Exploring Memory through Movement

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This curriculum unit is recommended for:
3rd Grade Science - Human Body Unit

Keywords: Human Body, Central Nervous System, Memory, Movement, Dance, Brain

Teaching Standards: See **Appendix 1** for teaching standards addressed in this unit.

Synopsis: This curriculum unit (CU) will focus on the essential question: How are memories made? Throughout the course of this seven-lesson unit, third-grade scientists will expand upon their knowledge of the Human Body and the Central Nervous System. Scientists will focus on the brain and the three different types of memory: Sensory Memory, Short-term Memory, and Long-Term Memory. Students will gain insight into the world of dance by learning some foundational skills regarding dance composition and tools used to communicate within the dance community. For the culminating project, students will integrate their knowledge of the brain and memory with their knowledge of dance to create a dance composition to demonstrate how memory is made.

I plan to teach this unit during the coming year to 27 students in third grade Science.

Introduction

Rationale

Starmount Academy of Excellence (SAE) is a Title I school located in the Southwest Learning Community of Charlotte-Mecklenburg Schools. It is a community school with multiple community partnerships. This year, I am a self-contained third grade teacher and teach all subjects to my students. Since we are self-contained, my students spend a majority of their day in our classroom. As such, I am constantly looking for ways to incorporate intentional movement throughout our day and into our lessons. I believe that by incorporating movement into lessons, it will help students be more engaged with the material it will help make material more accessible to different learning styles, and it will allow students to engage with material through more than one modality.

While reflecting on units of study that my students enjoyed last year and thinking through the lens of the seminar, I chose to write this Curriculum Unit (CU) on memory. This year, my third-grade scientists will become experts on a few of the different systems of the human body, one of which is the Central Nervous System. Last year during this unit, one of my students asked how memories were made and how they were stored. This CU will revolve around that central question: "How are memories made?" In exploring this question, my goal is not only that students gain an understanding of the different anatomical systems and structures involved in the process of memory making but that they also gain insight into themselves as learners.

Throughout this CU students will also explore elements of dance and will be invited to express their creativity in linking movement and the process of memory. In order to prepare students for the culminating project, lessons will introduce elements of dance throughout the CU sequence. Students will identify a movement or movement pattern to represent each process involved in memory storage. At the end of each lesson, students will record their selected movement or movement pattern and keep them for the culminating project.

This unit is a culmination of my Charlotte Teachers Institute (CTI) seminar, the Charlotte Mecklenburg Schools (CMS) Science curriculum, and my students' curiosity. In developing this unit, I hope that students are able to express their creativity while learning new material and that this use of intentional movement may help students engage with new content material.

Demographics

For the 2022-2023 school year SAE has one principal, one assistant principal, one dean of instruction, two Multi-Classroom Leaders, two Expanded Impact Teachers, and two school counselors. According to the Charlotte Mecklenburg Schools diversity report for the 2021-2022 academic school year, SAE had 411 students registered. Of those 411 students, 78.8% of those students were Hispanic, 17% were Black or African American, 2% were White, and 1.9% were multi-racial (CMS, 2021). Of those 411 students, 49.6% of students were male and 50.4% of students were female.

For the 2022-2023 academic school year, my classroom consists of 27 students. Of my students, 63% are Multilingual learners and 37% are not. The home languages represented in my

classroom are Spanish and English. Additionally, my students represent many different Central and Latin American countries as well as the United States.

Objectives

Guiding Questions

In the third grade Science curriculum, students spend one unit studying the human body and the different systems that comprise the body. One of the systems that is studied is the Central Nervous System. Students spend time exploring the different parts of the Central Nervous System as well as the different parts of the brain. Last year during a discussion, a student asked how memory worked. That curiosity and question inspired this Curriculum Unit (CU).

This CU is separated into two parts. The first section of this unit will focus on the guiding question: "What are the three different types of memory?" Students will explore the anatomy and processes that are involved in storing memory. It is suggested that this part of the CU be incorporated during the human body unit. After identifying the anatomy and processes, students will research the different types of memory. This research will serve as the foundation for the final culminating project. Throughout the CU sequence, students will be exposed to the foundations of dance. Students will use their knowledge of the steps that occur to store memory in conjunction with their knowledge about dance to create a short score that will serve as the foundation for a dance that demonstrates the process of memory storage.

Learning Outcomes

By the end of the CU, students will be able to explain and describe how long-term memories are made and the three different types of memory. Students will have a foundational understanding of dance, vocabulary related to dance, and be able to read and write a score to plan and execute a short dance sequence demonstrating the memory process. Students will then use dance as a means to remember the steps involved and share their findings with their peers. Furthermore, students will reflect on their learning and identify ways and strategies that will lead to storing long term memories. Finally, they will identify strategies that they might use to help them learn and store new content.

Content Research

Universal Design for Learning

The idea to incorporate movement and content was influenced by research supporting Universal Design for Learning (UDL). UDL is a framework that highlights three guidelines for planning and implementing lessons (CAST, 2018). This framework was developed by CAST, originally named the Center for Applied Special Technology. The first guideline "Multiple Means of Engagement" aims to include student voice to foster engagement and collaboration (CAST, 2018). Additionally, the second guideline regarding "Multiple Means of Representation" allows for information to be represented in multimodal ways. Content presented in a lesson may be presented in a visual, auditory, or kinesthetic manner to allow for learners of all learning

styles to access the material. The third guideline "Multiple Means of Action and Expression" allows students to demonstrate knowledge or mastery of a subject through multi-modal activities, such as dance. This is especially important for learners with varying learning styles (CAST, 2018). In this CU, students will participate in lessons that incorporate different components of UDL. In their culminating task, students will be given the opportunity to express their knowledge by using a tool (a score) to create a composition.

The Brain

The human brain is a very complex organ that plays many vital roles in memory storage and retrieval. Gilbert (2006) posits that one can think of the brain in three parts, the lower brain, midbrain, and upper brain. Each part of the brain is responsible for different functions that influence daily life.

The lower brain consists of the cerebellum and the brain stem (Gilbert, 2006). The brain stem includes components such as the medulla oblongata, pons, and midbrain which are responsible for many of the autonomic functions that keep humans alive, such as breathing and heart rate (Gilbert, 2006). Many of these functions are done automatically and do not require conscious thought and decision making. The cerebellum "is linked to coordination, balance, posture, muscle movements, cognition, and emotions" (Gilbert, 2006, pg. 7).

The midbrain is made up of the thalamus, hypothalamus, amygdala, and hippocampus (Gilbert, 2006). Of these parts, the amygdala and the hippocampus are vital in memory storage and retrieval. The amygdala is strongly connected to our senses and allows us to process sensory input (Gilbert, 2006). This is especially important when thinking of long-term memory and memories that are saturated with emotion (Gilbert, 2006).

The upper brain is comprised of the cerebrum which consists of four lobes, the frontal, parietal, temporal, and occipital (Gilbert, 2006). Each lobe is responsible for actions and serves a specific purpose. The frontal lobe is responsible for "voluntary movement, creativity, problem solving, verbal expression and planning" (Gilbert, 2006, pg. 9). The parietal lobe is involved with the body's movement throughout space (Gilbert, 2006). Additionally, Gilbert (2006) adds that the occipital lobe is involved in receiving visual input and allowing us to see what we see around us. Lastly, the temporal lobe assists with "hearing, the vestibular system, language, and memory storage" (Gilbert, 2006, pg. 9). These lobes are also involved in memory storage (Purves, et al., 2008). While all of these parts play vital roles in day to day life, the subsequent section will detail specific structures and processes that are involved with memory storage.

Memory

For the purposes of this CU, memory will be defined as "the mechanisms whereby past experiences influences present behavior" (Purves, et al., 2008, pg. 44). Memory is very complex

and involves many different pathways and structures in our brain. Furthermore, there are many different types of memory. Each type of memory follows a process for storage and may last for varying amounts of time depending upon the type of memory (Purves, et al., 2008). While memory has been the center of many research studies, there are multiple theories and the research on the subject matter is constantly updating and evolving to reflect present findings. The information outlined below will provide a general overview of the types of memory, memory processing, and structures involved in the storage and retrieval of memory.

Types of Memory

Sensory Memory

According to Purves, et al. (2008), sensory memory serves as the catalyst for the subsequent types of memory (both short-term and long-term memory). As the name suggests, sensory memory is strongly related to and dependent upon sensory input from the five senses (sight, smell, sound, taste, and touch). Once a stimulus is perceived, or sensed, sensory memory captures the information for a very brief period of time, although "a small amount is 'selected' for short - term memory storage and further processing (Purves, et al., 2008, pg. 44). Depending upon what information is sensed, the corresponding lobes will be activated and involved in encoding the memory in the future (Purves, et al., 2008).

Short-Term Memory/ Working Memory

If sensory memories are chosen to continue in the memory process, they enter the short-term memory stage. This stage is also known as working memory. Information can be stored here for a few seconds but needs to be rehearsed to be transferred to long-term memory (Purves, et al., 2008). Purves, et al. (2008) gives some examples of information that might be transferred to working memory. These include, asking individuals to recall from a list or recall information from a source that was recently presented. Research suggests that standard recall from working memory should be around 7-9 items (Purves, et al., 2008).

When thinking of working memory implications in the classroom, one might think of tasks that involve presenting information to students and then having students recall information almost immediately. While student recall in this format may give insight to attention in that moment, it may not be an indication of long-term learning. Learning to be defined as "the processes by which experience acts on neural circuitry to generate memories" (Purves, et al., 2008, pg. 44). In order for learning to take place, students need to be able to master a concept and apply it across domains, consistently over time. In order for information to be stored and available over time, it needs to be rehearsed to then be stored in long-term memory (Purves, et al., 2008).

Long-Term Memory

Long-term memories are formed when short-term memories are stored and transferred. As the name suggests, long-term memories are available for longer periods of time and are also

categorized into different categories. Purves et al. (2008) posits the following domains and categories of long-term memory: Declarative Memory and Nondeclarative Memory.

Declarative Memory

Declarative memories are memories that can be recalled and shared verbally (Purves, et al., 2008). They are split between episodic memory and semantic memory.

- *Episodic memory*
  Episodic memories are linked to events that one has experienced (Purves, et al., 2008). These memories can involve information processed from a variety of senses. One example of this may be a student recalling the first day of school. They may be able to recall different components of the day to include their feelings, different sounds they heard, and even what the school smelled like when they first walked in.
- *Semantic memory*
  Semantic memories are memories related to facts (Purves, et al., 2008). One example of this may be recalling multiplication facts over time. As multiplication facts are rehearsed, they may be stored in long-term memory and be available for recall in the future.

Nondeclarative memory

Nondeclarative memories are processes that, while not recalled verbally, still shape behavior and can be observed through actions (Purves, et al., 2008). Purves, et al. (2008) includes skill learning, priming, and conditioning in this category.

- *Skill learning*
  Skill learning can be defined as "a gradual improvement in performance as a result of practicing a motor or cognitive task" (Purves, et al., 2008, pg. 324). This may be displayed as a student improves in a task after practice and repetition.
- *Priming*
  Priming refers to "processing of a particular stimulus based on previous encounters with the same or related stimulus" (Purves, et al., 2008, pg. 324).
- *Conditioning*
  Conditioning refers to the relationship between stimulus and responses (Purves, et al., 2008).

Memory Making: The Process

As previously mentioned, all memories begin at the sensory memory stage. From there, they undergo the process of encoding, consolidation and storage (Purves, et al., 2008). When a memory is called upon, an individual uses retrieval to recall the memory from their "memory bank". While this process is also complex and involves many different structures and neurons at the molecular level, below is an overview of the process.

Encoding

Encoding allows the memory to reach the short term and then long-term memory (Purves, et al, 2008).

Consolidation

Consolidation allows for a memory to be strengthened (Purves, et al., 2008). For example, a memory undergoing consolidation may include details of the specific memory or event.

Storage

A memory has reached the storage stage when it has been transferred to long-term memory and is available for a long period of time and can be recalled at any moment (Purves, et al., 2008).

Retrieval

Retrieval refers to recalling a memory.

Memory and the Brain

As previously mentioned, memory involves many different lobes, structures, and pathways of the brain. There are specific structures and regions of the brain involved with storage of declarative memory and nondeclarative memory. According to Purves, et al. (2008), the medial temporal lobe is crucial for declarative memory and the occipital cortex is imperative for nondeclarative memory. This is based on research and case studies that analyzed individuals with lesions in different regions of their brain and the effect on their memory. Furthermore, research suggests that the frontal lobe is involved in both short- and long-term memory as well as declarative and nondeclarative memory (Purves, et al., 2008).

Dance Components

Score

When choreographing a dance, choreographers use standardized tools that allow them to capture their ideas and share them with colleagues and other professionals. One of the tools is called a score. A score is “a set of instructions for a dance that a performer can interpret” (Nesbit, 2022). A score is divided into a set number of sections and is labeled using graphic or motif notation.

Graphic/Motif Notation

Motif notation is a system of visual symbols that represent specific dance movement categories (Gilbert, 2006). Language of Dance® (2022) published the *Movement Alphabet* which includes a variety of visual symbols that serve as the foundation for movement sequences, patterns, and dances. These symbols allow all dancers to be able to understand what type of movement is being asked for during a certain time. The dancer's interpretation of the movement, or the specific movement choice, will vary by dancer.

Concepts used in this CU include motion toward, motion away, any flexion, any extension, any traveling, and any still shape. While there are more actions included in the *Movement Alphabet*, this CU will focus on these actions in both the lessons and in the culminating project. According to Language of Dance® (2022),

> *Motion Toward:* moving toward any object
> *Motion Away:* moving away from an object
> *Any Flexion:* contracting or making smaller
> *Any Extension:* to grow or opening outward
> *Any Traveling:* moving from one spot to another
> *Any Still Shape:* holding a specific shape with the body

General Strategies

Think-pair-share
Think-pair-share will be used to foster collaboration amongst students. The teacher will pose a question to the students. Students will then be given time to think about their response and will then pair up with a partner. Finally, students will have a short discussion about the prompt using their responses.

Turn and talk
Turn and talks will also be used to promote collaboration amongst students. Similar to a think-pair-share, turn and talks require students to turn to a partner and have a brief discussion about a topic. Turn and talks will be utilized to gather background knowledge students have on the topic.

KWL Charts
Know-Wonder-Learn (KWL) charts will be used throughout the unit to chart students' knowledge and wonderings. At the beginning of the unit, the teacher will ask the students what they know about the brain and memory and chart their responses. Next, the teacher will ask the students what they wonder about the brain and memory. Responses will be charted and responses can be used to guide future discussions. At the end of the CU, teachers and students will return to the chart to fill in the "L" column with information the students have learned.

Dance
Dance will be used to demonstrate learning acquired during this CU. Throughout the lessons, students will learn about scores, Motif Notation, and how to create a dance or movement sequence using a score. For the culminating project, students will create a score to depict how a memory goes from sensory memory to long-term memory.

Classroom Lessons and Assessments

Part 1: Dance

Lesson 1 (Inspired by Seminar 7 - Nesbit, 2022)

Objective	I can define a score and identify symbols in a score.
Materials	● Anchor chart with Motif Notation symbols ● Markers ● Matching symbols to movement Exit Ticket
Engage	The lesson will begin by displaying six different symbols used in a score (see *Movement Alphabet* - motion toward, motion away, any flexion, any extension, any traveling, and any still shape). The teacher will explain that each symbol represents a specific type of movement. When the symbols are entered into a score, a dance or movement pattern is made. The teacher will then display an image of a score with the symbols.
Explore	The teacher will explain that the score is read from the bottom to top and will lead the class in reviewing each symbol and brainstorming potential movement or movement pattern for each symbol. Since this is the first-time students are exposed to a score, it is recommended that this step is done whole group. The teacher will begin reading the score symbol-by-symbol and take ideas from the students for each symbol. The group will determine one movement for each symbol and the teacher will use the information to co-create a score model in the form of an anchor chart. It is recommended that as each step is determined, the students are moving and practicing each movement to see how they flow.
Explain	Once the movements have been identified, the teacher will review the whole score by reading over the symbols and highlighting the movements that were chosen. The teacher may then demonstrate putting the score into practice, or completing the dance/movement pattern that the students created.
Elaborate	After the demonstration, the teacher may go back to the score and highlight individual movements. As they do the movements, they may ask the students to identify which symbol from the score corresponds to the movement.
Evaluate	Matching score symbols to icons (sort/match - Exit Ticket)

Lesson 2 (Inspired by Seminar 7 - Nesbit, 2022)

Objective	I can use Motif Notation on a score to create a movement pattern or dance.

Materials	● Blank Score with 4 sections/symbols (1/group) ● Predetermined student groups
Engage	The teacher will begin the lesson by posting the symbols that the students learned the day before. The teacher will then review what each symbol represents and will have the students stand up and move to a spot in the room where they have enough room to move. The teacher will randomly select one of the symbols and the students will then demonstrate a movement that aligns with the symbol. This active review will assist the students in not only recalling what was learned the day before, but will also aid in storing the information. As the students are doing their movements, the teacher may highlight students that are doing a great job identifying movements to match the symbols.
Explore	The teacher will split the class into groups with an equal number of students in each (perhaps groups of 4-5). Groups will be given a score with the symbols filled in on the side and the groups will be tasked with identifying corresponding movements. The teacher will remind the students of the anchor chart they created the day before when the teacher charted different ideas for each symbol. Students will receive a certain amount of work time to complete the score with movements to match the symbols (recommended time: 15-20 minutes).
Explain	At the end of the time, the class will come back together and the teacher will ask for a volunteer from each group. This volunteer will review their group's completed score and explain the movements that they chose to go with each symbol. The teacher can ask for another volunteer from the group to demonstrate their dance, if they are comfortable.
Elaborate	The teacher may ask if any groups would like to demonstrate their dance/movement patterns with the group.
Evaluate	4 item group score: creating a movement to match each item.

Part 2: Memory and the Brain

Lesson 3

Objective	I can identify one of the three different types of memory: Sensory Memory
Materials	● Blank KWL Anchor Chart ● Poster (1/group) ● Markers (3-4/group)

	• Predetermined student groups
Engage	The teacher will begin the lesson by explaining that the students are going to begin their study on memory and the brain. The teacher will then present the cumulative learning task that the class is working towards. *Cumulative learning task*: I can demonstrate and explain how memory is stored, from sensory memory to long-term memory, by creating a score to highlight the processes involved.
Explore	The teacher will post an empty KWL chart on the board. The teacher will begin the lesson by asking the students: What do you know about memory? During this time, the teacher will capture whatever the students say in the "K" column of the anchor chart. Specifically, students should connect memory to the brain and then the teacher may connect it back to prior knowledge by asking students what system the brain is a part of. Next, the teacher will ask the students: What do you want to learn about memory or what do you wonder about memory? The teacher will then capture students' thoughts in the "W" column of the anchor chart. They will then explain that there are three different types of memory and that over the next few days students will spend time studying each of them. As they study memory, students should pay attention to the processes and structures involved in the process. The teacher will present the first type of memory: Sensory Memory.
Explain	The teacher will ask the students what familiar word they might notice in "sensory". Students will turn and talk with a partner to identify the familiar part of the word. Students may identify that sensory, is related to the word senses. The teacher will highlight that **sensory memory** occurs when information is perceived by any of the five senses. As different stimuli are perceived, they are registered by different pathways to the brain; each pathway corresponding with a different part of the brain. For example, visual stimuli are partly processed in the occipital lobe (Purves, et al., 2008). Next, they will review that sensory memory does not last long at all. While it may be brief, it serves as the basis of all memories that we have. Some of the sensory memories continue in the memory process and can be transformed into short term (or working memory; Purves, et al., 2008).
Elaborate	The teacher will ask the students to identify the 5 senses. Once the 5 senses are identified, the teacher will break the students into groups and give each group a poster and some markers. Students will then write the title "Sensory Memory" at the top. They will then take about 5-10 minutes to identify different sights, sounds, flavors, smells, and textures that can be perceived or

	"felt" by each sense. Students will draw or write their response on their group's poster. At the end of the time, the teacher may ask for groups to share out.
Evaluate	Students will end the session by answering the following question. Exit ticket: Explain how Sensory Memory is formed. (Answer: It is registered by senses and sent to different parts of the brain).

Lesson 4

Objective	I can identify one of the three different types of memory: Short-Term and Working Memory
Materials	● Memory Storage Anchor Chart ● Memory Matching Game
Engage	The teacher will begin by presenting the Memory Storage Anchor Chart. The teacher will explain that today, the class will continue their journey of memory storage. The end goal being long-term memory. The teacher will begin to create an anchor chart with the three types of memory. They will ask if the students remember the memory that they discussed the day before. The students should recall the lesson from the previous day and answer Sensory Memory. The teacher will write Sensory Memory on the anchor chart. The teacher will then point to number two. They will then explain that today the class will be focusing on the next stage: Short-term or Working Memory. The teacher can add to their chart.
Explore	The teacher can display a series of 7 numbers (1, 3, 5, 7, 8, 9, 10). The teacher will give the students about 20 seconds to memorize the order that the numbers are in. Then the teacher will display another slide that has 3 of the numbers missing (_, 3, 5, _, 8, _, 10). The teacher will ask the students what numbers are missing. Students should be able to recall the numbers that are missing (1, 7, 9).
Explain	The teacher will explain that the students were able to recall the numbers because they were stored in their short-term memory. **Short-term memory** stores information for a few seconds after it is perceived. Information will continue from short term-memory to long term memory if it is rehearsed (or practiced (Purves, et al., 2008).
Elaborate	For the next portion of the lesson, students will work in groups to complete a memory matching game. The teacher can use any matching game they have in their classroom. Prior to starting the game, the teacher will explain that while the students are playing the game, they will be thinking about this question: What type of memory am I using while playing this game?

	The teacher will explain that for this game, all cards need to be placed in a grid-like formation face down. The students will take turns flipping one card over and then another trying to find a match. If a student does not find a match on their turn, they flip both cards over again and the next student has their turn. If the student does find a match on their turn, they take the cards out of the formation and keep them. The goal is to find all of the matches.
Evaluate	Exit Ticket: What is short-term memory? (When information is stored for a few seconds after it is perceived) What type of memory did you use during the game? (Short term memory)

Lesson 5

Objective	I can identify one of the three different types of memory: Long-Term Memory
Materials	● Memory Storage Anchor Chart ● Blank Anchor Chart ● Sticky notes ● Predetermined Partners
Engage	The teacher will begin the lesson by explaining that today the class will explore the last type of memory: Long-term memory. The teacher can then ask students to describe a time when they felt happy.
Explore	After students have shared a time when they felt happy, the teacher will explain that each of those memories (unless students shared a memory from within the past 30 seconds) were stored in the students' long term memory. **Long-term memory** can be defined as memories that are stored, transferred, and available for longer periods of time (Purves, et al., 2008). Memories reach long-term memory when they have been rehearsed or chunked (Purves, et al., 2008). The teacher will then fill in long-term memory on the anchor chart. The teacher can then ask the students to list other examples of memories that are stored in their long-term memory.
Explain	As the students are listing other memories, the teacher can be writing down their responses on sticky notes and adding them to a new piece of anchor chart paper. Memories may include: moving, new pet, first day of school, favorite memory with family member or friend, etc. After the students finish listing their ideas, the teacher will explain that they will sort the memories into two categories: **episodic memories** (experiences) and **semantic memories** (facts) (Purves, et al., 2008).

Elaborate	The students will then get into partners and complete the Long-Term memory sort. For the sort, the students will be given a piece of paper that has a table of memories listed. The students will work together to sort the memories into either episodic or semantic memories.
Evaluate	Long-Term Memory Sort

Lesson 6 (Day 1 and 2)

Objective	I can create a movement pattern or dance (using a score) to show how memory is stored from sensory memory to long-term memory.
Materials	● Score with 6 sections ● Predetermined groups ● Motif Notation Anchor chart (for student reference)
Engage	The teacher will begin the lesson by reviewing the three types of memory/ the process of how memory reaches long-term memory. The teacher will present the culminating task for the unit. *Cumulative learning task*: I can explain how a memory is stored by creating a score to highlight the processes involved from being a sensory memory to a long-term memory. The teacher will explain that for the next two lessons (this one and the next) students will work in groups to complete a score that depicts how memory starts as a perception and makes its way to long-term memory.
Explore	Students will be given a 6 item score. The teacher may choose to have two versions of a score, one with 6 predetermined Motif notations printed on it and one with 6 blanks (for students to choose and fill in). Each group will need one version of the score. The teacher will remind them that their piece needs to be reflective of the Memory Storage Process and therefore students should be ready and able to explain their score to the group.
Explain	Students will be given two-20 minute work sessions across two days. During this time, students should be working in groups to complete their score. The teacher may choose to have a group and/or rotate around to offer support to groups as needed. At the end of the two-20 minute work sessions, the teacher will ask for a volunteer from each group to share their piece. Any volunteers that would like to demonstrate their score in action may share. If not many want to share, the teacher will ask for volunteers to share their completed score.
Elaborate	After individuals have shared their completed scores, the teacher will ask the groups to elaborate on the reasoning behind the motif symbol chosen and the

	movement chosen. Specifically, the teacher will be listening for which movement represented the different parts of the Memory Storage Process or the 3 types of memory.
Evaluate	Completed Score

Appendix 1: Content Standards

- **3.L.1.** Understand human body systems and how they are essential for life: protection, movement, and support (North Carolina Department of Public Instruction, 2019).
  This CU will address a component of the Central Nervous System which is studied by third graders in the CMS Science Curriculum. This CU will build upon the Science curriculum by exposing students to how memories are made.

- **CCSS.ELA-LITERACY.RI.3.1**- Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers (National Governors Association Center for Best Practices, 2010).
  At the beginning of the CU, the teacher will begin by building a KWL chart where they will invite students to pose questions that they have about the brain. As students progress throughout the CU, they will identify the answers to those questions based upon the content and research done.

- **CCSS.ELA-LITERACY.SL.3.4** - Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace (National Governors Association Center for Best Practices, 2010).
  During the debrief and discussion of the movement patterns, students will need to report on how memories are made. They will need to draw upon the information learned to report and review the memory making process.

Appendix 2: Materials List

Lesson 1

Anchor chart with Motif Notation symbols

This will be used as a reference for students to depict Motif Notation symbols and their meaning. Students will use this for the cumulative project.

Markers

The teacher will use these to create anchor charts during lessons.

Matching symbols to movement Exit Ticket

This Exit Ticket will be used to measure if students grasped that day's material.

Lesson 2

Blank Score with 4 sections/symbols (1/group)

This score will be used by groups to create a movement sequence or dance.

Predetermined student groups

Students will work in these groups to complete the activity.

Lesson 3

Blank KWL Anchor Chart

The teacher will use this to capture what students "know" about memory and what students "wonder or want to learn"

Poster (1/group)

Students will use posters to chart their five senses and information that can be perceived by each.

Markers (3-4/group)
Students will use the markers to complete their poster.

Predetermined student groups
Students will work in these groups to complete the activity.

Lesson 4
Memory Storage Anchor Chart
This anchor chart will serve as a reference throughout the rest of the unit. The teacher and students will fill in the missing components when they are covered in class.

Memory Matching Game
Students will use this game to practice using short term memory.
Lesson 5
Memory Storage Anchor Chart
This anchor chart will serve as a reference throughout the rest of the unit. The teacher and students will fill in the missing components when they are covered in class.

Blank Anchor Chart
The teacher will use this to create a T-chart with Episodic Memories on one side and Semantic Memories on the other.

Sticky notes
The teacher or students will use these to capture examples of long-term memories.

Predetermined Partners
Students will work with these partners to complete the activity.

Lesson 6 and 7
Score with 6 sections
This score will be used by groups to create a movement sequence or dance to depict the three types of memory.

Predetermined groups
Students will work in these groups to complete the activity.

Motif Notation Anchor chart (for student reference)
This will be used as a reference for students to depict Motif Notation symbols and their meaning. Students will use this for the cumulative project.

Appendix 3: Additional Resources

Student Resources

Electronic Resources

- How do you make memories? - Scishow Youtube video
  This video gives students an overview of memory and some of the brain structures involved in long-term memory.
- Language of Dance® Motif Notation (Language of Dance®, 2022)
  This resource serves as a reference for both students and teachers regarding the standard notation for dance choreography. Students will use this as a reference to support them in creating a score.

Teacher Resources

Reading Resources

- Principles of Cognitive Neuroscience (Purves, et al., 2008)
  This textbook gives an in-depth view of memory and the structures and pathways involved in the different types of memory.
- Brain Compatible Dance Education (Gilbert, 2006)
  This book gives an overview of dance education and gives ideas about how to incorporate dance into the classroom.
- What Every Teacher Should Know About Learning, Memory, and the Brain (Walker Tileston, 2004)
  This book gives an overview of learning, memory, and the brain and could serve as a great read to build background knowledge prior to teaching the CU.

Electronic Resources

- Language of Dance® Motif Notation (Language of Dance®, 2022)
  This resource serves as a reference for both students and teachers regarding the standard notation for dance choreography. Teachers will use this to reference and recreate an anchor chart to support students in creating a score.

Appendix 4: Lesson Resources and Handouts

Resources can be printed out together to form a student packet for the unit.

Lesson 1: Evaluate

Name: _____

Match the Motif Symbol with the corresponding meaning.

a) move towards

b) move away

c) any flexion

d) any extension

e) any traveling

f) any still shape

*All symbols are from the Language of Dance ® (2022) *The Movement Alphabet*

Lesson 2: Evaluate

Name: _____

Fill in the four-item score with movements to match the actions. Remember: scores are read from bottom to top

Motif Notation	**Movement**
	
	
	

	

*All symbols are from the Language of Dance ® (2022) *The Movement Alphabet*

Lesson 3 Exit Ticket

How is sensory memory formed?

Lesson 4 Exit Ticket

What is short-term memory? What type of memory was used during the game?

Lesson 5 Long-term Memory Sort
Name: _____

Episodic Memory	**Semantic Memory**

Cut and paste these into the table above

My 5th birthday	How to find the area of a square
My multiplication facts	The first time riding a bike
What I played at recess yesterday	The planets

Lesson 6 and Lesson 7
Fill in the score to show the three different types/stages of memory.

Score Option 1

Motif Notation	**Movement**
	
	
	

	
	
	

*All symbols are from the Language of Dance ® (2022) *The Movement Alphabet*

Score Option 2

Motif Notation	**Movement**

*All symbols are from the Language of Dance ® (2022) *The Movement Alphabet*

Culminating Task Rubric

Group #____
Students

Criteria	**1**	**2**	**3**
Filled in score with movements	Filled in 1-2 sections with movement	Filled in 3-4 sections with movement	Filled in 5-6 sections with movement
Explained different types of memories	Could name and describe 1 type of memory	Could name and describe 2 types of memory	Could name and describe 3 types of memory

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