Use of classifiers is strong throughout the video, slight inconsistency with shape/form of object described	Use of classifier is evident yet not consistent throughout or incorrect use of classifier	No classifiers are used. Incorrect use of signs to represent shape/form of object described
Spatial Awareness (Position)	Excellent use of spatial awareness in respect to functions and relationships of structure.	Strong spatial awareness early on and maintains relationship of structure for most of the presentation.	Incorrect use of space but the purpose is fairly clear.	Difficulty in showing structure and relation of object.
Imagery (Can you visualize it?)	Excellent use of metaphor/simile/personification that brings interpretation to life.	Strong use of metaphor/simile/personification makes interpretation clear with minimal ambiguity.	Attempt at imagery but not clear.	No attempt at imagery.
Vocabulary (Correct use of sign choice + fingerspelling)	Fingerspelled vocabulary right after explanation Excellent use of sign choice and excellent use of fingerspelling at appropriate times within video	Vocabulary is introduced through video with fingerspelling slight error. Sign choice is good, not consistent.	Vocabulary is fingerspelled but not explained. Many errors of sign choice.	Too much fingerspelling or not enough throughout video. Sign choices are not appropriate.

Expository ASL Rubric

Category	Beyond Expectations (4)	Expectations (3)	Meeting Expectations (2)	Need Attention (1)
Content Knowledge	Exceptionally clear, focused, engaging, with relevant, strong supporting detail.	Evident main idea with some support with may be general or limited.	Purpose and main idea may be unclear, no clear explanation given.	Lack central idea; development of ideas is minimal given.
Organization of Ideas/Concepts/ Relationships	Effective organization in sequential manner Creative and engaging intro and conclusion	Strong order and structure, ideas are there Sequence has minimal errors but does not affect the big picture.	Lack of structure; hard to follow Missing key ideas that help viewer understand importance and function of body system	Lack of structure; no ideas are presented; viewer does not know what is being signed.
Spatial Awareness (constant object handling)	Excellent use of spatial awareness in respect to functions and relationships of structure.	Strong spatial awareness early on and maintains relationship of structure for most of the presentation.	There are a few lapses in focus, but the purpose is fairly clear.	Difficulty in showing structure and relation of object.
Vocabulary (Correct use of sign choice + fingerspelling)	Fingerspelled vocabulary right after explanation Excellent use of sign choice and excellent use of fingerspelling at appropriate times within video	Vocabulary is introduced through video with fingerspelling slight error. Sign choice is good, not consistent.	Vocabulary is fingerspelled but not explained. Many errors of sign choice.	Too much fingerspelling or not enough throughout video. Sign choices are not appropriate.

Human Body Systems Assessment Rubric

CATEGORY	4	3	2	1
Identification of System	Able to identify 5-6 body systems with appropriate labeling	Able to identify 4-5 body systems with appropriate labeling	Able to identify 2-3 body systems with appropriate labeling	Able to identify only 1 body system with appropriate labeling
Scientific Knowledge	Explanations indicate a clear and accurate understanding of 5-6 body systems and interrelationship with other body systems.	Explanations indicate a relatively accurate understanding of 4-5 body systems and interrelationship with other body systems.	Explanations indicate relatively accurate understanding of 2-3 body systems and interrelationship with other body systems.	Explanations do not illustrate much understanding of 1 body system and interrelationship with other body systems.
Summary	Summary describes in detail with 3 or more applications to real life situation, how body systems work and influence our everyday life. the skills learned, the information learned and some future applications to real life situations.	Summary describes in detail with 2-3 applications to real life situation, how body systems work and influence our everyday life.	Summary describes in detail with 1-2 more applications to life situation, how body systems work and influence our everyday life.	No summary is written.

Have you ever wondered how the human body works? Our lives are filled with many activities such as school, sports and personal responsibilities. Our human body is like a complicated machine, with many different parts, either acting alone or in unison. It is important to know your body, so you recognize what is normal and what is not.

For the next two weeks, you are about to become an expert on the human body. The body is a complex system with eleven subsystems. Each and every body systems is important for survival, growth and reproduction. What you must do to graduate from this “Science Institution”, is to present to the whole class a specific body system describing the structure and function of all the major organs and explaining how they relate to other subsystems.

Your responsibilities are:

1. To create a PowerPoint presentation on a specific body system using visual supports such as images and videos that will help your peers understand the system the best they can.
2. In your PowerPoint explain the:
 - Structure: What organs are involved? What do they look like?
 - (i.e. circulatory: heart, arteries, veins, and capillaries)
 - Function: How does your system work? What is the process from start to finish? Is it voluntary or involuntary?
 - Relationships: What other body systems does your body system work closely with?
3. Create an ASL video of yourself describing the body system, explaining how it works from start to finish, and why it is so important to us.
4. Lastly, while we are all becoming experts please be responsible, respectful, and try your best at all times.

Student Checklist:

Phase 1: ALL ABOUT YOUR BODY SYSTEM Descriptive Human Body Systems Project Handout

- Choose a Body System
- Research and label parts essential to body system (i.e. organs)
 - What is the role of the body system?
 - Provide at least three videos and 3 images
- Describe the function of each organ within body system (i.e. heart: artery, ventricle, and
 - What is each organ responsible for?
 - How does it look like?
- Create PowerPoint Slides adding information what you have found so far
 - Pick three videos you feel explain your body system well
- Develop Descriptive ASL Video of chosen body system
 - First Draft: Try with a Picture
 - Get feedback from a peer
 - Final Draft: Include in PPT

Phase 2: BECOMING THE EXPERT- What is involved in the system? Students conduct research on assigned body system and its relationship with one other body system. Research can be done on the internet or in the library.

- ENGLISH: Research and take notes on body system and how it works in PPT
- Expository ASL Video: Explain what happens within your body system from beginning to end
 - First draft in ASL send to me by ... with prompts
 - Second draft in ASL with feedback from peers
 - Final draft in ASL without prompts/support
 - Add final draft to PowerPoint Slides

Phase 3: EVERYDAY IMPLICATIONS ON OUR HEALTH: Students present the final stage of their project.

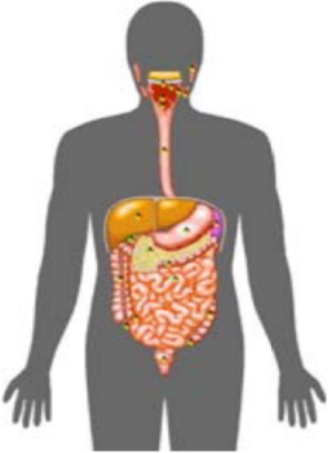
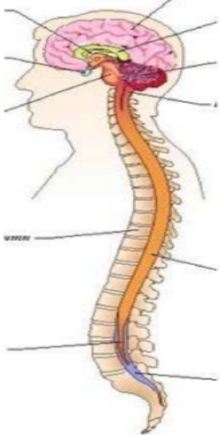
- What are some dangers to your body system we need to consider?
- Add to PowerPoint Slides
- To demonstrate your expertise, you will present what you learned and know to your peers using your PowerPoint Slides and ASL videos you have created.


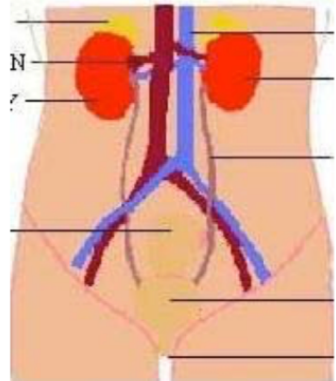
Pre/Post Assessment

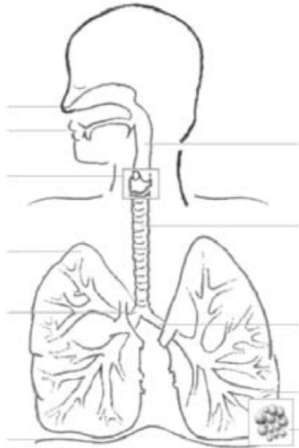

Name: _____

Date: _____

Digestive System	Circulatory System	Muscular System
Respiratory System	Nervous System	Excretory (Urinary) System

Name of System	Diagram	What is the system for? What organs are involved?	What other systems does it work with?
			
			

In complete sentences, write/sign a response explaining how body systems work and influence our everyday life.

Assessment adapted and modified from:
<https://www.wsfcs.k12.nc.us/cms/lib/NC01001395/Centricity/Domain/8472/Body%20Systems%20Interactions%20chart.pdf>
 Lesson Plans and Materials

Unit 1: Investigating Phenomena
Lesson Plan #1: What does it take to run?

Goal

MS-LS1-3: Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

ASL Standard: Text Types and Purposes:

Sign arguments to support claims with clear reasons and relevant evidence.

Published Signing/ Vocabulary Description and Use (Fingerspelling)

Sign informative/explanatory text to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

Acquire and use accurately grade-appropriate general academic and domain-specific signs, fingerspelled words, and phrases; gather vocabulary knowledge when considering signs, fingerspelled words, or phrases important to comprehension or expression.

Content Objective

Given a phenomena video and question “What body systems are needed to run a mile?” students will show their knowledge of body systems as measured by their recorded responses on the phenomena table and signed responses in classroom.

Given a hands-on activity using snap on cubes, students will demonstrate their knowledge on the levels of organization as measured by their explanations in class and on a recorded sheet in their science journals.

Language Objective

ASL Objective:

Given the phenomena question “What body systems are involved with running” students will sign “I think (specific body system) plays a role because...” as supported with their claim, reasoning as measured by in class responses.

Given the building blocks exploration activity, students will sign all levels of organization “cells, tissues, organs, and body system” as measured by in class responses through partner talk and teacher questions.

English Objective:

Given a phenomena table, student will write down several body systems they think play a role in a mile run, with supporting information as to why, as measured by their recorded responses.

Given a “Which Comes First?” worksheet, students will identify and label the appropriate levels of organization as measured by their recorded responses.

Formative Assessment

While students are recording their responses, I will monitor for student’s progress by asking them questions regarding the body systems to access their prior knowledge to measure individually and as a whole class.

Questions to ask:

1. What does level of complexity mean? How would you explain that?
2. Can you list three levels of organization?
3. How would you show that a tissue is made up of multiple cells?
4. How do we know that cells are the smallest level of organization?
5. What makes up for a tissue? Are the cells the same or different? How do we know?
6. How are organs created? Do all organs have specific roles?

Summative Assessment

Students will record on their phenomena table and share several different body systems they think play a role in participating in a mile run with supporting reasons.

Students will also identify and label the different levels of organization on their “Levels of Organization Sheet” in writing. Students will be asked to share their responses in class via ASL at end of class discussion. To clear up any misconceptions.

Misconceptions to address:

All systems and subsystems work independently and together to help organisms’ function. (Students may think organ systems work independently of one another).

Organs are made up of either several tissues working together. (Students may believe that organs are made up of only one type of tissue)

Materials/Preparation

Launch:

Investigative Phenomena Video from StemScopes
Investigative Phenomena Table (per student) from StemScopes

Exploration:

Printed Materials: Print one copy of Which Comes First? for each student.
1 Level of Organization (per student)
16 snap cubes (per student)
1 plastic baggie (per student)
5 index cards (per student)

Summary:

Human Body Systems Project Guideline Handout (1 per student)
10 Cut Outs (1 Body System per cut out)

Lesson

Launch

Hand out Pre-Assessment Form to Students
Introduce students to the Wandering of Phenomena question below:
A. “What body systems are required to run a mile?”
B. Allow students time to generate possible answers to the question.
C. Can record student responses in Investigative Phenomena Table throughout Unit

Procedure

A. Handout Investigative Phenomena Table
B. Show Video of Runners, ask “Wondering of Phenomena Question”
C. Allow students to record and generate as many answers to question
D. Allow students to generate their own questions about the phenomena
E. Inform students as we move through the unit, they can refer back to the table and record what they learn/wonder.

Exploration

Assessing Prior Knowledge

A. Distribute Level of Complexity Sheet to students
a. Students are to reorganize level of complexity of following diagrams and explain why they believe it is simple or complex.

Distribute plastic bags with snap cubes and pose the following questions/beginning a discussion.

- A. Visualize your own house. Is it made up of one solid part? Or smaller parts of a whole?
- B. How does this concept apply to your body?
- C. Give me examples

Procedure:

- A. To begin, choose a snap cube from your bag. It does not matter what color. What does this represent in a house? Brick
- B. What would this same snap cube represent in the human body? Cell
- C. Build a wall using snap cubes of the same color, what does this represent in the human body? Tissue
- D. Combine your wall with three other student walls. What would this represent in a house? Organ
- E. Are all the rooms the same color?
- F. Why? Why not? What do the colors represent?
- G. Are organs made up of the same type of tissue?
- H. Find another group and combine your rooms together to form a first floor. What would this represent in a human body? Organ System

Assessing Prior Knowledge

- a. Students order pictures of levels of organization by complexity.
- b. Distribute copies of “Which comes First?” to each student.
- c. Pass out five index cards to each student and instruct them to label them A-E.
- d. Ask students to hold up which letter they think comes first, second, third, etc.
- e. Monitor students’ discussions for misconceptions.

Misconceptions to address:

All systems and subsystems work independently and together to help organism function. (Students may think organ systems work independently of one another).

Organs are made up of either several tissues working together. (Students may believe that organs are made up of only one type of tissue)

Summary:

After students have performed the “Levels of Organization” activity. Have a whole class discussion.

Ask students to share what “level of complexity” means to them?

Draw a pyramid and within draw 5 lines. Ask students to label what would an appropriate level of complexity look like on the pyramid? (top being most complex).

Leave the students with the following question. (They do not need to answer; they just need to think about it.)

Question: How do we know the subsystems of the human body all work together?

After Lesson: Introducing Human Body Systems Project

A. Introduce Body Systems Project and go over expectations of this project starting with Learning Outcomes

Primary Learning Outcomes

- Students will be able to name the eleven human body systems and their functions.
- Students will be able to identify the organs and structural parts present in each system (i.e. circulatory: heart, arteries, veins, and capillaries).
- Students will be able to describe the basic structure of the major organs in each system.
- Students will recognize different interrelationships associated with the body systems.

Additional Learning Outcomes

- Students will enhance their research and presentation capabilities.
- Students will enhance their ASL Presentational skills in both Descriptive and Expository features

Modifications

- Some students may need additional support in spelling or identifying English words for signs.
- Pair shares, wait time
- Reminder how to communicate ideas throughout activity and group discussions
- Visual displays (images, videos) supported with captioning as needed
- Teaching Strategies for BLA-ASL
 - Explicit and Elaborate
 - Fingerspelling
 - Eye gaze for participation
 - Prompting using ASL for further class and/or individual discussions

Credits:

Pre-Assessment Photos:

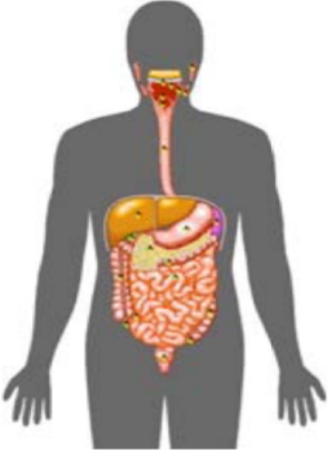
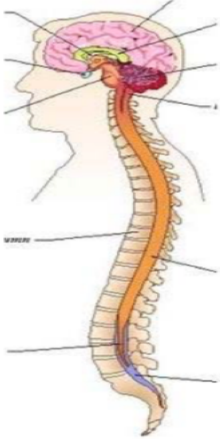
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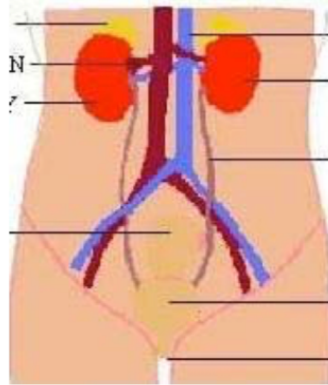
Investigative Phenomena Video, Which Comes First, and Phenomena Table:

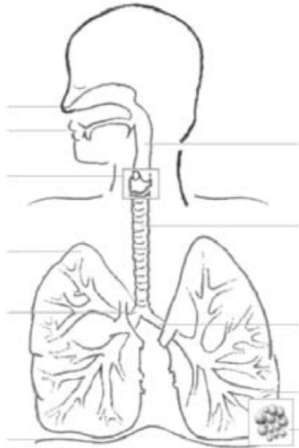

<https://app.acceleratelearning.com/scopes/15575/elements/691118>

Pre/Post Assessment

Digestive System	Circulatory System	Muscular System
Respiratory System	Nervous System	Excretory (Urinary) System

Name of System	Diagram	What is the system for? What organs are involved?	What other systems does it work with?
			
			

In complete sentences, write/sign a response explaining how body systems work and influence our everyday life.

Adapted and modified from:
<https://www.wsfcs.k12.nc.us/cms/lib/NC01001395/Centricity/Domain/8472/Body%20Systems%20Interactions%20chart.pdf>

Bodies and Systems

Investigative Phenomena

Name: _____ Date: _____

Bodies and Systems

Student Wondering of Phenomena: What body systems are required to successfully run a mile?

Record your thoughts about the Student Wondering of Phenomena question in the boxes below.

Before Instruction	During Instruction (Refine your thoughts as you learn more throughout the scope.)	After Instruction

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Accessing Prior Knowledge

Name: _____ Date: _____

Which Comes First?



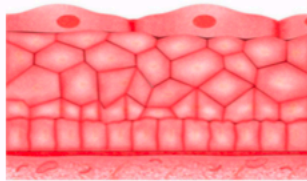
A



B



C



D



E

Complete the following statements about the pictures above.

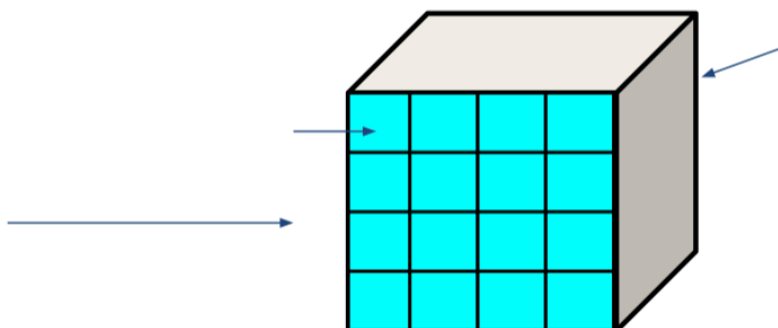
1. I believe the correct order of pictures from least complex to most complex is _____, _____, _____, and _____.
2. I think _____ goes first because _____.
3. I think _____ goes last because _____.

Name: _____ Date: _____

Levels of Organization

Directions:

1. To begin, choose a snap cube from your bag. It does not matter what color.
2. What does this represent in a house? _____ What does it represent in the human body? _____
3. Build a wall using more snap cubes of the same color. What does this represent in the human body? _____
4. Combine your wall with three other students' walls. This would represent a room in a house. What would this represent in the human body? _____
5. Find another group and combine your rooms together to form a first floor. What would this represent in a human body? _____
6. Find one more group to complete your house with a second floor. What do we call this in the human body? _____
7. Draw a model of your house in the space below and label the levels of organization.



8. Now it's your turn! Choose another object to compare to the levels of organization in the body and complete the analogy.

Name of Object:	
Part in Object	Part in Body
	Cell
	Tissue
	Organ
	Organ system

Unit 1: Investigating Phenomena
Teachable Moment: Descriptive ASL

Launch:

Ask students what does “Descriptive ASL” mean to them?

Ask them to give examples of how they describe something to someone? What features do they focus on?

Ask how they would use descriptive ASL in science content? Would the features stay the same?

Introduce and discuss different aspects of Descriptive ASL from “Descriptive ASL Rubric”

Classifier Use

Spatial Awareness

Imagery

Vocabulary

Ask students to explain what they think each one means to a partner, then class discussion.

Show YouTube videos. Have them figure out how to describe this in ASL.

“Power of Union Is Strength” <https://www.youtube.com/watch?v=kLYa7frC5d4> _

Explore:

Refer to “Human Body Systems Project” explain to students about Descriptive ASL and how they will create a video on the body system they are assigned.

Hand Out diagram of body system (at this point students should already be assigned body system).

Student A (with diagram) will be paired with Student B. Student A will describe diagram to Student B. Student B will draw the diagram to best ability.

Note: The drawing of Student B should give Student A visual feedback in what is missing from their descriptive features provided. After this activity, switch places and repeat.

Students will then practice signing a descriptive video of the body system by recording themselves and sending it to the teacher. (This will serve as first documentation of documentation in use of imagery).

Summary:

Have students share video with a partner and have partner draw based off what the video provided. (Partner can see actual diagram hand out after, have drawn the image themselves)

Descriptive ASL Rubric

Category	Beyond Expectations (4)	Expectations (3)	Meeting Expectations (2)	Need Attention (1)
Classifier Use (How do you describe something?)	Excellent use of classifiers all throughout video; is consistent with shape/form of object being described	Use of classifiers is strong throughout the video, slight inconsistency with shape/form of object described	Use of classifier is evident yet not consistent throughout or incorrect use of classifier	No classifiers are used. Incorrect use of signs to represent shape/form of object described
Spatial Awareness (Position)	Excellent use of spatial awareness in respect to functions and relationships of structure.	Strong spatial awareness early on and maintains relationship of structure for most of the presentation.	Incorrect use of space but the purpose is fairly clear.	Difficulty in showing structure and relation of object.
Imagery (Can you visualize it?)	Excellent use of metaphor/simile/personification that brings interpretation to life.	Strong use of metaphor/simile/personification makes interpretation clear with minimal ambiguity.	Attempt at imagery but not clear.	No attempt at imagery.
Vocabulary (Correct use of sign choice + fingerspelling)	Fingerspelled vocabulary right after explanation Excellent use of sign choice and excellent use of fingerspelling at appropriate times within video	Vocabulary is introduced through video with fingerspelling slight error. Sign choice is good, not consistent.	Vocabulary is fingerspelled but not explained. Many errors of sign choice.	Too much fingerspelling or not enough throughout video. Sign choices are not appropriate.

Unit 1: Investigating Phenomena

Lesson Plan # 2: Circulatory, Respiratory and Lymphatic System and its Interrelationships

Goal

MS-LS1-3: Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

ASL Standard: Text Types and Purposes:

Sign arguments to support claims with clear reasons and relevant evidence.

Published Signing/ Vocabulary Description and Use (Fingerspelling)

Sign informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

Acquire and use accurately grade-appropriate general academic and domain-specific signs, fingerspelled words, and phrases; gather vocabulary knowledge when considering signs, fingerspelled words, or phrases important to comprehension or expression.

Content Objective

Students will explain how the circulatory and respiratory system works from a procedural perspective as well as the different types of blood cells (i.e. white vs red) and how the lymphatic system is closely tied to it (i.e. interrelationship between subsystems) as measured by written responses in their science journals.

Language Objective

ASL Objective:

In this lesson, two distinctive ASL Structures will be emphasized: CLASSIFIERS and FINGERSPELLING, when asked to provide a descriptive video of a body system focused in this lesson (circulatory, respiratory, or lymphatic system).

English Objective:

Given the different body systems stations, students will explain their observations on a paper that is specific to each station using words such as “I observe”, “I noticed xxx happening”, and provide details to support their observations. Students will also explain “The (body system) main function is....” and it “interacts with the rest of the body by....” as measured by their written responses.

Formative Assessment

While students are recording their responses, I will monitor for student's progress by asking them questions regarding the body systems to assess their prior knowledge to measure individually and as a whole class, such as parts of the heart, in which direction does oxygenated blood flow, what are the functions of the lymphatic system.

Circulatory System Questions

What one of the strongest muscles in the body? Heart

What does the heart do? Pumps blood around the body. Pump oxygen from the lungs to body parts that need it. After the body parts use the oxygen, we exhale all of the carbon dioxide out. Where does the blood go? Everywhere

Respiratory System Questions:

Why do we breathe? Breathing is essential to keep us alive, because every living cell in the body needs a continual supply of oxygen.

How do we breathe? Use of lungs

Where does the process of breathing start? Explain your answer. Process of breathing starts either at the nose or at the mouth.

Summative Assessment

Students will label the parts of the hearts and lungs and describing its function in addition to how the lymphatic system is interrelated through written responses and signed responses.

Materials

Respiratory System:

PowerPoint

Straw

Plastic Bottles (top half)

Balloon (small and large)

Scissors

Measuring Tape

Circulatory System:

PowerPoint

Circulatory Handout

Blue and Red construction cut outs ($\frac{1}{2}$ " x $\frac{1}{2}$ ")

Masking Tape (blue/red)

Heart Worksheet (Labeling)

Lymphatic System:

PowerPoint
Magnetic tape, inch width (3 inches per group)
Ruler
Scissors
Plastic Wrap (1 foot)
Twist Ties (3)
Glass jar with lid, 16 oz
Table salt (1 cup)
Measuring Cup
Measuring Tablespoon
Iron Fillings (1 tbsp)
Piece of paper
Pencil/Pen

Lesson Plan (2-3 Days)

Explain to students that today we will be learning about the function of the respiratory, circulatory and lymphatic systems as well as making connections on how these three systems are closely knit together. These interrelationships will also be explained in reading materials such as “California Life Science (2009) by Prentice Hall” and “The Magic School Bus presents The Human Body (2014)” by Scholastic Inc. We will have readings and activities that will help us build our understanding of these systems.

Begin by asking students some questions that will elicit responses relating to the circulatory, respiratory and lymphatic systems:

Intro for Respiratory System:

Show PPT slide with activity for Respiratory System.

1. Students will be given a balloon and will be asked to blow into the balloon as much as they can with one breath.
2. Students will receive measuring tape to measure circumference of the balloon. Record on handout.
3. Students perform second attempt and record.
4. Find average of both trials. Record on handout and on whiteboard.

Pose Question for students to write on handout.

1. What factors might affect the volume of air a person can exhale?
2. Have students write and share their answers with the class.
3. Discussion for 5 minutes.

Proceed to show PowerPoint and discuss about Structure of Respiratory System (provided with images and videos)

Explore for Respiratory System:

Station: Respiratory System Activity

1. Cut the straw in half and place it through the hole in the cup.
 - a. The straw should fit securely in the hole. If the hole is too big, you can use tape to secure it more snugly.
2. Attach the small balloon to the end of the straw inside the cup with a rubber band.
3. Cut the neck part of the second, larger balloon off and discard.
4. Place the remaining portion of the balloon over the entire lip of the cup.
5. Pull down on the outside of the balloon. What happens to the balloon on the inside? The balloon on the inside fills with air.
6. Push up on the outside of the balloon. What happens to the balloon on the inside? The balloon on the inside deflates.

Summary for Respiratory System:

1. How is this model like your respiratory system? When we breathe in, our lungs fill with air; when we breathe out, our lungs deflate.
2. What is the main function of the respiratory system? It brings in oxygen and removes carbon dioxide.
3. How does the respiratory system interact with other body systems? It works with the circulatory system to supply the body with oxygen and remove the body of oxygen.

Intro for Circulatory System:

Questions about the Circulatory System:

What one of the strongest muscles in the body? Heart

What does the heart do? Pumps blood around the body. Pump oxygen from the lungs to body parts that need it. After the body parts use the oxygen, we exhale all of the carbon dioxide out.

Where does the blood go? Everywhere

Explain to students that today we will be learning about the interrelationships between the circulatory system, the lymphatic system also known as the immune system and the respiratory system. We will have readings and activities that will help us build our understanding of these systems.

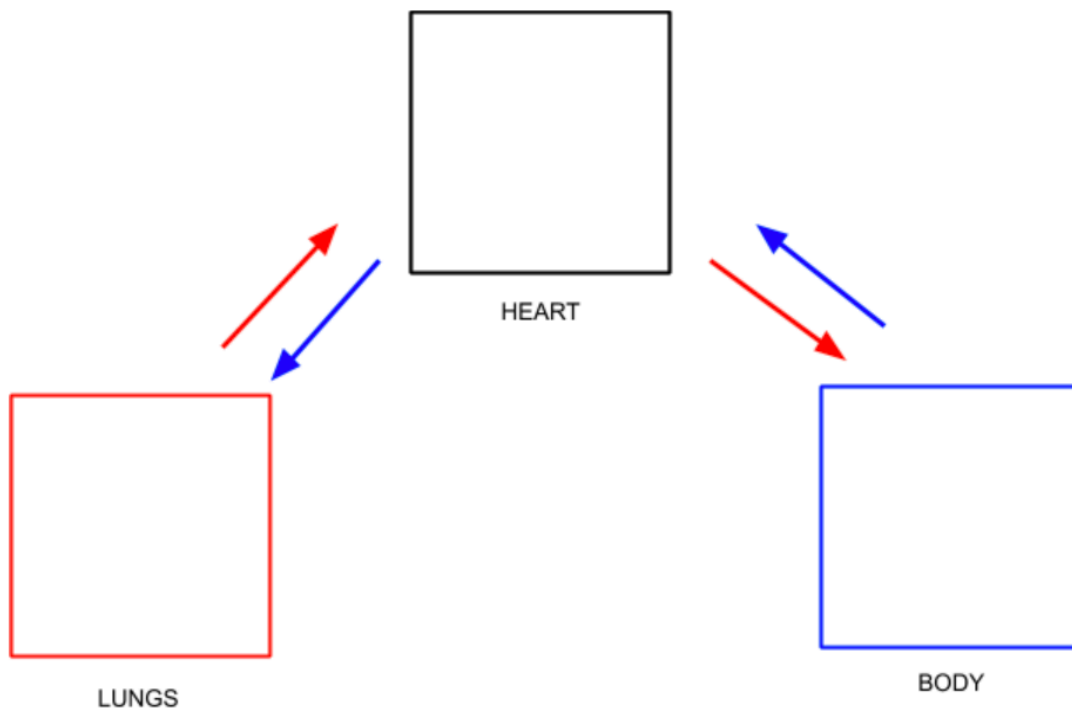
Explore for Circulatory System:

1. Hand out reading worksheet, have students read and pair share with a partner what they learned. (Note: Teacher will monitor for any confusion, and may use PPT as resource for guiding whole class)
 - a. Have students answer questions:
 1. Briefly list and describe the components of the heart.

2. Use PPT slides to guide class after they have read and discuss heart structure.
3. Students then will proceed with understanding the circulation pathway of the blood as it goes through the heart becoming oxygenated and deoxygenated.
4. Provide red and blue dots to help students demonstrate the movement of oxygenated and deoxygenated blood.

Exploration on Circulatory System:

(Teacher should have three separate boxes and tape set up on floor prior to lesson to save time)



Teacher Prompt for Activity:

“We are going to do an activity that demonstrates the flow of blood and oxygen around the body. Some of you will be playing the role of red blood cells, picking up oxygen (strips of paper) at the lungs and carrying oxygen (strips of paper) to the heart and the rest of the body. I will flash the lights to represent the heartbeat. The body represents all of our other systems including our brain, tissues and other parts.”

1. Assign one student at each station to act as the distributor of red/blue construction paper squares.
 - a. Red squares will be at the lungs
 - b. Blue squares will be at the body
2. Assign one student to go through path starting at the lungs following arrows.

3. Student assigned at the lungs hands other student 3 red squares
4. Student will receive three red squares, leaving one at the lungs, carrying one to the heart (leaving at the heart) and ultimately carrying one to the body (leaving one there)
5. Once student gets to body, they will receive three blue strips (deoxygenated blood) and doing the same as previously before following the path and leaving one blue strip at each square.
6. Students may alter around to get an idea of how the exchange of oxygen in blood acts throughout the respiration and circulatory process

Summary of Circulatory System:

1. What is the relationship between the heart and the lungs?
 - . It works with the respiratory system to deliver oxygen and remove carbon dioxide and works as our body needs it.
2. As the lights flashed quicker, did any part of the stations (lungs, heart or body) have absolutely no blood or carbon dioxide waste?
 - . No, the body works in sync and makes sure all parts have necessary blood and oxygen as needed.

Lymphatic System Activity

Before beginning this activity:

Introduce Lymphatic System

Teacher Prompt “Speaking of everywhere, does anyone know why we get sick sometimes?”

A: Bacteria, viruses, fungi, or parasites

Teacher Prompt: How does our body respond to these pathogens? A: Immune system

Teacher Prompt: How is the immune system related with the circulatory system?

A: Specialized cells in our blood stream called white blood cells. There are different types of white blood cells that help destroy bacteria.

Teacher Prompt:

Can you think of a way to model our immune system? How could we simulate the antibody binding to the bacteria?

Let your students come up with their own ideas. If they have trouble, point them towards the materials they will use for the activity. Ask them specifically, what the salt, iron filings, the jar, or the magnets could represent.

End the discussion by explaining to them that in their model of the immune response, the jar represents the human body. The salt represents human cells and the iron filings represent bacteria. The human body is infected with the pathogens.

Setting up Immune System Model

1. Make the "antibodies," as shown in Figure 2.
 1. Label the pieces of magnetic tape 1, 2, and 3 by writing large, bold numbers on the paper backing.
 2. Put each magnetic tape square in the middle of a plastic wrap square, with the adhesive side (covered by paper) facing up.
 3. Pull the ends of the plastic wrap together around each magnetic tape square, twist them together, and secure them with a twist tie.
 4. Make sure there are no openings in the plastic wrap surrounding any of the magnets (so that salt or iron filings cannot get through and reach the magnetic tape).



Figure 2. Completed antibody models.

1. Measure the mass of each antibody model and record these values on the student worksheet.
2. Measure 1 cup of salt and pour it into the glass jar. Then measure 1 tbs. of iron filings and add it to the jar, as shown in Figure 3, left.
3. Put the lid on the jar tightly, and then mix the salt and iron filings together by flipping the jar upside down and then right-side up again about ten times, or until the iron filings appear evenly dispersed throughout the salt (Figure 3, right).



Figure 3. After mixing the iron filings and salt together, the iron filings should appear only as specks throughout the jar.

Simulating the Primary Immune Response

1. Take one piece of magnetic tape and put it in the jar, resting on top of the mixture as shown in Figure 4. Then put the lid back on the jar tightly and flip it ten times.



Figure 4. Magnetic tape in the jar.

1. Carefully remove the magnetic tape from the jar.
 1. You may need to carefully tilt the jar to grasp the tape.
 2. Only grab it by the twist tie or twisted plastic and try not to touch the iron filings.
 3. As you take it out of the jar, gently turn the piece of tape upside down, so that any salt trapped in the twisted plastic wrap falls back into the jar.
2. Examine the magnetic tape (shown in Figure 5). Does it look like more iron filings are stuck to the tape than salt?



Figure 5. Magnetic tape after being removed from the jar.

1. Measure the mass of the magnetic tape, including any attached salt or iron filings.
 1. Place a piece of paper onto the scale in case any iron filings fall off.
 2. Zero the scale.
 3. Measure the mass of the magnet and record this value on the student worksheet.
2. Hold the magnetic tape over the piece of paper, untie the twist tie, and carefully open up the plastic wrap so the salt and iron filings fall onto the paper.

3. Use the paper to carefully funnel the iron filings and salt back into the jar and secure the lid. Mix the iron filings and salt again by flipping the jar ten times.

Simulating the Secondary Immune Response

1. Now you will simulate a second attack with the same pathogen. In the model, this represents the immune system's memory cells making more antibodies when they encounter the same type of pathogen again.
2. Repeat steps 5–10, but this time put all three pieces of tape in the jar, as shown in Figure 6. You will also need to measure and record the combined mass of all three magnetic tape pieces with and without attached salt and iron filings.



Figure 6. All three pieces of magnetic tape in the jar.

Summary for Lymphatic System:

1. What happened when you added the magnetic tape to the jar and mixed it with the salt and iron filings?
 - a. The iron filings were attracted to the magnet and stuck to it.
2. How is this similar to a real antibody response in our body?
 - a. In our body, antibodies are only supposed to bind to invading bacteria, while ignoring regular cells.

Performance Task Summary: Students will show the relationship of the respiratory system and circulatory system by creating an ASL video using descriptive and expository features.

Modifications

- Some students may need additional support in spelling or identifying English words for signs.
- Pair shares, wait time
- Reminder how to communicate ideas throughout activity and group discussions
- Visual displays (images, videos) supported with captioning as needed
- Teaching Strategies for BLA-ASL
 - Explicit and Elaborate
 - Fingerspelling
 - Eye gaze for participation
 - Prompting using ASL for further class and/or individual discussions

Credits:

Respiratory System Lesson Activity Idea:

<https://www.science-sparks.com/breathing-making-a-fake-lung/>

Circulatory System Lesson Activity Idea:

<https://www.smm.org/heart/lessons/lesson10.htm>

Lymphatic System Lesson Activity Idea:

<https://www.sciencebuddies.org/teacher-resources/lesson-plans/antibodies-immune-system#lesson>

Respiratory System PowerPoint Images and Video:

<https://www.therespiratorysystem.com>

<https://www.twigsecondary.com>

<https://www.learnprononline.net/wp-content/uploads/2017/01/ArteriesVeinsCapillaries-300x281.jpg>

<https://www.youtube.com/watch?v=38zMOWQU2Rw>

Circulatory System PowerPoint Images and Video:

<https://pixabay.com/id/illustrations/vertikal-jantung-3076624/>

<https://www.twigsecondary.com>

<https://www.learnprononline.net/wp-content/uploads/2017/01/ArteriesVeinsCapillaries-300x281.jpg>

Lymphatic System PowerPoint Images and Video:

<https://www.lymphcareusa.com/patient/lymph-a-what/what-is-lymphedema/lymphatic-system.html>

<https://www.sciencebuddies.org/teacher-resources/lesson-plans/antibodies-immune-system#lesson>

Respiratory System Slides

Respiratory System

...

Warm-Up

How big can you blow a balloon?

Pair with a partner. Measure at greatest width. Record.

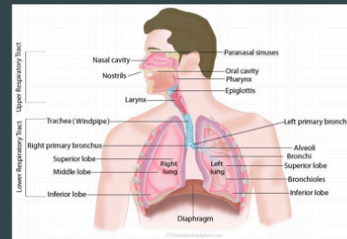
Try one more time.

Add and average.

“What factors might affect the volume of air a person can exhale?”

Write your responses and share in class.

Respiratory System



Purpose of Respiratory System

- Involves all mechanisms that get O_2 to the cells
- Gets rid of CO_2
- Formation of energy

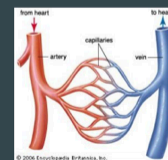
Path Air Takes

1. Air enters nose or mouth
2. Passes Pharynx
3. Moves past epiglottis
4. Passes through larynx
5. Trachea
6. Lungs and their passageways



3 Types of Vessels

1. Arteries
2. Capillaries
3. Veins





Respiratory System Activity Hand Out

Name _____

How Big Can You Blow Up a Balloon?

1. Take a normal breath, then blow as much air as possible into a balloon. Twist the end and hold it closed. Have your partner measure around the balloon at its widest point.
2. Let air out of the balloon. Repeat Step 1 and calculate the average of the two measurements.
3. Compare your results with those of your classmates. The bigger the circumference, the greater the volume of air exhaled.

	Attempt #1	Attempt #2	Average

Think It Over

What factors might affect the volume of air a person can exhale?

Circulatory System PowerPoint

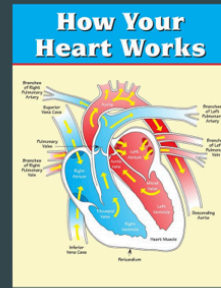
Circulatory System

...

Everyday you travel from home to school and back home again. Think about your travel path.

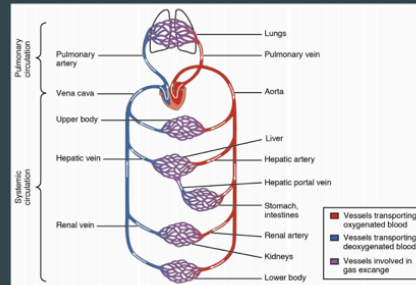
Where does it begin and end?

How does this apply to our bodies?



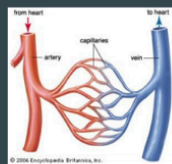
Two Pathways

- Pulmonary Circulation (Lungs)
 - Carries blood to lungs and back to the heart
- Systemic Circulation (Body)
 - Carries blood to body and back to the heart



3 Types of Vessels

1. Arteries
2. Capillaries
3. Veins



Exit Slip

Pretend you are a red blood cell and you have reached the heart. Describe as you travel through the different types of blood vessels as you make your journey through the body.

Record your responses using iPad video.

Lymphatic System PowerPoint Slides

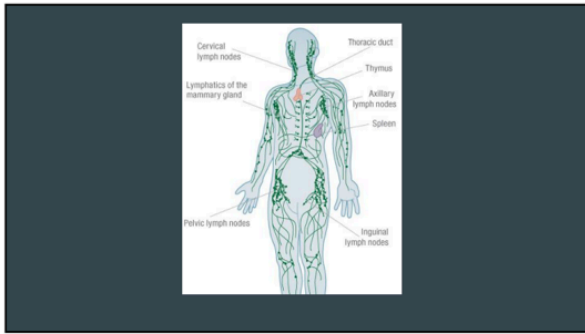
Lymphatic System ...

Discussion Prompt:

Speaking of everywhere, does anyone know why we get sick sometimes?

How does our body respond to this?

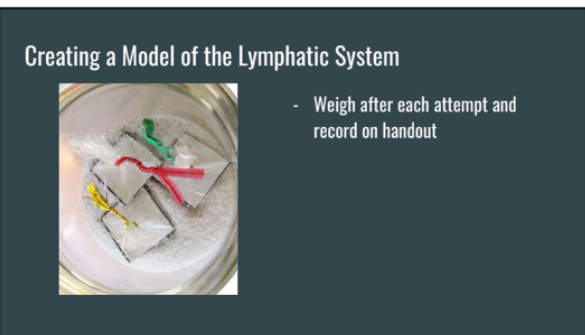
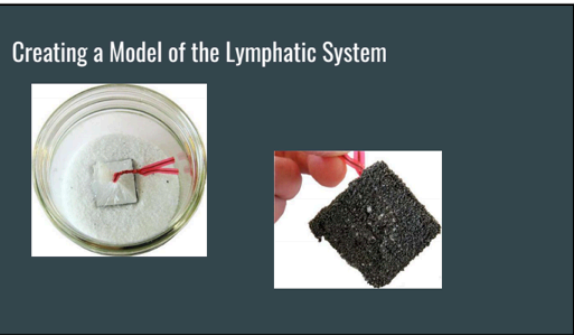
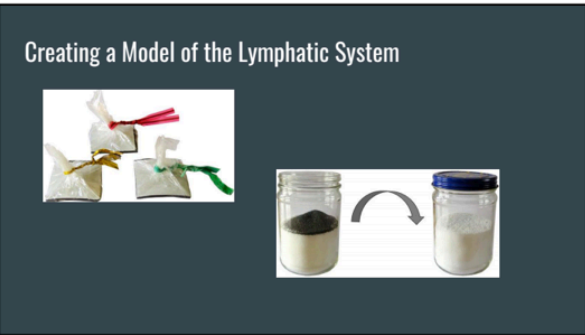
How is the immune system related with the circulatory system?
circulatory system?



Creating a Model of the Lymphatic System

Materials:

- Magnetic tape (1 inch width)
- Ruler
- Scissors
- Plastic Wrap (1 foot)
- Pencil
- Twist Ties (3)
- Table salt (1 cup)
- Iron Fillings (1 tbsp)
- Paper Handout



Exit Slip

What happened when you added the magnetic tape and mixed it with the salt and iron filings?

How is this similar to a real antibody response in our body?

Fighting Infections with Your Immune System

Name: _____

Date: _____

Student worksheet

Directions: Prepare for the experiment.

1. Before the Experiment

- a. Which parts of your model represent which part of the immune system?

Salt: _____

Iron filings: _____

Jar: _____

Magnets: _____

- b. What do you think will happen when you add more antibodies to your model?

2. Experiment

Follow these steps to do your experiments:

1. Setting up your immune system model

- Label the pieces of magnetic tape 1, 2, and 3 by writing large, bold numbers on the paper backing.
- Put each magnetic tape square in the middle of a plastic wrap square with the adhesive side (covered by paper) facing up.

Fighting Infections with Your Immune System—Page 2

Name: _____

Directions: Follow the directions below to do the experiment.

- c. Pull the ends of the plastic wrap together around each magnetic tape square, twist them together, and secure them with a twist tie as shown below.
- d. Make sure there are no openings in the plastic wrap surrounding any of the magnets!



- e. Measure the mass of each piece of magnetic tape, including the plastic wrap and twist tie, and record these values below:
Tape 1: _____ grams [g]
Tape 2: _____ grams [g]
Tape 3: _____ grams [g]
- f. Measure 1 cup of salt and pour it into the glass jar. Then measure out 1 tsp. of iron filings and add it on top of the salt in the jar, as shown below.
- g. Put the lid on the jar tightly and then mix the salt and iron filings together by flipping the jar upside down and then right-side up again. Do this, about one flip per second, until the iron filings appear evenly dispersed throughout the salt in the jar, as shown below.



- h. Examine the jar and describe below how its content looks. Can you see the iron filings dispersed in the salt?

Fighting Infections with Your Immune System—Page 3

Name: _____

Directions: Continue the experiment.

2. Simulating the primary immune response

- a. Take one of the magnetic tape pieces (make sure to remember which one) and put it in the jar, resting on top of the mixture, as shown at right. Then put the lid back on the jar tightly and flip it ten times.
- b. Carefully remove the piece of magnetic tape from the jar.
 - i. Only grab it by the twist tie or twisted plastic. Do not touch where the iron filings are.
 - ii. Turn the tape upside down so that any salt trapped in the twisted plastic wrap falls back into the jar.
 - iii. Be careful not to shake any attached iron filings off.
- c. Examine the magnetic tape. How much salt versus iron filings is stuck to the magnet?



- d. Measure the mass of the magnetic tape, including any attached salt or iron filings.
 - i. Place a piece of paper onto the scale in case any iron filings fall off.
 - ii. Zero the scale.
 - iii. Measure the mass of the magnet and record this value below.

Magnetic tape mass including attached particles: _____ grams [g]

- e. Hold the magnetic tape over the piece of paper, untie the twist tie, and carefully open the plastic wrap so the salt and iron filings fall onto the paper.
- f. Use the paper to carefully funnel the iron filings and salt back into the jar and secure the lid. Mix the iron filings and salt again by flipping the jar ten times.

Unit #2: Becoming the Experts
Lesson Plan#3: Interrelationships Between Nervous and Integumentary Systems

Goal

MS LS1-3: Students discover that systems may interact with other systems and subsystems and can be a part of larger complex systems.

ASL Standard: Text Types and Purposes:

Sign arguments to support claims with clear reasons and relevant evidence.

Published Signing/ Vocabulary Description and Use (Fingerspelling)

Sign informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

Acquire and use accurately grade-appropriate general academic and domain-specific signs, fingerspelled words, and phrases; gather vocabulary knowledge when considering signs, fingerspelled words, or phrases important to comprehension or expression.

Content Objective

Given two different body systems stations (integumentary and nervous systems) students will organize their ideas through the scientific method of making predictions, observations, and recordings and ultimately explain their knowledge of each body system as measured by their in-class responses throughout and at the end of the activities.

Language Objective

ASL Objective:

Given the different body system stations, students will sign their responses by appropriately signing (fingerspelling specific body system), their predictions, observations and findings as measured by their by in class responses.

English Objective:

Given the different body systems stations, students will explain their observations on a worksheet that is specific to each station using words such as “I observe”, “happening”, and provide details to support their observations. Students will also explain “the (body system) main function is....” and it “interacts with the rest of the body by....” as measured by their written responses.

Formative Assessment:

While students are recording their responses, I will monitor for student's progress by asking them questions regarding the body systems to assess their knowledge to measure individually and as a whole class.

Nervous System Lab Questions:

1. Now that you have done this activity the second time, what helps you remember?
2. What is the main function of the nervous system?

Integumentary System Lab Questions:

1. What are the layers of the skin?
2. What is the skin responsible for?
3. Which areas of the skin are most or least sensitive?

Summative Assessment:

Student will record on their worksheet for the exploration station of each body system. Students will continue to use the scientific method of making predictions, observations and recording what occurred in their science journals.

Students will be able to explain the main function of each system in ASL response through exit slip responses.

“What is the function of the nervous system?”

“What is the function of the integumentary system?” “What system does it work closely with?”

Materials:

Printed:

1 Nervous System Handout (per student)

Nervous System Material:

Timer

1 Towel (per group)

1 Plastic tray (per group)

Several small items, such as erasers, paper clips, marbles, etc. (per group)

Hand out

Integumentary System Materials:

Index cards

Toothpicks

Glue

Rulers

The Lesson

Introduction:

Students will explore the basic functions of the nervous and integumentary systems of the human body and how they interact with each other.

Exploration:

Nervous System Station

1. Under the towel is a tray with a number of small items.
2. Set the timer for one minute.
3. You have one minute to remember as many items as you can.
4. After the minute, cover the tray back up.
5. List as many of the items as you can in the table.
6. Once you think you have it down, repeat steps 1–5.

Summary:

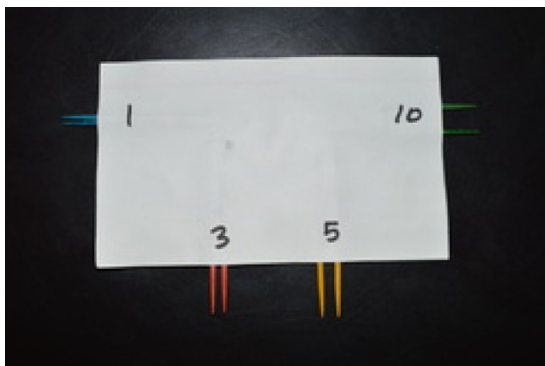
Why do you think you were able to remember more items the second time? Practice

Your nervous system is in charge of your memory. What else do you think it controls? Balance, voluntary and involuntary movements, thinking, etc.

Integumentary Station

Start by going over the structure and functions of the skin, discussing the layers of the skin.

For this minilab, make calipers using index cards, toothpicks, glue, rulers. The toothpicks are glued down to the index cards at various distances – 1mm, 3mm, 5mm, and 10mm. Glue another index card down over top and label the distances on the caliper on both sides.



1. Pair students up to test the sensitivity of each other's skin.
2. Have them begin by predicting which area of the body they believe will be most sensitive and which area will be least sensitive of the places tested.
3. Before you begin, go over the procedures and discuss how to use the caliper.
4. Students take turns, one acting as the piker, the other acting as the pin cushion. Tell the students that are being tested to close their eyes and tell honestly if they feel two toothpicks (which means they are highly sensitive) or one toothpick (which

means they lack sensitivity) as their partner gently touches them in one of the locations.

5. The back of the hand...



The fingertip... use the pointer finger of their dominant hand to decrease variables and make sure your data is accurate for all students.



And lastly, they use the caliper on the back of the neck. Have them rotate through all the different toothpick measurements on all three areas of the body before they switch roles.



Explain It: Students should be recording their lab data in their data table – make this even more efficient by having students record a “+” (two toothpicks felt = sensitive) and “-” (one toothpick felt = not sensitive). When finished, have them work in a group or think-pairs-share on their conclusion questions.

Summary:

Why are some areas of the skin more sensitive than others? (Compare fingertips to back of neck)

Modifications

- Some students may need additional support in spelling or identifying English words for signs.
- Pair shares, wait time
- Reminder how to communicate ideas throughout activity and group discussions
- Visual displays (images, videos) supported with captioning as needed
- Teaching Strategies for BLA-ASL
 - Explicit and Elaborate
 - Fingerspelling
 - Eye gaze for participation
 - Prompting using ASL for further class and/or individual discussions

Credits:

Lesson Plan Ideas from:

Nervous System Lab: <https://app.acceleratelearning.com/scopes/15575/elements/691125>

Integumentary Lab: <https://gettingnerdywithmelanderdy.com/its-elementary-integumentary-that-is/>

Nervous and Integumentary System PowerPoint Images and Videos:

<https://www.cnn.com/videos/health/2018/01/30/vital-signs-nervous-system.cnn>

https://qbi.uq.edu.au/files/38434/Nervous_System.jpg

<https://www.evolving-science.com/health/scientists-find-largest-new-organ-body-00616>

<https://www.webmd.com/skin-problems-and-treatments/picture-of-the-skin#1>

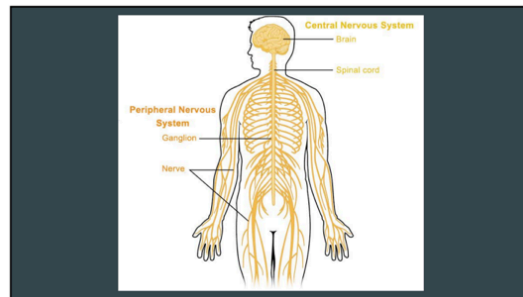
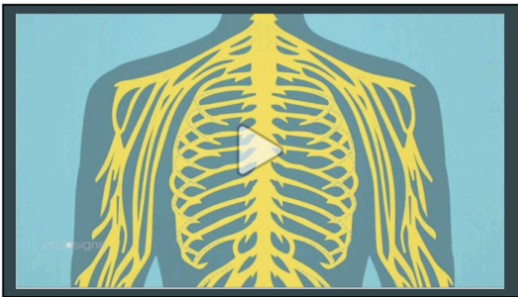
<https://gettingnerdywithmelanderdy.com/its-elementary-integumentary-that-is/>

Nervous System and Integumentary System PowerPoint

Nervous and Integumentary System

...

What is the primary role of the nervous system and how does it work? Share examples



Two Pathways

- Central Nervous System (CNS) made up of brain and spinal cord
- Peripheral Nervous System (PNS) made up of ganglion and nerves to send back information to brain quickly as possible

Activity

- Materials
- Tray
 - Towel
 - Timer
 - Small items (eraser, paper clip, marbles etc)

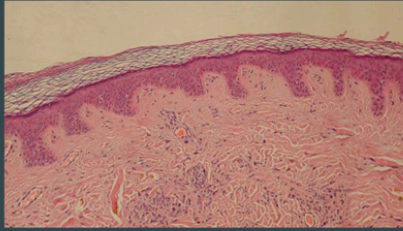
Summary Discussion

- Why do you think you were able to remember more items the second time?
- What else do you think the nervous system controls?

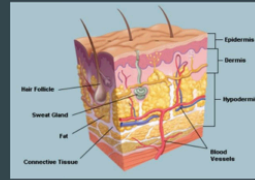
What do you think the largest organ in our body is?

- Pair, share, discuss with a partner

In fact largest organ in our body is.....



Human Skin



Made up of 3 layers

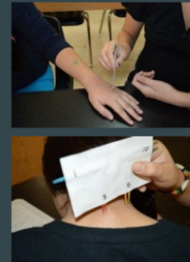
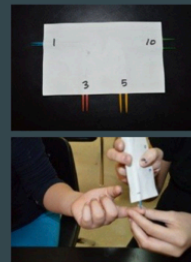
- 1) Epidermis
- 2) Dermis
- 3) Hypodermis

And is surrounded with blood vessels and nerves!

Activity

Materials needed:

- Index cards
- Toothpicks
- Ruler
- Glue



Summary Discussion

Share your findings with the class

Why are some areas of the skin more sensitive than others?



Explore

Nervous System

1. Under the towel is a tray with a number of small items.
2. Set the timer for one minute.
3. You will have one minute to observe and try to remember as many items as you can.
4. After the minute, cover the tray back up.
5. Then try to list as many of the items as you can in the data table.
6. Now come up with a memory technique or use one below to see if you can improve the number of items you can remember.
 - Chain it: Link the items together by thinking of images that connect them.
 - Place it: Items to be remembered are linked to specific places in the order you would visit them.
 - Chunk it: Remember items in small pieces.
 - Acrostic: Come up with a phrase that uses the first letter of a word to remember it.
7. Once you think you have it down, repeat steps 1–5.

List of Items: Trial 1	List of Items: Trial 2

Questions:

1. What is the main function of the nervous system?
2. How does the nervous system interact with other body systems?

Unit 2: Becoming the Experts
Expository ASL Mini Lesson

Teachable Moment: Expository ASL

Launch:

Ask students what does the word “Expository” mean to them?

Ask them to give examples of how they describe something in sequence to someone? What features do they focus on?

Ask how they would use expository ASL in science content? Would the features stay the same?

Introduce different aspects of Expository ASL from “Expository ASL Rubric”

Content Knowledge

Organization of Ideas/Concepts/Relationships

Spatial Awareness

Vocabulary (Right Sign Choice/Fingerspelling)

Ask students to explain what they think each one means to a partner, then class discussion.

Show YouTube video. Have them figure out how to describe this in expository ASL.

“Power of Union Is Strength” <https://www.youtube.com/watch?v=kLYa7frC5d4>

Explore:

Refer to “Human Body Systems Project” explain to students about Expository ASL and how they will create a video on the body system they are assigned.

Students may need time to research upon how their body system works

Hand Out diagram of body system (at this point students should already be assigned body system).

Summary

Students will then practice signing an expository video of the body system by recording themselves and sending it to the teacher. (This will serve as first documentation of documentation in use of imagery).

Expository ASL Rubric

Category	Beyond Expectations (4)	Expectations (3)	Meeting Expectations (2)	Need Attention (1)
Content Knowledge	Exceptionally clear, focused, engaging, with relevant, strong supporting detail.	Evident main idea with some support with may be general or limited.	Purpose and main idea may be unclear, no clear explanation given.	Lack central idea; development of ideas is minimal
Organization of Ideas/Concepts/ Relationships	Effective organization in sequential manner Creative and engaging intro and conclusion	Strong order and structure, ideas are there Sequence has minimal errors but does not affect the big picture.	Lack of structure; hard to follow Missing key ideas that help viewer understand importance and function of body system	Lack of structure; no ideas are presented; viewer does not know what is being signed.
Spatial Awareness (constant object handling)	Excellent use of spatial awareness in respect to functions and relationships of structure.	Strong spatial awareness early on and maintains relationship of structure for most of the presentation.	There are a few lapses in focus, but the purpose is fairly clear.	Difficulty in showing structure and relation of object.
Vocabulary (Correct use of sign choice + fingerspelling)	Fingerspelled vocabulary right after explanation Excellent use of sign choice and excellent use of fingerspelling at appropriate times within video	Vocabulary is introduced through video with fingerspelling slight error. Sign choice is good, not consistent.	Vocabulary is fingerspelled but not explained. Many errors of sign choice.	Too much fingerspelling or not enough throughout video. Sign choices are not appropriate.

Unit 2: Becoming the Expert
Lesson Plan #4: Skeletal and Muscular System and its Interrelationships

Goal

MS-LS1-3: Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

ASL Standard: Text Types and Purposes:

Sign arguments to support claims with clear reasons and relevant evidence.

Published Signing/ Vocabulary Description and Use (Fingerspelling)

Sign informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

Acquire and use accurately grade-appropriate general academic and domain-specific signs, fingerspelled words, and phrases; gather vocabulary knowledge when considering signs, fingerspelled words, or phrases important to comprehension or expression.

Content Objective

Students will explain how the muscular system works from a procedural perspective as well as the different types of muscles there are and their locations (i.e. skeletal, smooth, cardiac) and how the muscular system is closely tied to the skeletal system(i.e. interrelationship between subsystems) as measured by written responses in their science journals.

Language Objective

ASL Objective:

In this lesson, distinctive ASL structures will be emphasized, specifically classifiers and sequential markers such as “first ...then...last” explaining what muscle shaped like and describing how the bicep and triceps muscle works along with the elbow joint.

CLASSIFIERS are provided as descriptors in terms of shape, look-like
SEQUENTIAL MARKERS can be provided with use of non-dominant hand to list things that occur in sequential manner, or as given through a story-telling portrayal of how body system functions from start to finish

English Objective:

Given the different body systems stations, students will explain their observations on a worksheet that is specific to each station using words such as “I observe”, “happening”, and provide details to support their observations. Students will also explain “the (body system)

main function is....” and it “interacts with the rest of the body by....” as measured by their written responses.

Formative Assessment:

While students are recording their signed responses, I will monitor student’s progress by asking them questions regarding the body systems to access their prior knowledge. Focus will be on individual responses as well as class discussion. For this lesson, evaluation of whether students described the relationship between the bones of the arm and the biceps/triceps, and how it affects movement using the “Expository ASL Rubric”.

Muscular System Questions

What are the levels of organization in a skeletal muscle from largest to smallest unit?

Fibers -> myofibrils → sarcomeres → filaments

Would you be able to move without muscles? Why or why not?

No, you cannot move without muscles since there is no pull and push reaction.

What are three types of muscles? Smooth, skeletal, cardiac. Where can you find each one?
Smooth (Ex. stomach), Skeletal (Ex. Biceps), Cardiac (Only on heart)

Skeletal System Questions

What is some type of bone joints in the body?

Gliding, pivot, hinge, ball and socket

What is the role of the bone for our body? Protection

Summative Assessment:

Students will record and label the parts of the muscle and skeletal system, describe its function and how both systems are interrelated through written and signed responses.

Materials:

Muscle Lab
Clothespin
Stopwatch

Bone Lab
At least 3 chicken bones
Access to 3 jars of water (16 oz) stove, and bleach (500 mL)
Large Bowl

The Lesson:

Muscular System

Launch:

1. Pose questions to students and have them write on a paper: “In your own words, explain how muscles allow our bodies to move. If needed, feel free to show this in a drawing or a diagram you create”.
2. After students have written on a paper have students share in class.

Have students watch TedED video: <https://www.youtube.com/watch?v=VVL-8zr2hk4>

3. Ask students to identify two different types of muscles (involuntary and voluntary) and have them give examples of each.
4. Ask students how many types of muscles there are and have them give examples of each:
 - a. Skeletal: voluntary muscles that move bone
 - b. Smooth: involuntary muscles that make up internal organs
 - c. Cardiac: involuntary muscles only found in heart
5. Ask students if there has ever been a time where muscles can tire? What were some examples?

Explore:

Task One

1. Hold a clothespin between your thumb and index finger and see how many times you can squeeze it in one minute. Record.
2. Now, without resting, squeeze it as fast as you can for the second minute. Record.
3. What causes the clothespin to move? Muscles
4. Why do you think your forearm burns? Your muscle is fatiguing.

Task Two

1. Sit against a wall with your knees bent at a 90-degree angle.
2. Hold this position as long as you can until your muscles begin to burn. How long did it take you to feel the burn?

Questions:

1. What is the main function of the muscular system? Movement
2. How does the muscular system interact with other parts of the body? It works with the skeletal system to move the body, and it works with the circulatory system to pump blood.

Summary:

1. List and describe the features of 3 different muscle types.
2. Describe difference between involuntary and voluntary muscles.
3. Describe in your own words how muscles allow our bodies to move. If needed, feel free to show this in a drawing or a diagram you create.

Skeletal System

Launch:

Pose question to students: “How is our body protected? Specifically, our internal organs? Is this protection repairable?”

To engage students I conduct a chicken bone demonstration written by Lawrence Hall of Science (2015) In this demonstration I have students observe three bones that have received three different treatments:

- 1) Soaked in bleach
- 2) Baked
- 3) Vinegar

It's important that you plan ahead of time since the bleach treatment takes about 24 hours to soak.

Explore:

1. After 24 hours, use tongs to remove bones from each container and rinse off with water. Try to bend and flex each bone. What differences do you notice?
2. Place each bone back in its cup. Every day, for 2-3 days check flexibility of bones again. How does flexibility change over time?

Summary

Discuss with students what is going on?

Exit Slip: Have students use scientific terms such as calcium, rigid, flexibility.

Modifications

- Some students may need additional support in spelling or identifying English words for signs.
- Pair shares, wait time
- Reminder how to communicate ideas throughout activity and group discussions
- Visual displays (images, videos) supported with captioning as needed
- Teaching Strategies for BLA-ASL
 - Explicit and Elaborate
 - Fingerspelling
 - Eye gaze for participation
 - Prompting using ASL for further class and/or individual discussions

Unit 2: Becoming the Expert
Lesson Plan #4: Skeletal and Muscular System and its Interrelationships cont.

Credits:

Muscle Lab:

<https://app.acceleratelearning.com/scopes/15575/elements/691125>

Bone Lab:

http://static.lawrencehallofscience.org/diy_human_body/downloads/diy_hb_stiff_bones_bendy_bones.pdf

Muscle and Bone PowerPoint Images/Videos:

<https://www.youtube.com/watch?v=VVL-8zr2hk4>

https://www.teachpe.com/anatomy/types_of_muscle.php

<https://c.tadst.com/gfx/300x175/fb-stopwatch2.png?1>

https://images.schoolspecialty.com/images/1006317_ecommmfullsize.jpg

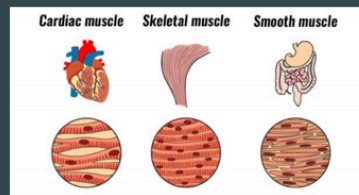
https://upload.wikimedia.org/wikipedia/commons/thumb/2/23/603_Anatomy_of_Long_Bone.jpg/250px-603_Anatomy_of_Long_Bone.jpg

https://sites.google.com/site/missjacksonscience7/_/rsrc/1452288275421/skeletal-s/skeleton%20labeled.JPG

Skeletal and Muscular System PowerPoint

Skeletal and Muscular System ...

In your own words, explain how muscles allow our bodies to move? If needed feel free to show this in a drawing or a diagram you create.



Activity

- Materials Needed:
- Timer
- Clothespin
- Handout

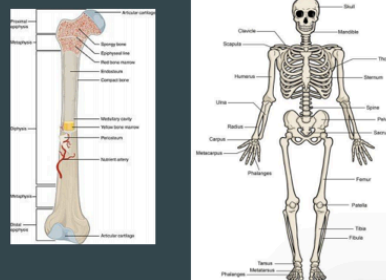


Summary

What is the main function of the muscular system?

How does the muscular system interact with other parts of the body?

In your own words, explain how our body is protected. Specifically, our internal organs. Is this protection repairable or irreparable?



Activity

Materials Needed:

At least 3 chicken bones

3 Jars

Water, Vinegar, Bleach

Access to Stove

Paper towel

Explore:

After 24 hours of being soaked in a solution, try to bend and flex each bone.

Check flexibility again for 2-3 days. Be sure to put bones back in solution.

Summary

What is going on?



Explore

Muscular System

Task One

1. Hold a clothespin between your thumb and index finger and see how many times you can squeeze it in one minute. Record.
2. Now, without resting, squeeze it as fast as you can for the second minute. Record.

Number of Squeezes During First Minute	Number of Squeezes During Second Minute

Task Two

1. Sit against a wall with your knees bent at a 90-degree angle.
2. Hold this position as long as you can until your muscles begin to burn. How long did it take you to feel the burn?

Questions:

1. What is the main function of the muscular system?

2. How does the muscular system interact with other parts of the body?

Unit 2: Becoming the Expert
Lesson #5: Urinary (Excretory) and Digestive Systems and its Interrelationships

Goal

MS-LS1-3: Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

ASL Standard: Text Types and Purposes:

Sign arguments to support claims with clear reasons and relevant evidence.

Published Signing/ Vocabulary Description and Use (Fingerspelling)

Sign informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

Acquire and use accurately grade-appropriate general academic and domain-specific signs, fingerspelled words, and phrases; gather vocabulary knowledge when considering signs, fingerspelled words, or phrases important to comprehension or expression.

Content Objective

Given body system stations in which students will utilize materials to understand how the body system functions, students will explain how the three distinctive body systems (excretory, urinary and digestive system) work from a procedural perspective and identify what their relationships are with other body systems as measured by written responses in their science journals.

Language Objective

ASL Objective:

In this lesson, distinctive ASL structures will be emphasized such as: FINGERSPELLING (LABELING) organs and systems and CLASSIFIERS, explaining what organ shaped like when asked to provide an expository video of a body system focused in this lesson (excretory or digestive system).

Given the different body system stations, students will sign their responses by appropriately signing the content (fingerspelling specific body system) and using correct spatial awareness, classifiers and organization of the body system function in sequential manner. Students will also sign their predictions, observations and findings as measured by their by in class responses.

English Objective:

Given the different body systems stations, students will explain their observations on a worksheet that is specific to each station using words such as “I observe”, I noticed ____ happening”, and provide details to support their observations. Students will also explain “the (body system) main function is...” and it “interacts with the rest of the body by...” as measured by their written responses.

Formative Assessment

While students are recording their responses, I will monitor for student’s progress by asking them questions regarding the body systems to assess their prior knowledge to measure individually and as a whole class, such as parts of the respiratory and urinary system and their respective connections between the circulatory and excretory system respectively.

Urinary/Excretory System Questions:

What are the two names for the liquid waste removal system? Excretory and urinary

What are the four main parts of the excretory system? Kidneys, urethra, bladder, urethra

What connects the kidneys to the bladder? Urethra

Digestive System Lab Questions:

1. What is going on in the Saltine Activity?
2. What is causing the crackers to dissolve in the mouth?
3. What does the plastic bag represent in this activity?
4. What does the hose represent?

Summative Assessment

Students will record and label the parts of the urinary system; excretory and digestive system describe its function through written responses and signed responses.

Materials

Excretory/Urinary Station

Sand Funnel
Beaker Long plastic tube
Water Short tube
Yellow Food Coloring Handout
Rubber Band
Graduated Cylinder
Coffee Filter

Lesson Plan

Intro:

Begin by asking students questions that will elicit responses relating to the urinary system and excretory system:

Show PPT slide with prompt:

Explain to students that today we will be learning about the function of the excretory system and the urinary system as well as making connections on how these two systems have closely knit interrelationship with other systems (allow students to make discovery themselves: urinary → excretory) We will have readings and activities that will help us build our understanding of these systems.

Explore

1. Hand out reading worksheet, have students read and pair share with a partner what they learned. (Note: Teacher will monitor for any confusion, and may use PPT as resource for guiding whole class)
2. Use PPT slides to guide class.
3. Explain structure, and functions of both excretory and urinary system.

Activity: Station

Urinary/Excretory System Activity

1. Measure 100 mL of sand into a 500-mL beaker. Leave the sand in the beaker. The sand represents waste in your blood.
2. Add 100 mL of water to the beaker with the sand.
3. Add 10 drops of yellow food coloring into the beaker with sand and water and stir.
4. Fill a second beaker with 200 mL of water.
5. Place the filter over the beaker containing 200 mL of water and secure it in place with a rubber band. Push the filter in slightly to form a bowl. Your kidneys filter the blood of wastes.
6. Use the spoon to place three scoops of the yellow mixture from the first beaker directly on top of the secured filter paper.
7. Pour 50 mL of water over the yellow mixture on the filter paper.
8. Observe and record what your observations.
9. Fill the third beaker with 200 mL of water.
10. Carefully place the filter paper with the same sand and water mixture you just used onto the top of the third beaker. Secure it with the rubber band.
11. Using the graduated cylinder, pour 50 mL of water over the sand and water mixture.
12. Compare the liquids in beakers 2 and 3. Record your observations.

Discuss:

1. Your kidneys filter wastes from the blood. What part of the lab represented the kidneys? Coffee filter
2. What do you think would happen if your kidneys stopped working? Organs could shut down.
3. What is the main function of the excretory system? It filters and removes waste from the blood.
4. How does the excretory system interact with other systems? It works with the circulatory system and skin to remove waste. Without the kidneys, wastes would build up in the blood. Eventually, this would lead to other organs shutting down as they become surrounded by their own waste chemicals.

Digestive Station

Stomach Acid Machine

1. Place three crackers into a zip-top bag. What does the bag represent? Stomach
2. Pour in 100 mL of a carbonated beverage (cola) into the bag and zip the bag closed. What does the soda represent? Stomach acid
3. Observe the crackers. Record any changes.
4. Squeeze the bag in a pumping action for three minutes. Use the classroom clock to measure the three minutes.
5. Observe and record what happens to the crackers inside the bag. The stomach churns to break the food down even further.

Discuss the following and answer the questions together.

- What do you think the digestive system does? It breaks food into small enough pieces for the body to use. Answer your first question.
- Can you name some organs of the digestive system? Tongue, esophagus, stomach, small and large intestine
- Are these made of muscles? Yes. How do you know? Most of them move.
- What would the tissues of the stomach need to be specialized to do? Churn and mix food

Questions:

1. What is the main function of the digestive system? Break food into small enough pieces to be used by the body.
2. How does the digestive system interact with the rest of the body? Answers can vary. Possible responses: Circulatory system carries nutrients throughout the body brain instructs the digestive system, absorbs nutrients and sugars to fuel all other systems, etc.

Summary: Discuss station activity as a class with questions

Why is it important to stay hydrated? Hydration through fluids helps our body dissolve nutrients and make them accessible by the body's cells as well as remove waste products, proteins, and foreign invaders.

Modifications

- Some students may need additional support in spelling or identifying English words for signs.
- Pair shares, wait time
- Reminder how to communicate ideas throughout activity and group discussions
- Visual displays (images, videos) supported with captioning as needed
- Teaching Strategies for BLA-ASL
 - Explicit and Elaborate
 - Fingerspelling
 - Eye gaze for participation
 - Prompting using ASL for further class and/or individual discussions

Credits:

Urinary System Lab: <https://app.acceleratelearning.com/scopes/15575/elements/691125>

Digestive System Lab: <https://app.acceleratelearning.com/scopes/15575/elements/691125>

Urinary, Excretory and Digestive System PowerPoint Images and Video:

<http://4.bp.blogspot.com/-jJC5Hi5v0-k/WDIEU6rgXcI/AAAAAAAAUY/J0GGctAdj4A1-dla6BViwyMDyOnWef7CACK4B/s1600/Excretory%2Bsystem.png>

[https://www.niddk.nih.gov/-/media/Images/Health-Information/Digestive-](https://www.niddk.nih.gov/-/media/Images/Health-Information/Digestive-Diseases/The_Digestive_System_450x531.jpg?la=en&hash=F9F89B8C9B062082180327E2DDBC1FBA)

[Diseases/The_Digestive_System_450x531.jpg?la=en&hash=F9F89B8C9B062082180327E2DDBC1FBA](https://www.niddk.nih.gov/-/media/Images/Health-Information/Digestive-Diseases/The_Digestive_System_450x531.jpg?la=en&hash=F9F89B8C9B062082180327E2DDBC1FBA)

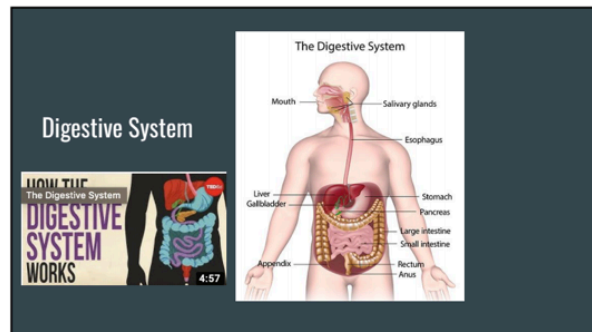
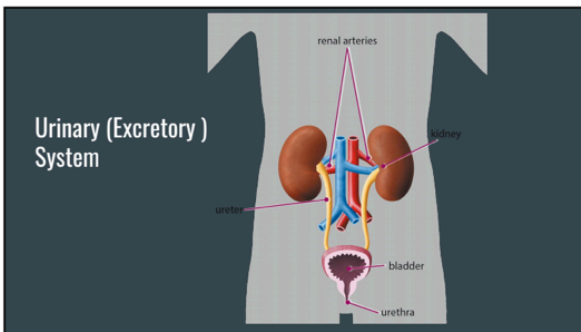
<https://www.youtube.com/watch?v=Og5xAdC8EUI>

Excretory (Urinary) and Digestive System PowerPoint

Urinary, Excretory and Digestive System

...

What are some of the ways our body creates waste? How does our body remove waste?



Excretory/Urinary System Lab Activity

Materials Needed:

Sand Funnel Beaker Long plastic tube
Water Short tube Yellow food coloring Rubber band
Graduated cylinder Coffee filter Handout

Summary

Your kidneys filter wastes from the blood. What part of the lab represented the kidneys?

What do you think would happen if your kidneys stop working?

What is the main function of the excretory/urinary system?

Digestive System Lab Activity

Stomach Acid Machine:

Materials Needed: three crackers, Coca-Cola (100mL), Zip-top bag

Summary

What do you think the digestive system does?

Can you name some organs of the digestive system?

Are these made of muscle?

Exit Slip: In your own words, record an ASL video of yourself explaining the relationship between the excretory/urinary system and the body.



Explore

Excretory Station

1. Measure 100 mL of sand into a 500-mL beaker. Leave the sand in the beaker.
2. Add 100 mL of water to the beaker with the sand.
3. Add 10 drops of yellow food coloring into the beaker with sand and water, and stir.
4. Fill a second beaker with 200 mL of water.
5. Place the filter over the beaker containing 200 mL of water and secure it in place with a rubber band. Push the filter in slightly to form a bowl.
6. Use the spoon to place three scoops of the yellow mixture from the first beaker directly on top of the secured filter paper.
7. Using a graduated cylinder, pour 50 mL of water over the yellow mixture on the filter paper.
8. Observe and record your observations for trial 1.
9. Fill the third beaker with 200 mL of water.
10. Carefully place the filter paper with the same sand and water mixture you just used onto the top of the third beaker. Secure it with the rubber band.
11. Using a graduated cylinder, pour 50 mL of water over the sand and water mixture on the filter paper.
12. Observe the contents of the third beaker and record your observations for trial 2.
13. Compare the liquids in beakers 2 and 3. Record your observations.

Trial	Observations
1	
2	
Comparison	

Questions:

1. What is the main function of the excretory system?

2. How does the excretory system interact with other systems?

Unit 3: Implications on Everyday Health
Lesson #6: How Do Diseases Affect Body Systems?

Goal

MS-LS1-3: Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

ASL Standard: Text Types and Purposes:

Sign arguments to support claims with clear reasons and relevant evidence.

Published Signing/ Vocabulary Description and Use (Fingerspelling)

Sign informative/explanatory text to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

Acquire and use accurately grade-appropriate general academic and domain-specific signs, fingerspelled words, and phrases; gather vocabulary knowledge when considering signs, fingerspelled words, or phrases important to comprehension or expression.

Content Objective

Given a mini presentation on diseases that affect specific body systems, students will research a disease that affects the assigned body system they researched (Human Body Systems Project) and demonstrate an understanding of diseases by; comparing and contrasting the difference between infectious and non-infectious disease; classifying identifying several infectious and noninfectious diseases; and identifying which organ or system the disease affects as measured by their responses.

Language Objective

ASL Objective:

Given the mini presentation and research activity, students will sign their responses explaining what a disease is (fingerspelling + definition of vocabulary) and that they are divided into two groups (infectious and noninfectious) as measured by their in-class responses.

English Objective:

Given the mini presentation and reading research activity, students will write down what disease they found that affected their body system project, including name and how it affects the system, as measured their written response in their science journal.

Formative Assessment

While students are researching a disease that affects a body system (assigned body system for project), I will ask students several questions to ensure they understand what diseases are:

1. What is a disease?
2. What types of diseases are there? (There are two types, infectious and noninfectious)
3. Give me an example or two of infectious and noninfectious diseases related to their own body system

Summative Assessment

Given an exit slip, students will present a disease that affects their body system as measured by their ASL Body Systems presentation.

Materials

PowerPoint
Internet
iPad

Lesson:

Introduction:

1. Help students identify the numerous benefits of physical activity and exercise by reflecting on the following questions in writing.
 - a. What physical activity do you enjoy?
 - b. List as many benefits of physical activity and exercise as you can.
 - c. What are some consequences of a healthy body that we must consider?
 - d. When does a body become unhealthy and how?
- e. What does the word “disease” mean to you? Do you know of anyone with a “disease”?
2. Have students discuss their answers in class setting.
3. Introduce the term “disease” and definition “condition that does not allow the body to function normally.”
4. Ask what some common diseases are, (answer looking for is flu, cold).
5. Explain that diseases are broken down into two groups:
 - a. Infectious
 - b. Noninfectious

Infectious Disease Types:

- Infectious diseases are caused by tiny organisms called pathogens.
- These pathogens can be bacteria, viruses, fungi, or protists.
- These pathogens can come from another person, a contaminated object, an animal bite, or the environment.

- The immune system is responsible for distinguishing between the different kinds of pathogens and reacting to each according to its type.
- Once a pathogen has entered the body, it works by damaging individual cells within the organs or in some cases attacks an entire body system.

Noninfectious diseases are diseases that are not caused by pathogens in the body.

- They are not spread from organism to organism.
- These diseases are caused by malfunctions in body systems that are either inherited or caused by environmental factors

Explore:

Students will categorize images of diseases into two categories: infectious and noninfectious as well as identifying which body system is affected.

Note: Some diseases do not have images, so word print outs will be given, students can use internet to research and determine where it falls

Examples:

Cold: illness caused by viral infection located in respiratory system

Flu: Highly contagious viral infection of the respiratory system

Athlete's Foot: fungal infection of skin

Strep Throat: contagious disease caused by bacterial infection located in throat

Noninfectious Disease Types:

Diabetes: disease results in glucose (sugar) level of blood being higher than normal range (cardiovascular system)

Parkinson's Disease: Disease of nervous system that occurs when certain nerve cells in the brain stop functioning properly, affecting the muscular system

Skin Cancer: a disease in which skin cells found in the outer layers of skin become damaged

Asthma: a disease that affects the lungs and airways that deliver air to the lungs

Summary:

Students will be given an opportunity to research their body system and determine an infectious disease or non-infectious disease and how it affects their body system. How is this disease transported into the organs? Blood, nutrients...

Students will also be asked to write down what they found into their science journal and add to their PowerPoint.

Modifications

- Some students may need additional support in spelling or identifying English words for signs.
- Pair shares, wait time
- Reminder how to communicate ideas throughout activity and group discussions
- Visual displays (images, videos) supported with captioning as needed
- Teaching Strategies for BLA-ASL
 - Explicit and Elaborate
 - Fingerspelling
 - Eye gaze for participation
 - Prompting using ASL for further class and/or individual discussions

Credits:

Lesson idea modified from:

<http://www.darlington.k12.sc.us/common/pages/DisplayFile.aspx?itemId=19466925>

How Do Diseases Affect Our Body Systems PowerPoint Images:

https://www.uab.edu/studentaffairs/news/images/News_Images/Flu-or-Cold-graphic.jpg

https://www.mayoclinic.org/-/media/kcms/gbs/patient-consumer/images/2014/01/23/09/24/mcdc7_athletes_foot.jpg

<https://cdn1.medicalnewstoday.com/content/images/articles/312/312433/strep-throat-br-image-credit-james-heilman-md-2010-september-29-br.jpg>

<https://3c1703fe8d.site.internapcdn.net/newman/csz/news/800/2017/1-rudnuniversi.jpg>

<https://previews.123rf.com/images/logo3in1/logo3in11711/logo3in1171100042/90665330-parkinson-s-disease-symptoms-illustration-about-health-problem-of-elderly-people-.jpg>

How Do Diseases Affect Our Body Systems PowerPoint

How do diseases affect our bodies?

...

Reflection:

What types of physical activity do you enjoy?
List as many benefits of physical activity/exercise as you can.

What are some consequences of a healthy body we must consider?

What do you think of when the word "disease" comes to mind?

Share with a partner

Disease *noun* "condition that does not allow the body to function normally"

There are two types: infectious and non-infectious

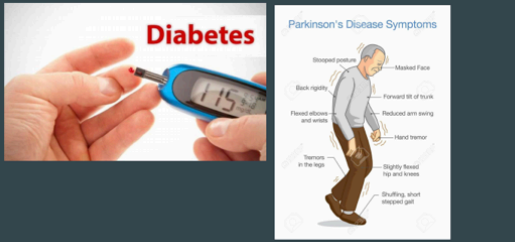
Infectious can be spread

Non-infectious cannot be spread

Examples of Infectious Diseases:



Examples of Non-infectious Diseases:



Summary:

Research your assigned body system and determine an infectious or non-infectious disease and how it affects the body system.

How is this disease transported into the organs?

Unit 3: Implications on Everyday Health
Lesson Plan #7: Application of Knowledge through Frog Dissection

Goal

MS-LS1-3: Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

After reviewing lab safety and introducing the dissection procedure, students dissect a preserved frog in order to observe the external and internal structures of frog anatomy. This lesson is recommended with at least 60 minutes of class time.

Content Objective

Students will participate in a scientific dissection of a frog, examine the internal and external anatomy of the frog by identifying all major organs and body systems and explain in detail the functionality and importance of the body systems. Ultimately, students will explain similarities and differences between frog and human anatomy.

Language Objective

ASL Language:

Given the frog dissection activity, students will explain how distinctive body systems function by signing rhetorical questions “FS (fingerspelling body system) FUNCTION HOW? (Explain). IMPORTANT WHY? ...” as measured by their accurate responses

English Language:

Given the frog dissection activity, students will identify and label the external and internal anatomy of the frog by identifying its organs, body systems as measured by accuracy of label and organ associations worksheet.

Formative Assessment

As students are proceeding with the dissection, students will use the scientific process to make observations about what they noticed, will identify similar and different characteristics in human organs previously discussed in Unit 1 and make conclusions based on prior knowledge.

I will ask the students to identify differences between the frog and the human body, as well as ask them to point out various organs to which systems they belong.

Summative Assessment

Students will identify the internal and external anatomy of the frog and compare its similarities and differences compared to a human through ASL response.

Materials

Carolina Frog Dissection Worksheet

Preserved Frogs
Frog Dissection Kit
Aprons
Rubber Gloves

Lesson:

Before starting the lesson, the teacher will address safety issues in the lab and provide clear instructions for students to follow.

Safety Guidelines:

Students will be working with sharp dissection tools. Protective eyewear must be worn at all times during this activity and gloves are required. We use powder-free latex gloves by default, however a box of one-size-fits all polyethylene (non- latex) gloves will also be available, and substitute gloves of another material are available for the whole class upon special request ahead of time. Please inform the instructor of a latex allergy before the day of the lesson. Hands and tables should be washed following the lesson.

Suggested Procedure:

1. Review Carolina Frog Dissection Guide and worksheet with Students
2. Review and model appropriate handling of dissection tools. Encourage students to work carefully and respectfully with one another and their specimens.
3. Monitor and observe student groups as they work through dissections.
4. Upon completion of dissection, work with students to complete Carolina Frog Dissection Lab Worksheet.

Intro:

1. Explain to students that today, we will apply all of our knowledge about body systems into a hands-on performance task (Frog Dissection).
2. Ask students what would be the rules for a safe environment? Review rules of dissecting with student. Emphasize Safety First at all times. Any student that fails to comply with this will have their frog immediately taken away and work with a partner.
3. Hand Out Frog Dissection Worksheet. Review the instruction with the class.
4. Hand Out individual frogs (x1 per student).

Explore:

1. Distribute frogs and Frog Dissection Lab Key to students
2. Monitor and observe students as they work through dissections.
3. Upon completion of dissection, work with students to complete Frog Dissection Lab Vocabulary worksheet.

Summary:

1. Have students identify organs on frog dissection using worksheet.
2. Ask students to take out their journals and respond to the prompt: Which body system serves the most important function in the human body?
3. Have students share their ideas.

Modifications

Step by step picture instructions should be provided for students who need support to stay focused. Instructional sentences and Vocabulary words would be included to help students be familiar with scientific terminology.

- Some students may need additional support in spelling or identifying English words for signs.
- Pair shares, wait time
- Reminder how to communicate ideas throughout activity and group discussions
- Visual displays (images, videos) supported with captioning as needed
- Teaching Strategies for BLA-ASL
- Explicit and Elaborate
- Fingerspelling
- Eye gaze for participation
- Prompting using ASL for further class and/or individual discussions

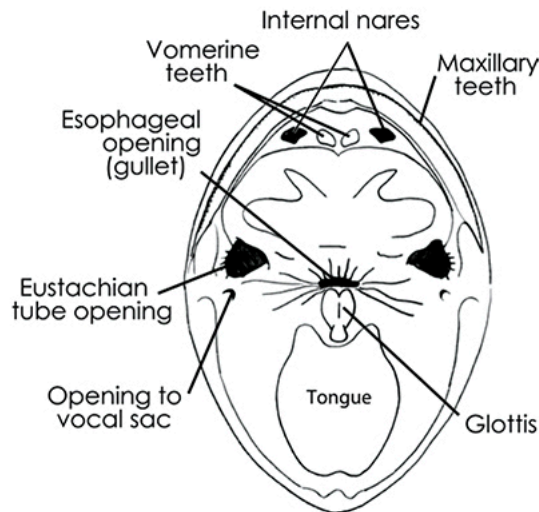
Credits:

Lesson idea modified from: <https://www.carolina.com/teacher-resources/Interactive/frog-dissection/tr48203.tr>

Carolina Frog Dissection Guide/Worksheet (per website)

External Frog Anatomy

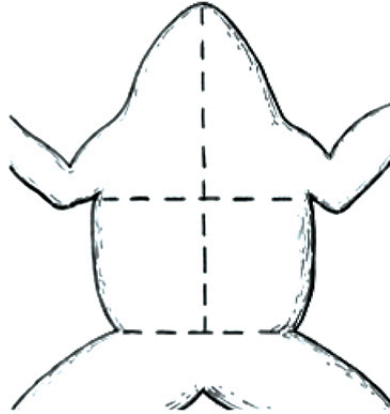
1. Obtain a preserved frog and place it on your dissecting tray, dorsal surface up.
2. Notice the appendages developed for a terrestrial life. The frog is a tetrapod, meaning that it possesses 4 limbs for locomotion. Observe that each forelimb is divided into an upper arm, forearm, and hand. Each hind limb is divided into a thigh, lower leg, and foot.
3. Study the head's external features.
 - a. Find the 2 external nares at the head's tip. They are used for respiration.
 - b. Posterior to the eyes are round tympanic membranes, the frog's external sound receptors.
4. Study the eyes. Notice the cloudy eyelid attached at the bottom of each eye. This is the frog's third eyelid, the nictitating membrane. In a living frog, this membrane is clear. It moistens and protects the eye.
5. Locate the cloaca at the specimen's posterior end. The cloacal opening, or anus, is the single exit from the urinary, reproductive, and digestive systems.
6. Place the frog on its dorsal side.
7. Cut through the jaw joints on each side of the mouth and open the mouth wide.
8. Identify the glottis and the opening to the esophagus. The esophagus leads to the stomach, and the glottis to the lungs.



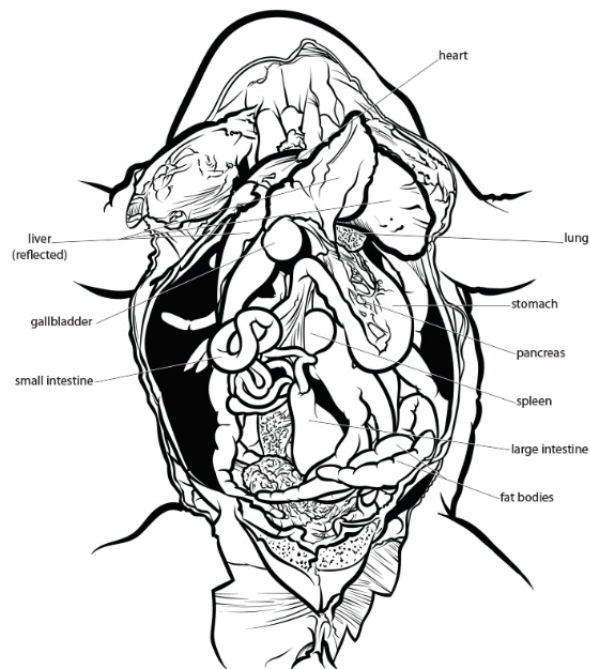
9. There are 2 sets of teeth. The fine maxillary teeth line the upper jaw and the two prominent vomerine teeth are found behind the mid-region of the upper jaw.
10. Two openings can be seen on the lateral sides of the mouth's roof. These are openings to the Eustachian tubes, leading to the tympanic membranes. These tubes help equalize pressure.

Internal Frog Anatomy

1. Lay the frog ventral surface up on the dissecting tray.
2. Pinch the loose skin at the center of the frog's stomach and make an initial cut with the scissors into the skin.
3. Cut through the skin, following the pattern shown in the diagram below.



4. Follow the same pattern to cut through the muscle and reveal the internal organs.
5. Find the large brownish structure in the center of the body cavity, the liver. This is the largest internal organ that consists of 3 lobes.
6. Lift the lobes of the liver and locate the gallbladder. It is a small greenish sac that stores bile.
7. Use the labeled diagram below to explore the rest of the internal anatomy. Identify the following internal structures:
 - a. Stomach
 - b. Small intestine
 - c. Large intestine
 - d. Spleen
 - e. Heart
 - f. Lungs
 - g. Fat bodies





8. Follow all clean up and disposal instructions.

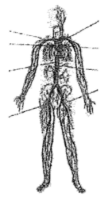
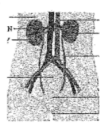
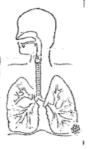
Appendix B: Student Work


Name: **Student A**

Date: April 29

Digestive System	Circulatory System	Muscular System
Respiratory System	Nervous System	Excretory (Urinary) System

Name of System	Diagram	What is the system for? What organs are involved?	What other systems does it work with?
digestive system		eating & pooping stomach, intestines, liver,	respiratory system
Nervous System		to feel brain, spine,	none other


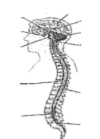
Circulatory System		Blood ^{heart} to keep moving & pumping blood.	respiratory System
Urinary System		to poop pee, bladder	none
Respiratory System		to breathe lungs, heart	none!




Muscular System		to move, Support	none other
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In complete sentences, write/sign a response explaining how body systems work and influence our everyday life.

Student B
Name: _____ Date: 4-29-19

Digestive System	Circulatory System ✓	Muscular System ✓
Respiratory System	Nervous System ✓	Excretory (Urinary) System ✓

Name of System	Diagram	What is the system for? What organs are involved?	What other systems does it work with?
Digestive System		for eat	
Nervous System		for movement	

Circulatory System		move to body	
Excretory (Urinary) System			
Respiratory System		for breath	always need air

Muscular System		exercise	
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In complete sentences, write/sign a response explaining how body systems work and influence our everyday life.

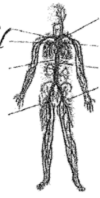
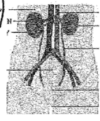
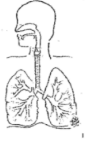
Your Brain made move to your body. Breath on your inside body. Muscular made to exercise more storge.

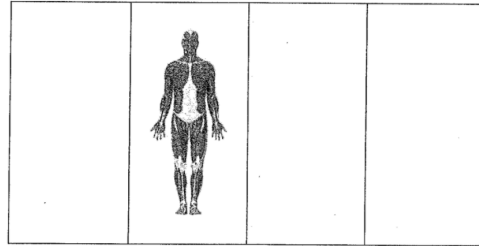
Name: **Student C**

Date: 4/29/19

Digestive System	Circulatory System	Muscular System
Respiratory System	Nervous System	Excretory System

Name of System	Diagram	What is the system for? What organs are involved?	What other systems does it work with?
Digestive System		when people eat ^{only} food into ^{the} body ^{inside} -body. part of the body ^{inside} the ^{way} clean if food ^{there}	
Nervous System		for movement	brain tell the body to move-well.

Excretory Urinary System		Brain tell body to-do work	
Circulatory System		Cleaning every day inside	people eating the food. Then, they went down
			


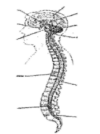


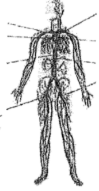
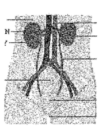
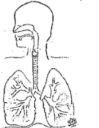
In complete sentences, write/sign a response explaining how body systems work and influence our everyday life.


Name: Student D

Date: 4/21/19

Digestive System	Circulatory System	Muscular System
Respiratory System	Nervous System	Excretory (Urinary) System

Name of System	Diagram	What is the system for? What organs are involved?	What other systems does it work with?
stomach stomach		chew the foods	
back pain		can move	

bone bone Muscle		can to lift things	all of the body
bat -		hold bathroom	bottom
lung		breath up your back and face	

<p>Muscles</p>		<p>move</p>	<p>all of body</p>
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In complete sentences, write/sign a response explaining how body systems work and influence our everyday life.



Accessing Prior Knowledge

Source and Systems

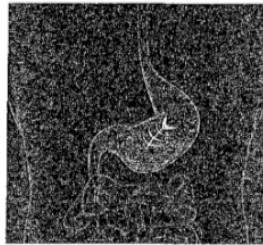
Name: Student A

Date: Apr 29

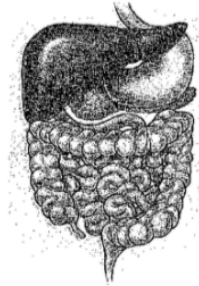
Which Comes First?



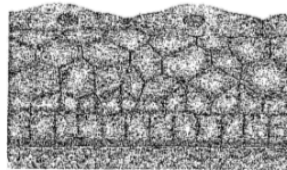
A



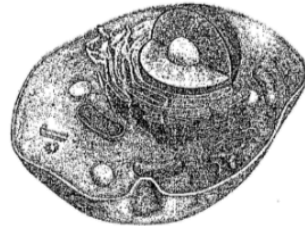
B



C



D



E

Complete the following statements about the pictures above.

- I believe the correct order of pictures from least complex to most complex is B
D, A, C, and E.
- I think E goes first because it is first to form.
- I think A goes last because it is last to form



Accessing Prior Knowledge

Science and Systems

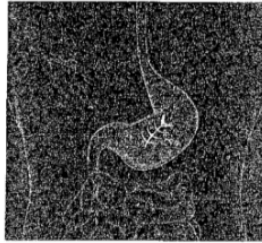
Name: Student B

Date: 4-29-19

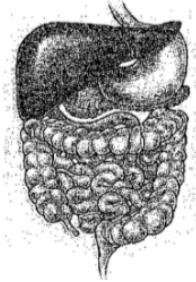
Which Comes First?



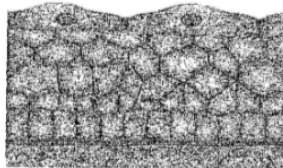
A



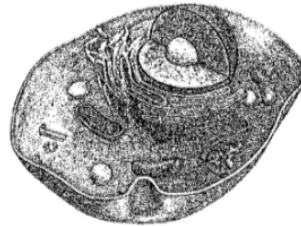
B



C



D



E

Complete the following statements about the pictures above.

- I believe the correct order of pictures from least complex to most complex is E, D, B, C, and A.
- I think E goes first because cell.
- I think A goes last because inside body.



Accessing Prior Knowledge

Science and Systems

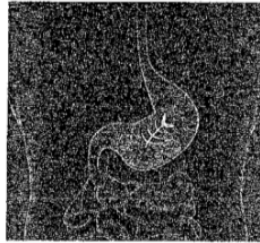
Name: Student C

Date: 4/29/19

Which Comes First?



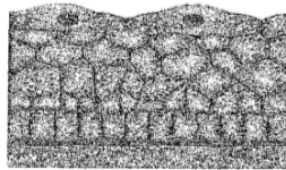
A



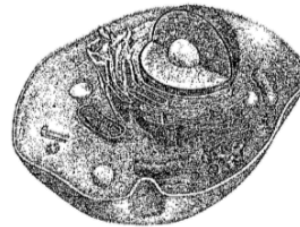
B



C



D



E

Complete the following statements about the pictures above.

- I believe the correct order of pictures from least complex to most complex is E, D, B, C, and A.
- I think E goes first because It was tiny cells.
- I think A goes last because The full body.



Accessing Prior Knowledge

Science and Systems

Student D

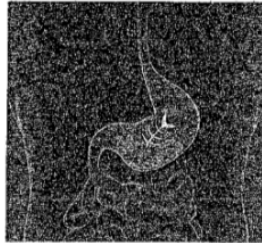
Name: _____

Date: 4-29-19

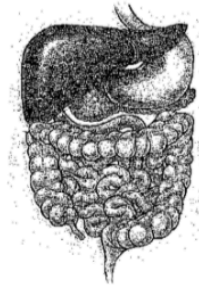
Which Comes First?



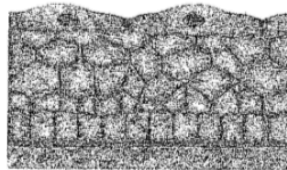
A



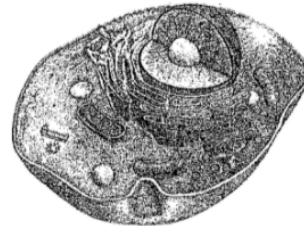
B



C



D



E

Complete the following statements about the pictures above.

- I believe the correct order of pictures from least complex to most complex is E, D, C, B, and A.
- I think E goes first because smaller can become bigger to grow
- I think A goes last because to spread at the last

Descriptive ASL Mini Lesson Responses

Student A

How do we use descriptive asl with ASL?

Well, that's simple. Using classifiers, surrogate, and token, you can imagine yourself as a blood cell, heart, or anything, then describe it. via ASL, you can describe yourself as something inanimate. facial expressions help.

Student B


Why is it so important
to be descriptive yet clear
as possible?

- If you sign not clear/unclear
that people will confusing/messing up
hard to follow / hard to listening.

Student C

How do we use Descriptive ABL w/science?

- To people understand.

- Facial expression 

- sign CLEAR.

- Role shift

Student D

Why is it so important to be descriptive yet clear as possible?

- will never understand if not clear

- most show things will grow or not

- science a lot of information can share with facial expressions, classifiers

- make description easy for others to visualize

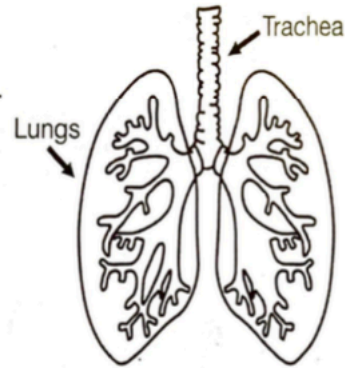
- clear

Respiratory System Reading and Worksheet

Name: _____

Your Lungs

by Cynthia Sherwood



You do something about twenty times a minute without even thinking about it—you breathe! In fact, every day you take about twenty-thousand breaths.

The organs of your body that allow you to breathe are called your lungs. You have two of them that work together, located in your chest inside the rib cage.

The main purpose of your lungs is to breathe in good air and breathe out bad air. The good air contains oxygen, which your body needs. The bad air is a gas called carbon dioxide, which your body cannot use.

When you breathe in through your nose or mouth, air travels down the back of your throat. It passes through your voice box and into your trachea, or windpipe. Your trachea is divided into two air passage tubes. One leads to your left lung. The other leads to your right lung. Inside your lungs, oxygen is removed from the air you breathe and pumped into blood cells. Your lungs also get rid of harmful carbon dioxide from these cells. This process takes place inside hundreds of millions of tiny air sacs.

Each adult lung is about the size of a football. When they are healthy, your lungs feel a little like a sponge and are pinkish-gray. When lungs are damaged by smoking, they can appear gray or have black spots on them.

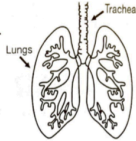
One disease that is very common in children involves the lungs. Asthma narrows the breathing tubes, making it harder to breathe. As many as nine million kids in the United States have asthma.

You probably already know that your lungs are important when you swim. But you may not know this—your lungs are the only part of your body that can float on water!

Name: Student A

Your Lungs

by Cynthia Sherwood



1. Where are your lungs located?

in my chest

2. Complete the graphic organizer.

Type of air that your lungs remove from your blood cells	Type of air that your lungs put into your blood cells
<u>CO₂</u>	<u>O₂</u>

3. What is your trachea?

my "throat" of lungs

4. What do lungs look like when they've been damaged from smoking?

gray & black spots

5. Why does asthma make it hard for people to breathe?

the trachea narrows

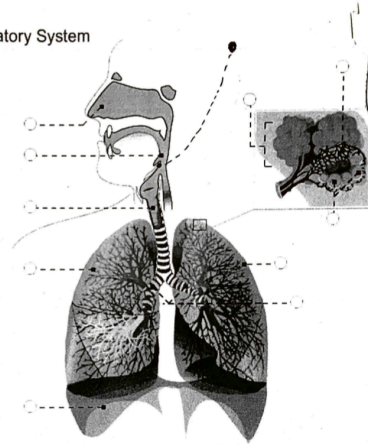
Name: Student A

Date: _____

Label the Diagram of Respiratory System

Human Respiratory System

Points: _____

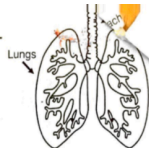


nasal cavity diaphragm pharynx epiglottis
 right lung alveolar sacs main bronchi
 trachea capillaries alveoli left lung

Name: Student B

Your Lungs

by Cynthia Sherwood



1. Where are your lungs located?

in your chest inside the rib cage.

2. Complete the graphic organizer.

Type of air that your lungs remove from your blood cells	Type of air that your lungs put into your blood cells
<u>Oxygen breathe pumped</u>	<u>harmful Carbon dioxide</u>

3. What is your trachea?

divided into two air passage tubes.

4. What do lungs look like when they've been damaged from smoking?

They can appear gray or have black spots on them.

5. Why does asthma make it hard for people to breathe?

need to air

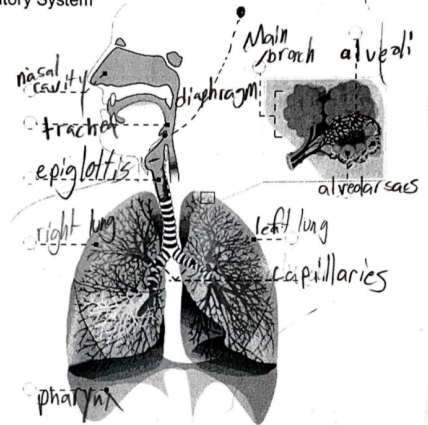
Name: Student B

Date: _____

Label the Diagram of Respiratory System

Human Respiratory System

Points: _____

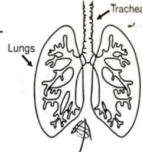


~~nasal cavity~~ ~~diaphragm~~ ~~pharynx~~ ~~epiglottis~~
~~right lung~~ ~~alveolar sacs~~ ~~main bronchi~~
~~trachea~~ ~~capillaries~~ ~~alveoli~~ ~~left lung~~

Name: Student C

Your Lungs

by Cynthia Sherwood



1. Where are your lungs located?
Inside the body (big lung)

2. Complete the graphic organizer.

Type of air that your lungs remove from your blood cells	Type of air that your lungs put into your blood cells

3. What is your trachea?
inside the holes

4. What do lungs look like when they've been damaged from smoking?
they will look black using

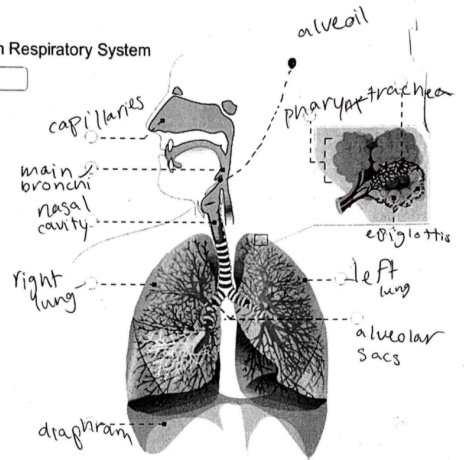
5. Why does asthma make it hard for people to breathe?
because of air need outside. Inside not enough room

Name: Student C Date: _____

Label the Diagram of Respiratory System

Human Respiratory System

Points: _____

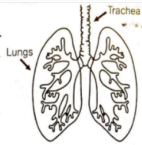


- ~~nasal cavity~~ ~~diaphragm~~ ~~pharynx~~ ~~epiglottis~~
- ~~right lung~~ ~~alveolar sacs~~ ~~main bronchi~~
- ~~trachea~~ ~~capillaries~~ ~~alveoli~~ ~~left lung~~

Name: Student D

Your Lungs

by Cynthia Sherwood



1. Where are your lungs located?
Chest

2. Complete the graphic organizer.

Type of air that your lungs remove from your blood cells	Type of air that your lungs put into your blood cells
<u>CO₂</u>	<u>O₂</u>

3. What is your trachea?
to keep stick together

4. What do lungs look like when they've been damaged from smoking?
like sponge

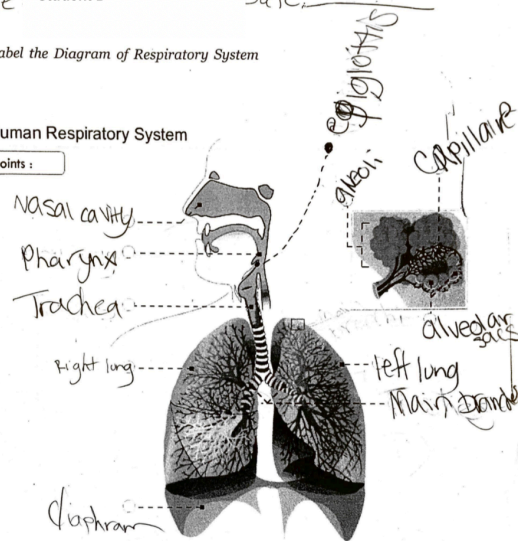
5. Why does asthma make it hard for people to breathe?
narrows the breathing tube

Name: Student D Date: _____

Label the Diagram of Respiratory System

Human Respiratory System

Points: _____



- ~~nasal cavity~~ ~~diaphragm~~ ~~pharynx~~ ~~epiglottis~~
- ~~right lung~~ ~~alveolar sacs~~ ~~main bronchi~~
- ~~trachea~~ ~~capillaries~~ ~~alveoli~~ ~~left lung~~

Name Student A

How Big Can You Blow Up a Balloon?

1. Take a normal breath, then blow as much air as possible into a balloon. Twist the end and hold it closed. Have your partner measure around the balloon at its widest point.
2. Let air out of the balloon. Repeat Step 1 and calculate the average of the two measurements.
3. Compare your results with those of your classmates. The bigger the circumference, the greater the volume of air exhaled.

	Attempt #1	Attempt #2	Average
Student D	54cm	69cm	61cm
Student B	50cm	65cm	57cm
Student A	55cm	72cm	63cm
Student C	58cm	75cm	66cm

Think It Over

What factors might affect the volume of air a person can exhale?

exercise, breath control, ↑ smalleress of lungs

Name **Student B** _____

How Big Can You Blow Up a Balloon?

1. Take a normal breath, then blow as much air as possible into a balloon. Twist the end and hold it closed. Have your partner measure around the balloon at its widest point.
2. Let air out of the balloon. Repeat Step 1 and calculate the average of the two measurements.
3. Compare your results with those of your classmates. The bigger the circumference, the greater the volume of air exhaled.

	Attempt #1	Attempt #2	Average
Student D	54cm	69cm	61.5 cm
Student B	50cm	65cm	57.5 cm
Student A	55cm	72cm	63.5 cm
Student C	58cm	75cm	66.5 cm

Think It Over

What factors might affect the volume of air a person can exhale?

lungs size small some large.

5/1/19

Name Student C

How Big Can You Blow Up a Balloon?

1. Take a normal breath, then blow as much air as possible into a balloon. Twist the end and hold it closed. Have your partner measure around the balloon at its widest point.
2. Let air out of the balloon. Repeat Step 1 and calculate the average of the two measurements.
3. Compare your results with those of your classmates. The bigger the circumference, the greater the volume of air exhaled.

	Attempt #1	Attempt #2	Average
Student D	54	69	88.5 cm
Student B	50	65	82.5 cm
Student A	55	72	91 cm
Student C	58 cm	75 cm	95.5 cm

Think It Over

What factors might affect the volume of air a person can exhale?

The heart - beats
OR
skinny = is ~~decrease~~ lowest
fatter = is highest

Student D

Name _____

How Big Can You Blow Up a Balloon?

1. Take a normal breath, then blow as much air as possible into a balloon. Twist the end and hold it closed. Have your partner measure around the balloon at its widest point.
2. Let air out of the balloon. Repeat Step 1 and calculate the average of the two measurements.
3. Compare your results with those of your classmates. The bigger the circumference, the greater the volume of air exhaled.

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Student C	58 cm	75 cm	66.5 cm

Think It Over

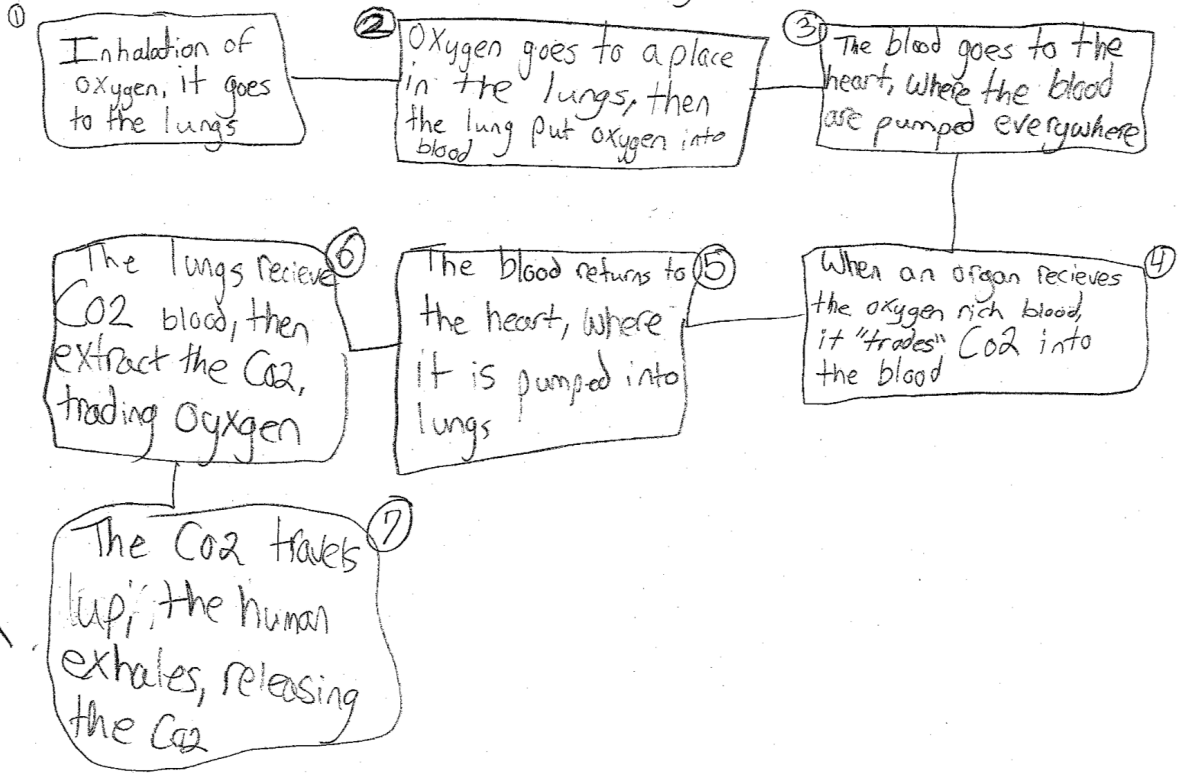
What factors might affect the volume of air a person can exhale?

- have big & small lungs
- ~~people~~ tot take lot air

Relationship between Respiratory and Circulatory System Flow Map

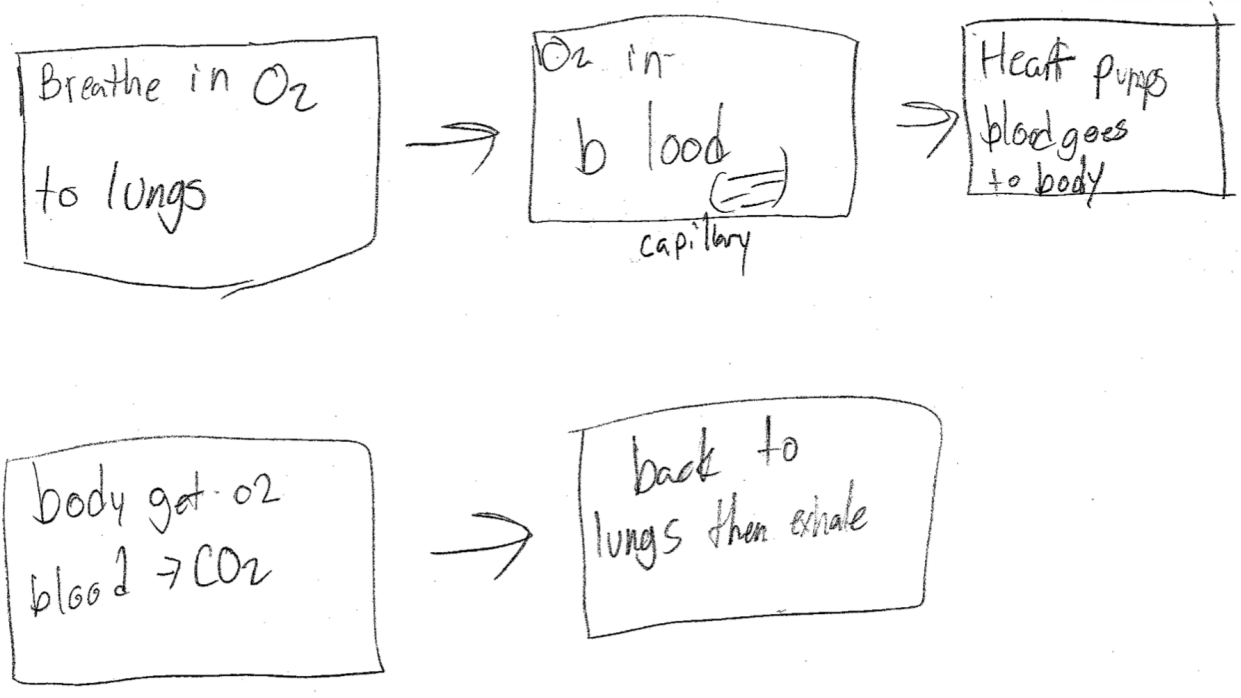
Process of delivering O₂ to body

Student A

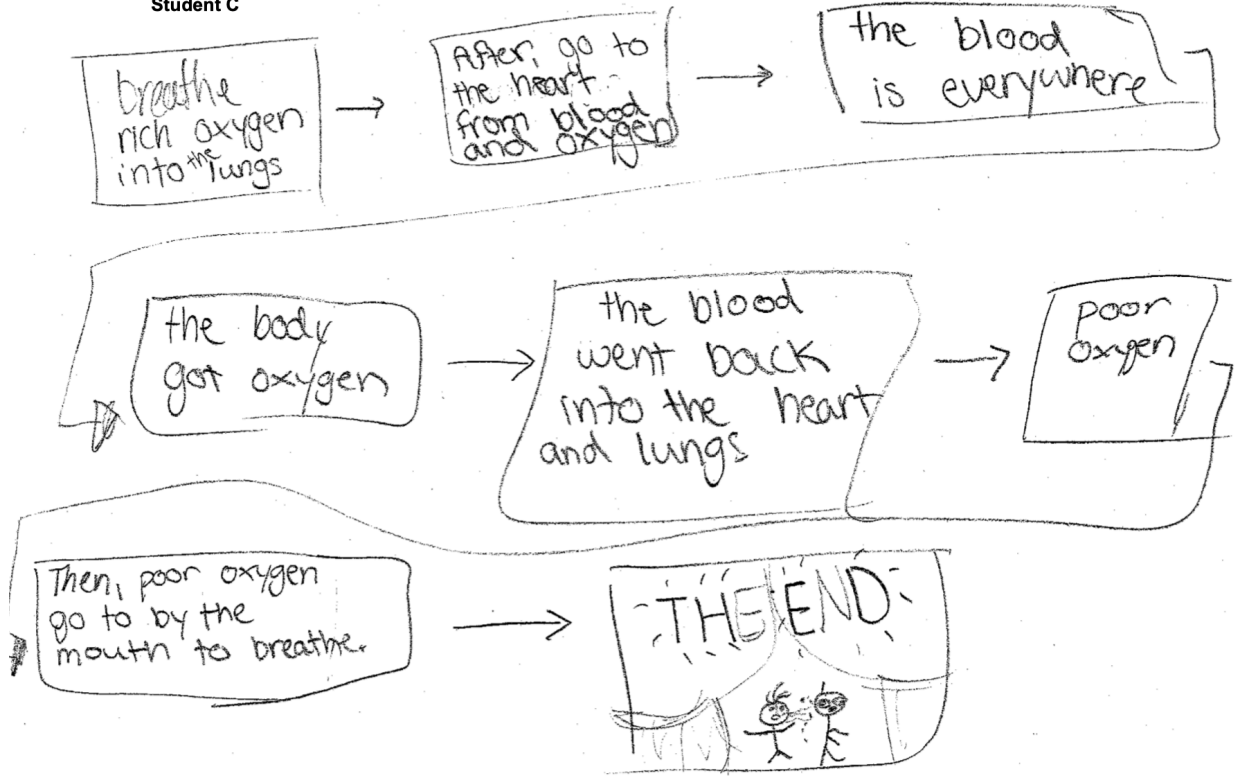


Process of Delivering O₂ to Body

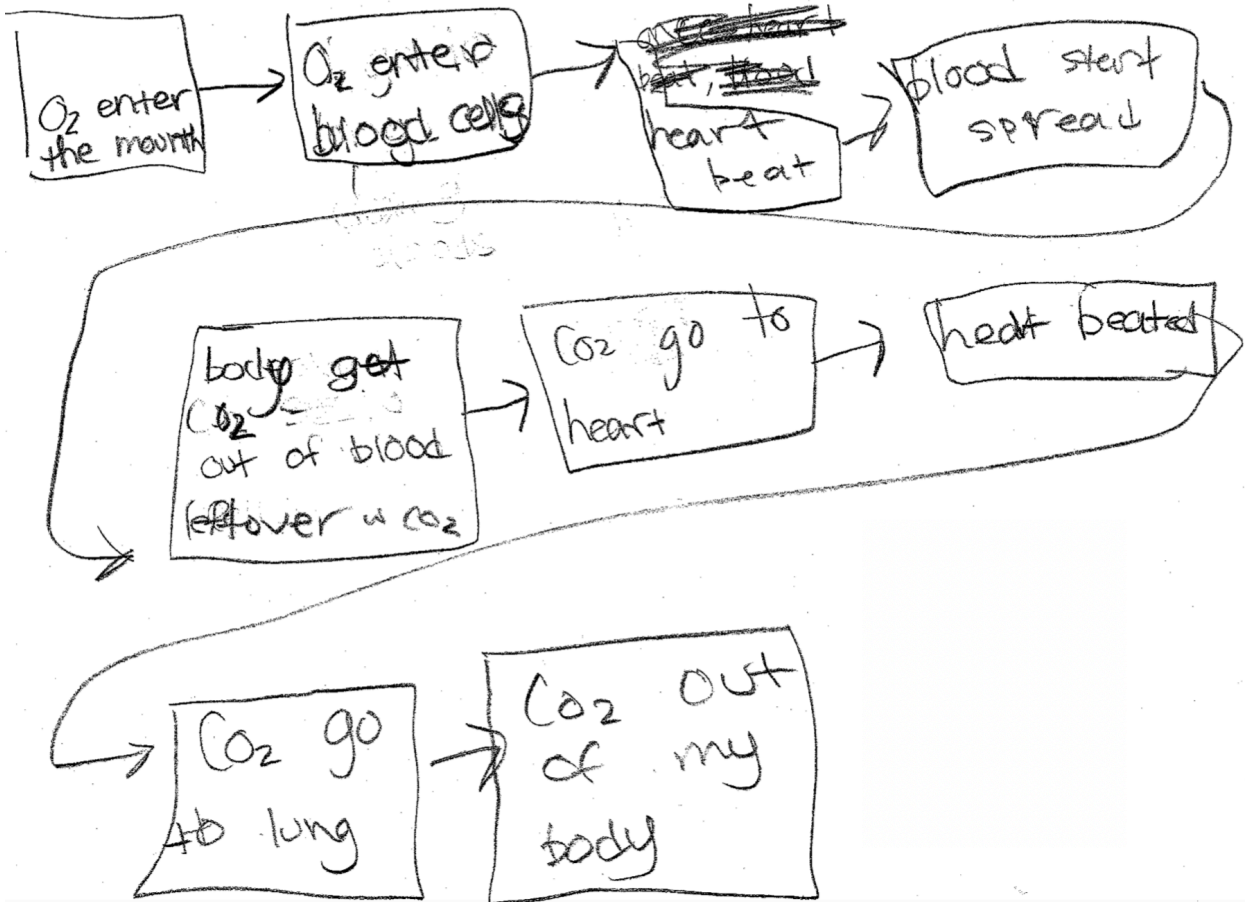
Student B



Student C



Student D



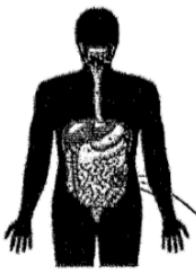

Post-Assessment

Student A

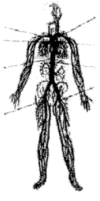
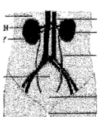
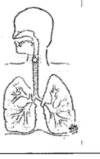
Name:

Date:


Digestive System	Circulatory System	Muscular System
Respiratory System	Nervous System	Excretory (Urinary) System

Name of System	Diagram	What is the system for? What organs are involved?	What other systems does it work with?
Digestive System		to digest stomach, tongue, liver, etc	Nervous System
Nervous System		to feel spine, brain, nerves	every system

Student A

Circulatory System		to pump blood heart, lungs, blood, veins	respiratory
Urinary System		to poop & pee/urinate liver, bladder, blood, veins,	Muscular System
Respiratory System		to breathe O ₂ lungs, mouth, trachea	Circulatory, nervous

Student A

Muscular System		to move is everything Skeletal, Cardiac, Smooth, etc
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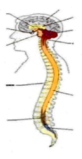
In complete sentences, write/sign a response explaining how body systems work and influence our everyday life.

They help us live our lives. They are urinary, muscular, respiratory, circulatory, digestive, nervous systems. They handle our body's functions which is to live.

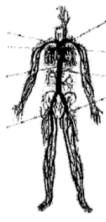
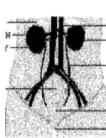

Name: Student B

Date: 5/29/19


Digestive System ✓	Circulatory System ✓	Muscular System ✓
Respiratory System ✓	Nervous System ✓	Excretory (Urinary) System ✓

Name of System	Diagram	What is the system for? What organs are involved?	What other systems does it work with?
Digestive system		food	if not food will get low energy. food has high energy
Nervous system		move	move help your body if nothing nervous will can't move

Student B

Circulatory system		clean for O ₂	red had clean Brain made for heart
Excretory (Urinary) System			
Respiratory System		air O ₂ CO ₂	beneath for air get CO ₂ and O ₂

Student B

Muscular System		energy exercise	
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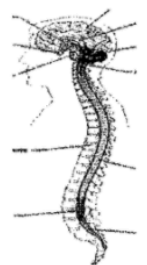
In complete sentences, write/sign a response explaining how body systems work and influence our everyday life.

Nervous System can move on your body as
freeway. Digestive System for food. Respiratory
System for benact air had O₂ and CO₂. Why
need to body if nothing body will dead.

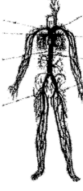
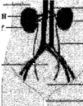

Name: **Student C**

Date:


Digestive System ✓	Circulatory System ✓	Muscular System ✓
Respiratory System ✓	Nervous System ✓	Excretory (Urinary) System

Name of System	Diagram	What is the system for? What organs are involved?	What other systems does it work with?
Digestive System		to eating after go to poop	- Muscular - Excretory (Urinary) System
Nervous System		to control inside body	- Nervous - Respiratory System

Student C

Circulatory system		to be health with in blood	-nervous -Muscular system
Excretory (Urinary) System			
Respiratory system		Breathe from oxygen lungs	-nervous -Muscular system

Student C

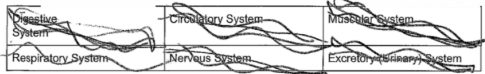
Muscular System		to keep is strong well	- Nervous - circulatory - Excretory (urinary) - Respiratory system
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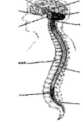
In complete sentences, write/sign a response explaining how body systems work and influence our everyday life.


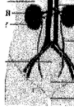
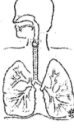
Because the body can work together, not alone. Body is very important and to survive.

Name: Student D


Date:



Name of System	Diagram	What is the system for? What organs are involved?	What other systems does it work with?
Digestive system		chews the foods	Circulatory system Nervous system
Nervous system		tell what body should do	All of the body

Circulatory system		TO take CO ₂ out & take oxygen in the body	all of the body
Excretory (urinary) system		TO hold bathroom	- Digestive system - circulatory system - Nervous system
Respiratory system		to breath	- Nervous system - circulatory system - chest

Student D

Muscular system		move	all of the body
-----------------	---	------	-----------------

In complete sentences, write/sign a response explaining how body systems work and influence our everyday life.

If one important organs in body has taken ³ not exist. you will not exist then. There lots organs runs very great than you except!

Body Systems Project Presentation Rubric Scores

90%

Body Systems Presentation Rubric

Name: **Student A** Date: 05 / 22 / 19

	BEYOND STANDARD (4)	MEETING STANDARD (3)	APPROACHING STANDARD (2)	I NEED A LOT OF SUPPORT (1)
SCIENCE CONTENT KNOWLEDGE	All required science information is correctly and clearly presented in cohesion. Terms and concepts are accurately labeled and explained.	Most of the required information is presented. A few slip ups in vocabulary or terms but overall understandable and does not interfere with comprehension.	Some of the required information is presented. Some confusion with facts/concepts are present.	Hardly any required information is presented. Confusion and lack of understanding of the content is evident.
VISUAL AID (movie, graph, drawing, visual display)	Visual aid is creative, colorful, easy to read, and used effectively.	Visual aid is colorful, readable and used somewhat effectively.	Visual aid is lacking color, difficult to read, and not used effectively.	Visual aid is not used at all in the presentation.
ORGANIZATION	Presentation is well organized and easy to follow. Transition between topics is smooth.	Presentation is organized and easy to follow but transition between topics is not smooth.	Presentation is somewhat organized but hard to follow.	Presentation is very unorganized and difficult to follow.
CONNECTIONS	Describes inter relationship with other body system in detail and makes clear connection to everyday life	Describes inter relationship with other body system with example and makes connection to everyday life with an example	Describes inter relationship with other body system briefly or brief connection to everyday life	Does not describe inter relationship with other body system nor makes connection to everyday life
CLARITY OF SIGNING	Presentation is clear and given at a slow pace that's easy to follow, eye contact is made throughout the entire presentation.	Presentation is clear and given at a good pace, eye contact made throughout most of the presentation.	Presentation is not clear and given at a fast pace, eye contact made during some of the presentation.	Presentation is not clear and given at a pace too fast to follow, no eye eye contact is made throughout.

Student B

Body Systems Presentation Rubric

Name: _____

Date: 5/22/19

	BEYOND STANDARD (4)	MEETING STANDARD (3)	APPROACHING STANDARD (2)	I NEED A LOT OF SUPPORT (1)
SCIENCE CONTENT KNOWLEDGE	All required science information is correctly and clearly presented in cohesion. Terms and concepts are accurately labeled and explained.	Most of the required information is presented. A few slip ups in vocabulary or terms but overall understandable and does not interfere with comprehension.	Some of the required information is presented. Some confusion with facts/concepts are present.	Hardly any required information is presented. Confusion and lack of understanding of the content is evident.
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CONNECTIONS	Describes inter relationship with other body system in detail and makes clear connection to everyday life	Describes inter relationship with other body system with example and makes connection to everyday life with an example	Describes inter relationship with other body system briefly or brief connection to everyday life	Does not describe inter relationship with other body system nor makes connection to everyday life
CLARITY OF SIGNING	Presentation is clear and given at a slow pace that's easy to follow, eye contact is made throughout the entire presentation. <u>3.5</u>	Presentation is clear and given at a good pace, eye contact made throughout most of the presentation.	Presentation is not clear and given at a fast pace, eye contact made during some of the presentation.	Presentation is not clear and given at a pace too fast to follow, no eye eye contact is made throughout.

17.5
 20
87.5%

Student C

Body Systems Presentation Rubric

Name: _____

Date: 5/22/19

	BEYOND STANDARD (4)	MEETING STANDARD (3)	APPROACHING STANDARD (2)	I NEED A LOT OF SUPPORT (1)
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17/20 = 85%

Student D 90.5%

Body Systems Presentation Rubric

Name: _

Date: 5/22/19

	BEYOND STANDARD (4)	MEETING STANDARD (3)	APPROACHING STANDARD (2)	I NEED A LOT OF SUPPORT (1)
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