Clay hand Lesson – CP Physics Prosthetic Hand PBL

Discussion (kinesthetic with student trying movements and identifying parts of the hand)

* What are the possible directions of movement? –
	+ use shoulder movement as an example -Not using the technical terms of degrees of freedom – can move about an axis 1) left/right, 2) up/down, 3)rotate
	+ discuss possible movement of fingers and wrist joints-the wrists inability to rotate about an axis surprises them
* define general vocab terms to use in discussion (students take notes on organizer/diagram)
* discuss/define four components(bones, ligaments, tendons, musles)
	+ label the bones of the hand
	+ make a point of recognizing the metacarpals are in the palm of the hand and not the “fingers”

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| **General Vocab** |
| Ventral (palmar) | Draw a dolphin/whale and ventral side of hand (not actually defined – more discusses) - anterior, “front” (more often called “palmar” – instead of ventral in anatomy of the hand) |
| Dorsal | Draw/demonstrate - posterior, “back”  |
| Proximal | “close” (in relation to the wrist in the case of the hand) |
| Intermediate | middle |
| Distal | “distant” (in relation to the wrist in the case of the hand) |
| Flexion | A movement toward ventral |
| Extension | A movement toward dorsal |
| Abduct | To draw away from median of the body |
| Adduct | To draw inward toward the median axis of the body |
| **Four main components** focusing on (not touching on nerves or blood vessels/veins) |
| **Bones** (the structure) | Rigid (in simplification for our purpose) |
| Forearm | Ulna | One of two long bones of the forearm – closest to the body when the arms are down at the sides and palms facing forward |
| Radius | One of two long bones of the forearm –farthest from the body when the arms are down at the sides and palms facing forward |
| Hand | Carpal | 8 bones of the wrist (connected with the radius and ulna of the forearm) |
| Metacarpal | 5 bones between the phalanges and the carpel bones – makes the knuckles |
| Phalanges | proximal | Closest to the metacarpal |
| intermediate | Middle phalanx |
| distal | Most distant phalanx (tips of fingers) |
| **Ligament** (constraints of the rigid structure) | Short band of tough, flexible, fibrous connective tissue that **connects two bones or cartilages or holds together a joint** |
| Ex. 3 ligaments make up the interphalangeal joint (joints between the phalange bones that constrain them to 1 degree of freedom),  |
| **Tendon** (provides a path for force to be directed – tension, links the power source (muscle) to the rigid structure (bone)) | Flexible (sometimes elastic) cord of strong fibrous collagen tissue **attaching a muscle to a bone** |
| **Muscle** (“power house”- force generator) | Band or bundle of fibrous tissue that has the ability to contract. |

* Build Clay hand models (have them mark lines on muscle to distinguish between muscle and tendon).
	+ - Label bones
		- Draw adduct muscles/tendons – green
		- Draw abduct muscles/tendons – blue
		- Draw flexion muscles/tendons – red
		- Draw extension muscles/tendons - orange / yellow