Fusing Critical Thinking
WITH KINESTHETIC LEARNING

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By Rebecca R. Stobaugh, Ph.D. and Sandra L. Love Ed.D.
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The physical workplace is changing in the business world. Instead of the conference room, professionals conduct meetings while walking. Sometimes treadmill desks replace stationary desks. Desk chairs are exchanged for exercise balls. Employees engage in complex problem solving and critical thinking as they move. Why would businesses shift in this direction?

Businesses are making changes such as these to their workplaces because movement has been shown to have a positive effect on focus and retention. Brain research also indicates a strong connection between cognitive and motor processes (Sousa, 2011). So how can schools similarly integrate critical thinking and movement into instruction? The answer is kinesthetic learning.

Kinesthetic Learning

A tactile-kinesthetic learner likes to be actively doing something while learning. Perhaps you are a kinesthetic learner who tries to assemble items before reading the directions, manipulates objects when learning, or has difficulties sitting still. Kinesthetic learners experience learning through movement and touch and prefer tasks that call for active participation. Reports indicate increasing amounts of kinesthetic learners in classrooms (National Center for Educational Statistics, 2006).

Kinesthetic learning is effective and research-based. More than 20 years of research show the positive effects of using active, hands-on tasks for many students (Honigsfeld & Dunn, 2009). Studies show students engage and retain more when teachers reinforce instruction with kinesthetic motions (Paivio, 1991). Studies show that incorporating movement into classroom instruction can enhance the classroom environment as well as positively affect classroom management. In addition, kinesthetic tasks are particularly positive for students of low socioeconomic backgrounds (Helgeson, 2011). In contrast, research has revealed that passive learning experiences produce little long-term learning (Gardner, 1999). With these findings, teachers should incorporate kinesthetic learning into instruction whenever feasible.

Critical Thinking

Critical thinking is a key skill for all students. A large percentage of employers (93 percent) say that job candidates’ capacity to think critically, communicate clearly, and solve complex problems is more important than their college major (Association of American Colleges and Universities, 2013). This is echoed in research of top-performing global educational systems, with rigor being a key identifier (Ripley, 2013). Critical thinking and problem-solving skills are identified as two key areas that are necessary for preparing students for college and career readiness (MetLife, 2011).
Research shows that students perceive cognitively challenging tasks as meaningful and intriguing (Marzano, Pickering & Heflebower, 2011). Paul and Elder (2007) stated the importance of “Every student, in every class, at every moment, being intellectually engaged” (p. 2). However, research of elementary classrooms shows that 91 percent of instructional time is given to whole-class teaching or individual work. This limits opportunities for students to “learn in small groups, to improve analytical skills, or to interact extensively with teachers” (Pianta, Belsky, Houts & Morrison, 2007).

Critical Thinking and Movement

Brain research reveals interesting details about how thinking and movement are connected. The research suggests that the human brain evolved as two areas in the brain expanded: the cerebellum—the part of the brain above the brain stem that controls movement—and frontal parts of the higher cortex. Hence, the section of the brain giving humans motor dexterity grew to give them mental dexterity. Brain-imaging studies support this theory (Blakeslee, 1994).

Accordingly, there is a solid body of research supporting a strong relationship between motor and cognitive processes (Jenson, 2005). Movement increases the amount of oxygen in the blood fueling the brain. Higher concentrations of oxygen in the blood help the brain perform tasks (Sousa, 2011). In young adults, higher oxygen levels in the brain affect cognitive performance (Chung, et al., 2009). Instructional tasks that use movement while teaching content deepen students’ understanding and increase energy levels (Marzano, Pickering & Heflebower, 2011). Sousa (2011) stated, “Despite the realization that physical activity enhances brain function and learning, secondary students spend most of their classroom time sitting” (p. 238).

Strategies Fusing Movement with Critical Thinking

In light of the research, many instructional strategies integrate movement with critical thinking. The following profiles highlight five strategies that are beneficial in engaging students in critical thinking and movement, along with a discussion on ways to incorporate them in various content areas.

Four Corners

The Four Corners strategy involves students moving to one corner of the room based on their response to a question. It can be a quick tool for formatively assessing students while promoting safe conversation in small groups. The question should be posed along with four answer choices. Below are sample question prompts:

• **Which president was the most influential?**  
  **CHOICES:** Ronald Reagan, Thomas Jefferson, Franklin D. Roosevelt, Abraham Lincoln

• **What is the most efficient way of solving this math problem?**  
  **CHOICES:** multiplication, addition, subtraction, division
Another option would be to present questions requiring students to express their opinion and use the corners to represent a rating scale: Strongly Agree, Agree, Disagree and Strongly Disagree. Some examples might include:

- Is the main character in the book a hero? Support your answer with textual evidence.
- Review the data. Does the data support the claim that climate change is largely human-made?

**STRATEGY STEPS**

1. Before beginning the strategy, explain why you are using it. For example, the strategy gives students an opportunity to think, discuss with partners, share with the entire class, and physically move to cultivate their arguments and thinking.

2. Select a thoughtful question. Controversial topics tend to engage students more in the discussion.

3. So that students are prepared for the group conversations, have them record their initial ideas about the question on a piece of paper or a notecard. Giving students three to four minutes to solidify their thinking will ready them to share with group members.

4. Using chart paper, post signs in the corners of the room to represent the option choices. Have students move to the corner that aligns with their ideas. Students will then subdivide into clusters of two or three to explain their choices.

5. Groups could select a spokesperson or students could be randomly called on to share their thinking. Afterward, students could pose questions to other groups and debate. After the discussion, if students have been persuaded, they can switch corners and have further discussions with their new groups.

There are many positive aspects to this strategy. Students make a decision and then, based on their choice, converse with others with similar thinking. Students are highly engaged as they listen to various perspectives and participate in critical thinking. As students discuss, they need to reflect on their thinking and critique the thinking of others.

**This strategy can be used in the following ways:**

- To pre-assess students’ prior knowledge of a topic
- To prepare for a debate
- To stimulate thinking and conversation after a text is read
- To provide time for students to process their learning (Teacher Toolkit, no date)
Matrix and Consensogram

The Matrix and Consensogram strategies display data to initiate conversations (Lipton & Wellman, 2011). They can expose a variety of perspectives and assess students’ levels of understanding. These strategies reinforce the teacher listening to the student voices.

The Matrix strategy involves examining two variables or ideas and observing the interactions. Each axis would represent a variable on a scale of zero to ten. Some ideas that could be used as variables on a matrix include:

- In science, collecting opinions on how much effort should be involved in preserving the environment versus the cost required to do so
- In economics, having students consider how much risk business should take in relation to the potential profit
- In writing, how important is the format of the haiku versus the impact of the writing

**MATRIX STRATEGY STEPS**

1. Select two variables to examine in the matrix. The interaction of these variables should spark interesting discussions and reveal different perspectives.

2. Have students create, on their own paper, a matrix and mark their rating. For example, a student might say that on a scale of zero to ten that preserving the environment should be a nine rating—very important—but believe that few financial resources should be allocated to support environmental initiatives, thus a two rating. The student would then mark the intersection of those points on his or her matrix. Below the matrix, students would justify their opinion in several sentences, using readings or other materials to support their answer.

3. Create a large matrix on chart paper and post it on the wall. Have students use sticky notes to mark their rating, creating a cluster graph. See Figure 1 for an example.

4. In small groups, have students examine the data. Instead of sitting, students could form standing groups around the room. Groups could consider the following questions: What do you notice in the data? What patterns are noticeable? What surprises you? What conclusions might you draw? What are some inferences?

5. Share conclusions in a whole-group discussion. Students could use different-colored sticky dots to mark their opinion at the end of the discussion to visually determine whether opinions have changed.

The strategy provides time for students to deeply think about two ideas. Many informational texts pose arguments that consider two ideas. A matrix would be an excellent conversation starter based on a text.
Similarly related is the Consensogram strategy, which displays data generated by a group as a bar graph and encourages conversations. The Consensogram strategy provides a “psychologically safe way to explore deep-seated beliefs, values, and assumptions” (Lipton & Wellman, 2011). Students can share viewpoints and consider other perspectives.

**Examples of some questions for a Consensogram strategy include:**

- To what degree do you consider the main character a hero?
- To what extent does the new Walmart in our community impact the local economy?
- To what degree is our community’s economy shaped by geography?
- To what extent is art necessary?

**CONSENSOGRAM STRATEGY STEPS**

1. The teacher prepares a task sheet noting the questions and a rating scale from zero to ten in one degree increments below each question. Another option would be to replace the numbers with other ratings including: None, Minor, Moderate, and Extremely High; Not Important, Somewhat Important, Important, and Very Important; or Definitely Won’t, Probably Won’t, Probably Will, and Definitely Will. See Figure 2 for an example. Students should individually complete the task sheet recording their rating for each question. Below each question, students should justify their rating. They could use citations from other sources to support their rating.

2. On a large chart paper, the teacher posts the question at the top and the zero to ten-degree increments or other rating scale indicators. Students should use a sticky note or colored dot to transfer their ratings to the scale on the chart paper, creating a bar graph depicting the data.

3. The teacher instructs students to form small groups to examine the data. Instead of sitting, students could form small groups standing around the perimeter of the room. Some questions to consider include: What do you notice in the data? What patterns are noticeable? What surprises you? What conclusions might you draw?

4. Students take part in a whole-group discussion, sharing reactions to the data.
This strategy visually shows the differences of opinions or reactions to a topic that can lead to deeper discussions on the topic. There are several ways to adapt this strategy. Different-colored sticky notes or dots could be used to represent groups within the class. For example, it might be interesting to see how males and females respond differently. In addition, different class periods could use different-color sticky notes to examine the varying opinions among the class periods. The Consensogram strategy could be used as a pre-assessment with students marking whether they were Not Confident, Confident, or Very Confident on each of the unit learning targets. Then at the end of the unit, students could use another color to mark the same chart and compare the changes. Teachers can use the data to adjust instruction and provide differentiated instruction based on the data. The Teacher Toolkit website has some downloadable Consensogram templates: www.theteachertoolkit.com/index.php/tool/consensogram.

![Consensogram Diagram]

### Gallery Walk

Gallery Walk is an instructional strategy where students move in small groups and rotate around the room to various stations and respond to thoughtful questions, documents, images, texts, or situations. This strategy engages students as they move around the room and respond to prompts on chart paper. It can be used to pre-assess, brainstorm new ideas, introduce new content, or review prior learning.

**STRATEGY STEPS**

1. Select major topics or concepts to be considered and record them on chart paper and tape them to the wall. These could be key topics, images like political cartoons, paintings, or quotes from a novel or primary source. They could also be higher-level questions based on reading a text or synthesizing information. For example, “Based on the reading, has equality been achieved in our nation?” Another variation is, after a reading, to have students respond to three different prompts and note comments or personal reactions, questions, and predictions.

2. Create groups of three to five students. Give each group a different-colored marker to use when recording their responses at each station. Groups should select who will be the initial recorder. When groups rotate to a new station, the recorder will change.
3. Designate a recorder in each group and signal when you wish groups to move to their first station. If using brainstorming prompts, it might only take one or two minutes for students to record their thoughts, but with higher-level questions it might take additional time to process and reflect. In this case, three or four minutes might be more appropriate. If students are brainstorming, they would record all they know about the topic on the paper. Students also can list questions at each station to be discussed later.

4. Have groups rotate to another station after a designated time period. The teacher explains the rotational pattern—for example, students will be rotating to the chart to the right of where they begin. When students read comments from other groups and have a question, they can place a question mark on the chart to discuss later as a class. Students should add new ideas and not repeat ideas already posted. Students will continue until they have visited all the stations.

5. Engage in a whole-group discussion or reflection. Groups can cycle back to their original prompt or station and summarize the posts and address any posted questions. Another option is for the groups to rotate another time, reviewing the posts of the other groups.

6. To conclude the activity, students could summarize their learning in a graphic organizer, write a summary, or in groups, circle three key information points on each chart (IRA & NCTE, no date).

The benefit of the Gallery Walk strategy is that students can engage in movement around the classroom as well as take part in discussions with peers and reflect on their ideas. All students are engaged in the small-group conversations, which encourages more timid students to participate.

### Gallery Walk

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2. Create groups of three to five.

3. Designate a recorder in each group and signal when you wish groups to move to their first station.

4. Have groups rotate to another station after a designated time period.

5. Conduct a whole-group discussion.

### Vocabulary-Building Movement Strategies

Using physical movement to represent concepts has been shown to be effective with younger children. When concepts are abstract, iconic or representational gestures (Kendon, 1988) depict objects or events. For example, students might put their arms directly in front of them to represent parallel lines. Metaphoric gestures, in contrast, make references to visual images but are more abstract. Students might symbolize the word dictatorship by putting one arm above their head with one finger up, noting “one,” meaning the leader is all powerful.
For students who have trouble explaining a concept, gesturing offers insight into the students’ understanding (Church & Goldin-Meadow, 1986). Piaget (1959) believed that gestures play an important role in students’ learning, development, and communication. In agreement, Roth (2001) stated that gestures are a key component of children’s cognitive development. Using hand gestures as representations for abstract concepts has been shown to enhance student learning (Collins, 2005). Vocabulary is easier to remember if taught with a gesture.

**STRATEGY STEPS**

1. **Use hand gestures:** Gestures can be used to represent terminology. Students can create their own representational gestures, demonstrating the concept in concrete ways. In addition, students could design gestures that depict concepts in a more abstract fashion. Of course, a variation would be for students to act out their gestures and play a game of charades.

2. **Form a group statue:** To make it more interactive, students can group with other students and use their bodies to represent a concept. For example, to illustrate the word conservation, two students could be in the center and the third student could wrap their arms around the others.

3. **Create a model:** Individuals or groups could create an abstract model to represent the word. While lots of materials could be available, students could be given a box of random objects including sticky notes, markers, building blocks, etc. They would construct a model that represents the word and describe it. For example, students might make a small tower with a pack of sticky notes, a building block and craft stick, symbolizing the three branches of government. The sticky notes represent the judicial branch as they handle the “sticky” issues. The building block depicts Congress as the group that makes the laws—the “building block” of societal rules. The craft stick represents the executive branch, which is led by one key figure—the president.

Students can be allowed to choose a way to demonstrate their understanding of vocabulary terms through a hand gesture, group statue, or model.

**Think-Pair-Share Continuum**

This strategy uses Think-Pair-Share actively and is modified from a strategy called “Soldiers and Heroes” (Daniels & Steinke, 2013). It requires students to think about a question with a wide array of stances. After deciding on a stance, students will physically stand on the continuum and share their opinions.

**Some ideas for using the continuum include:**

- After reading the article, do you believe in evolutionary biology? Do you believe in intelligent design?

- In The Things They Carried, was it heroic or villainous for Tim to consider leaving America to miss the draft. Discuss quotations from the book.

- Which position do you support in Roe v. Wade? Use the article to support your position.
STRATEGY STEPS

1. The teacher introduces students to a controversial topic by way of historical documents, literary writing, current news, or other informational texts.

2. Then the teacher sets up a continuum across the room. Each side of the continuum will represent the polar opposite standpoints with regard to the topic at hand. With signs or chart paper, note the ideas on each end of the continuum. To get students thinking, the teacher will ask students to first write a paragraph about their position. This works well in a class with students who would group together with friends, regardless of their actual stance. Then students will move and stand near the place on the continuum that represents their thinking (THINK).

3. The teacher then will divide students into groups according to their location on the continuum. Students will discuss, based on textual evidence, why they chose that area on the continuum (PAIR).

4. Finally, the teacher will open the floor for each group to discuss their issue at hand by having groups present their viewpoints and textual evidence (SHARE).

Another option to use in a speech class or debate unit is to pre-assign students to a spot on the continuum. Give them a position and supporting text upon which to base their argument. Be sure to have equal amounts of arguments from each side.

Using this strategy not only gets students moving but also provides a visual representation of contemporary issues. Issues are not black and white, and this strategy aims to acknowledge this important reality through learning kinesthetically and visually.

In Conclusion

It has been said, “Learning is more effective when it is an active rather than a passive process.” The aforementioned strategies demonstrate the importance of getting students moving while learning. However, movement must be intentional. Without strategies aligning with objectives, strategies may not successfully affect student learning. In addition, before implementing any form of kinesthetic learning, teachers need to consider the physical layout of the room and their students’ needs. When carefully considered, these strategies will prove effective in promoting critical thinking.

When used appropriately, fusing critical thinking with movement can enhance learning through higher student engagement. As students move, discuss, reflect, and analyze, learning becomes an active, student-centered experience that compels students to dig deeper into the content while enjoying the learning process.
About the Authors

Dr. Rebecca Stobaugh is an Associate Professor at Western Kentucky University and has authored two books on critical thinking: *Assessing Critical Thinking in Middle and High Schools* and *Assessing Critical Thinking in Elementary Schools*. She collaborates with Mentoring Minds to support teachers in integrating critical thinking skills into instruction.

Dr. Sandra Love is the Director of Education Insight and Research for Mentoring Minds, an educational publishing company. Dr. Love has authored numerous articles and developed several resources on critical thinking and instructional strategies to help educators improve the teaching and learning processes.

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