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Edtech 504 Jigsaw

Chap 8 key points – Embodied Cognition and Learning Environment Design

As early as 1938, it is discussed that much learning takes place through a formal learning environment that is fragile and shallow. Students learn necessary information which is subsequently forgotten after the necessary testing has occurred. It is concluded that the learning does not become part of how the student thinks or interacts with the every day world (Dewey,1938)

What is Embodied Cognition?

Embodied Cognition is the study of how a learner uses their perception to pull information up and connect it to what they are learning. Spatial perception is the foundation of how that information is retrieved. According to Black, 2007, there are three steps involved in having a grounded cognition learning experience. They are:

1. Have an embodied experience
2. Learn to imagine that embodied experience
3. Imagine the experience when learning from symbolic materials

An overall example of this idea is having children act out a story they just read using models and toys to retell the story. This method created links in the story with a physical reaction for the participants.

Gestural Interfaces and Learning Environments

* Includes two types of interfaces
	+ Touch interfaces require direct input of a device such as a SmartBoard, ipad or smartphone. (201)
	+ Free form interfaces do not require direct input from the user but allow for gestures provided from the user. (201)
* Action Compatibility Effect
	+ There is a compatibility effect between one’s physical state and one’s mental state (Barsalou, 2003). An example provided in the reading is that a participant had a quicker answer response when asked to pull a lever rather than pushing it away, indicating that the physical response was a more natural decision for the participant.
* Physical Manipulation and Learning
	+ Using compatible actions to map out ideas in one’s learning can set the concept faster. Schwartz and Martin (2006) conducted a study that found that children were able to better understand problems of division and arithmetic after physically separating and distributing piles of candy to other classmates.
* Embodied Interaction and Learning
	+ Embodied interaction uses more of our senses and includes touch and physical movement. (202) Chan and Black (2006) found that immediate sensorimotor feedback through the hands can be transferred to memory for further processing. This allowed better learning for subjects who were involved in direct manipulation. It essentially allows the learner to be directly engaged in the feedback.
* Congruent Gestures Promote Performance
	+ Gestural interfaces versus traditional interfaces
		- Children were asked to use either a multi touch device or a mouse and keyboard to do arithmetic and numerical estimation. Their actions would either be mapped congruently to the cognition or not. The claim is that the gesture performance should support an increase in cognition because the subject is using gestures rather than just inputting material.
* Direct manipulation: Gestural Conceptual Mapping and Haptic Channel, Sensorimotor Input
	+ Digital representation of the content and the gestures used should be compatible with each other. Discreetly tapping a block for counting or dragging a finger across them are two different inputs, just like clicking them with a mouse or dragging the mouse. In both cases, clicking or tapping the individual block was more compatible with counting than the act of dragging. (205)

Embodied Cognition, Gaming and Robotics

* Students were able to construct polygons by visualizing themselves as navigating a course that would make a polygon.
* Students imagine a possible path for a solution before creating the final path.
	+ The students were allowed to create a special connection with the shapes they were trying to create before trying to physically create the directions for the shape.
* Lu, Black, Kang, and Huang (2011) used LEGO Robotics to have students embody their knowledge of physical science concepts.
	+ By having the students act out the physics concepts with their own bodies first, then programming the robot to repeat the procedure, there was a greater amount of learning and understanding.
	+ Having students experience, then imagine these experinces, then embody the experience led to stronger retention and understanding(experience, imagination, Surrogate Embodiment).