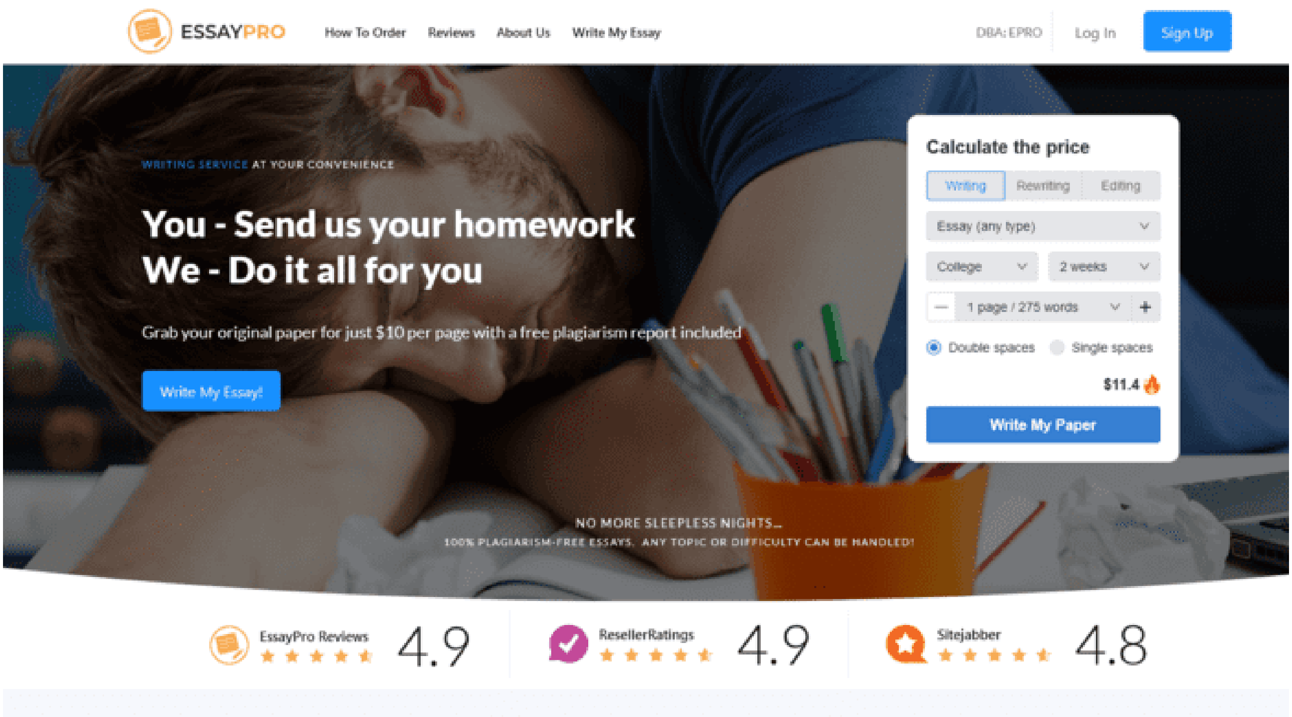
Kinesthesis in Science



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Kinesthesis in Science

Especially to the uninitiated, learning science can be daunting. A primary contribution to this problem is the fact that too often science lectures are overly formal, and they employ a notation--namely the language of math-which ostensibly is transparent to only an elite few. The belief behind my remedy to this difficulty is that any physical problem, as well as all of the associated formalism, can be rendered not only intelligible but even pleasurable if the student first achieves a gut sense of the physical situation. Put plainly, all of the math in any science class makes sense if the student first has an intuitive mental picture of exactly what is going on. Once this physical picture is in place, it serves as a framework upon which the formal treatment can hang. And when the formal treatment flows intelligibly with a student's gut picture of the situation, the subsequent sense of insight is no less than thrilling.

So how to instill this essential physical picture? I have found that getting students up out of their chairs and physically acting out a problem, though it may feel ridiculous, is an incredibly effective tool for instilling a gut-level physical intuition about any scientific situation. Need to understand tides? Link hands and form a circle to represent the Earth's hydrosphere. Pick volunteers for the sun and the moon. Distort the human hydrosphere appropriately, then let each student stand in the middle, being the Earth, physically witnessing the succession of high and low tides. Though it may appear laughable at first glance, actually acting out a given situation instills the physical sense of why behind the formalism to come. Once this instinct is in place, the rest of the discussion is well-motivated, and the formalism will make sense. Moreover, it is very unlikely that a student will forget one of these exercises. I have found that retention of material so introduced is near perfect.

As an ancillary benefit, the mere fact that the students are out of their seats during these human models, moving and laughing and bumping into each other, serves extraordinarily effectively to obliterate the impetus against asking questions in the classroom. The students have already felt silly and seen their instructor acting silly. In that respect, everyone is on equal footing, and the classroom becomes a safe environment for verbalizing concerns. Additionally, the enhanced physical and verbal interaction involved in kinesthetic modeling enormously smoothes the implementation of cooperative learning, since the "ice," so to speak, has long been broken.