In and Out- That's What It's All About!

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This is a kinesthetic activity that helps students to visualize the process of cell transport across a membrane by means of endocytosis and exocytosis.

Students are given roles in the cell and become part of the membrane/cell by acting out the processes of phagocytosis, pinocytosis, and exocytosis.

The following roles must be chosen.
Nucleus – person that directs all cell activities and helps to keep the membrane functioning. (Pick someone who seems to have the best knowledge of the subject and can delegate well.)
Food vacuole – three students who must stand beside each other when they are part of the membrane and will eventually be the vacuole that surrounds the food.
Mitochondrion – person who will be inside the cell membrane supplying energy for the food to be broken down by touching them with a magic wand of your choice. When they touch the "food" it is broken down and will be exported during exocytosis.
Food particle - person to be brought into the cell or taken out of the cell as waste (starts outside of the cell membrane for endocytosis)
All other students - serve their role as part of the membrane and must hold hands to keep the membrane and cytoplasm intact.

The nucleus, with support from the membrane, must decide how to get the food particle into the cell without breaking the membrane or letting them step over or under the membrane. They must figure out on their own that they should fold themselves around the food particle in order to take the food into the cell. For phagocytosis, they must actively reach out and fold the membrane around the food while during pinocytosis, the food particle enters an indented channel made from the 3 "food vacuole" students.
*Note: Students must find a way to surround the food particle without ever letting their hands break because the "cytoplasm" will be spilled out and the cell will die!

Follow up** Encounter Lesson/journal activity

Have students pretend that they are a cell membrane.
Explain how you feel when

A. a larger molecule tries to move through your proteins in the membrane.
B. water tries to move through you.
C. Research which kinds of particles can and cannot pass through the cell membrane, and by what method.

Ecology RAFTing by Elizabeth Pressley

RAFT stands for Role Audience Format Topic. This is a technique that I learned in Advanced Learner training and then applied to concepts in biology. The students choose one role, an audience to address, a particular format, and a topic to demonstrate that they have an in-depth understanding of some of the concepts in ecology.

ROLE	AUDIENCE	FORMAT	TOPIC
Lawyer	Jury	Legal brief	"My client might have done a good thing by setting fire in the forest"
Nature	Land developer	Petition	Protest of a new development in the rainforest
Bear	Campers	Confession	Maternal instincts
Lawyer for EPA	Politicians	Legal Brief	Abuse of non-renewable resources
Television reporter	Viewers	Video	Warning of dangers of pesticide bioaccumulation
"Road kill"	Bacteria	Epitaph	"Return me to the earth"
Child	Doctor	Conversation	"Bacteria live WHERE???"
Ad agency	US corn producers	Bumper sticker	"Got B-T"
Prey	Predator	Plea	"You don't really want me"
Plants	Cows	Graffiti	"Where does your breakfast come from?" (Nitrogen cycle, primary producers, etc.)
Rebel	Government officials	Editorial	"So who are you to tell me I can't let my (non-native invasive species of choice) _____ loose in the _____(forest, lake, river, ocean, etc.)
Hunter	US Wildlife Commission	Official complaint/commendation	Why you are upset/glad that they have limited the number of _____ that hunters kill each year
Child in the future	Past generation	Diary entry	"You know- some resources really are renewable!"
Advertising firm	General public	Advertisement	Why we should be using some genetically engineered product by X firm
Whole foods grocery owner	Customers	Advertisement or banner	Why buy organic???

This can be applied to any topic and is a great way to get kids involved in the topic.

TIC TAC TOE – Multiple Intelligences assignment for DNA concepts
By Elizabeth Pressley

Linguistic/verbal Write a newspaper article announcing Watson and Crick's discovery of DNA and its expected future importance.	**Mathematical** Make a timeline of the most important discoveries leading up to the most recent discoveries in genetics/DNA research. Make some future predictions on your timeline.	**Naturalist** 1. Photograph the results of your experiment extracting DNA and the gel electrophoresis. 2. Compare YOUR DNA to DNA of at least 5 other organisms and group organisms based on genetic similarities.
Musical 1. Listen to the song "I Am My Own Grandpa" provided. Design a pedigree based on listening to the relationships in the song. OR 2. Write a song about DNA.	**FREE CHOICE**	**Visual/spatial** 1. Build a 3-d model of DNA using a medium of your choice. OR 2. Make a concept map using as many connections as possible using the terms in chapter ___
Interpersonal Interview a person affected by a genetic disorder, i.e., sickle cell anemia, spina bifida, cystic fibrosis, PKU, lactose intolerance, hemophelia, Huntington's disease and report to the class your findings.	**Intrapersonal** Decide whether you agree with genetic testing of fetuses. Defend your position with criteria under which you find testing acceptable. Advise of other possible alternatives to genetic testing.	**Bodily-Kinesthetic** Act out 10 terms to a partner and have them guess the term you are acting out. (Charades). Film this process and share selected clips with the class.

Students can make tic tac toe by completing any 3 activities that give tic tac toe.