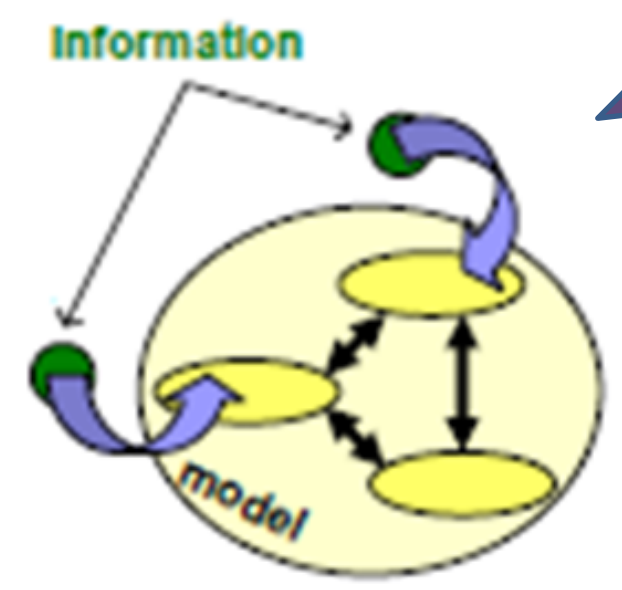


# Context & Representation: Insights from transfer research on teaching physics

Dean Zollman & N. Sanjay Rebello

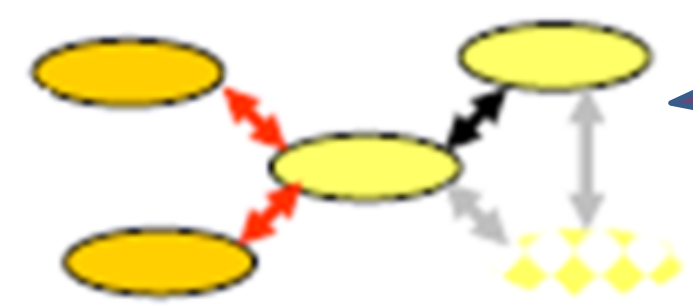
## Two types of transfer

### Horizontal



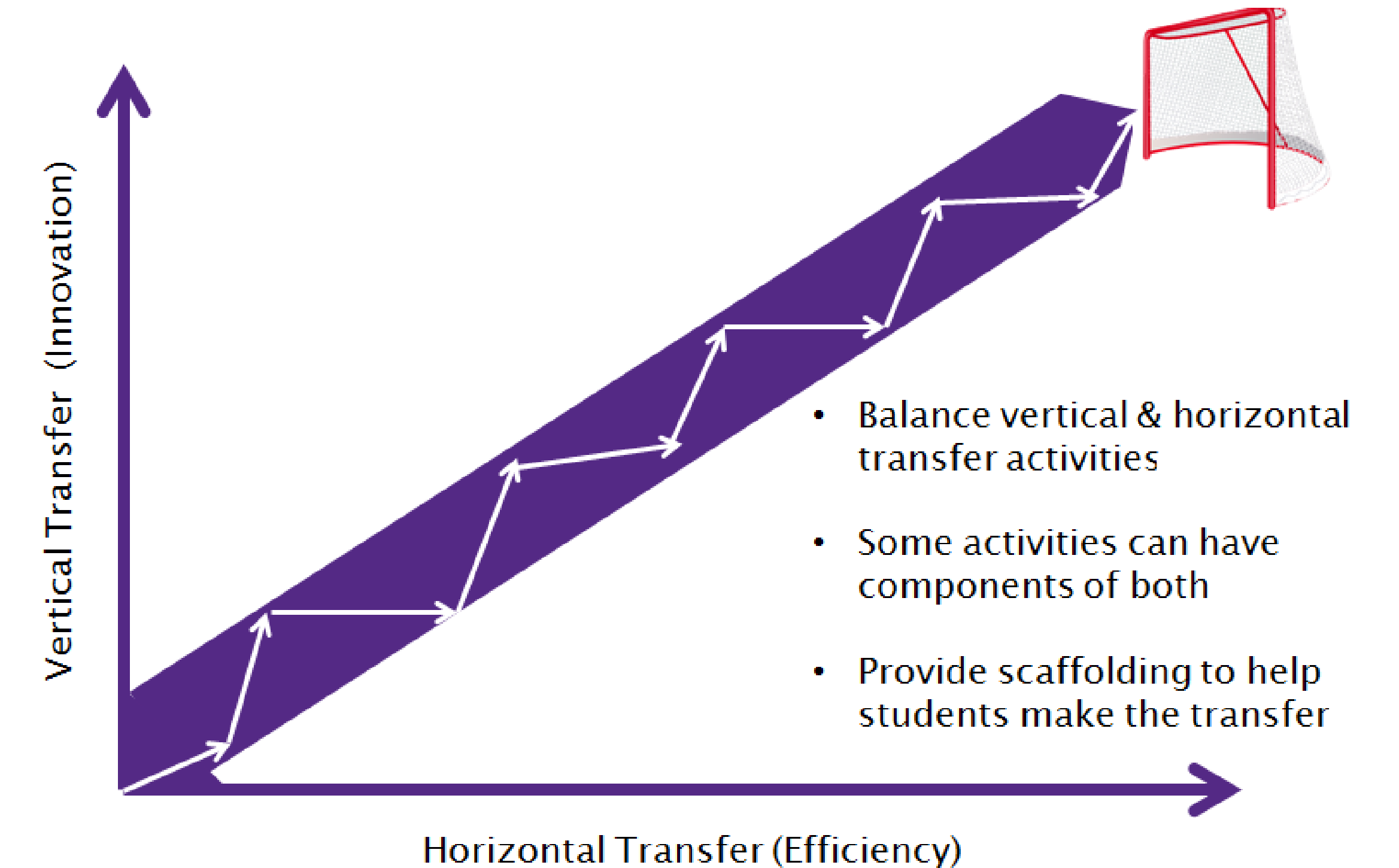
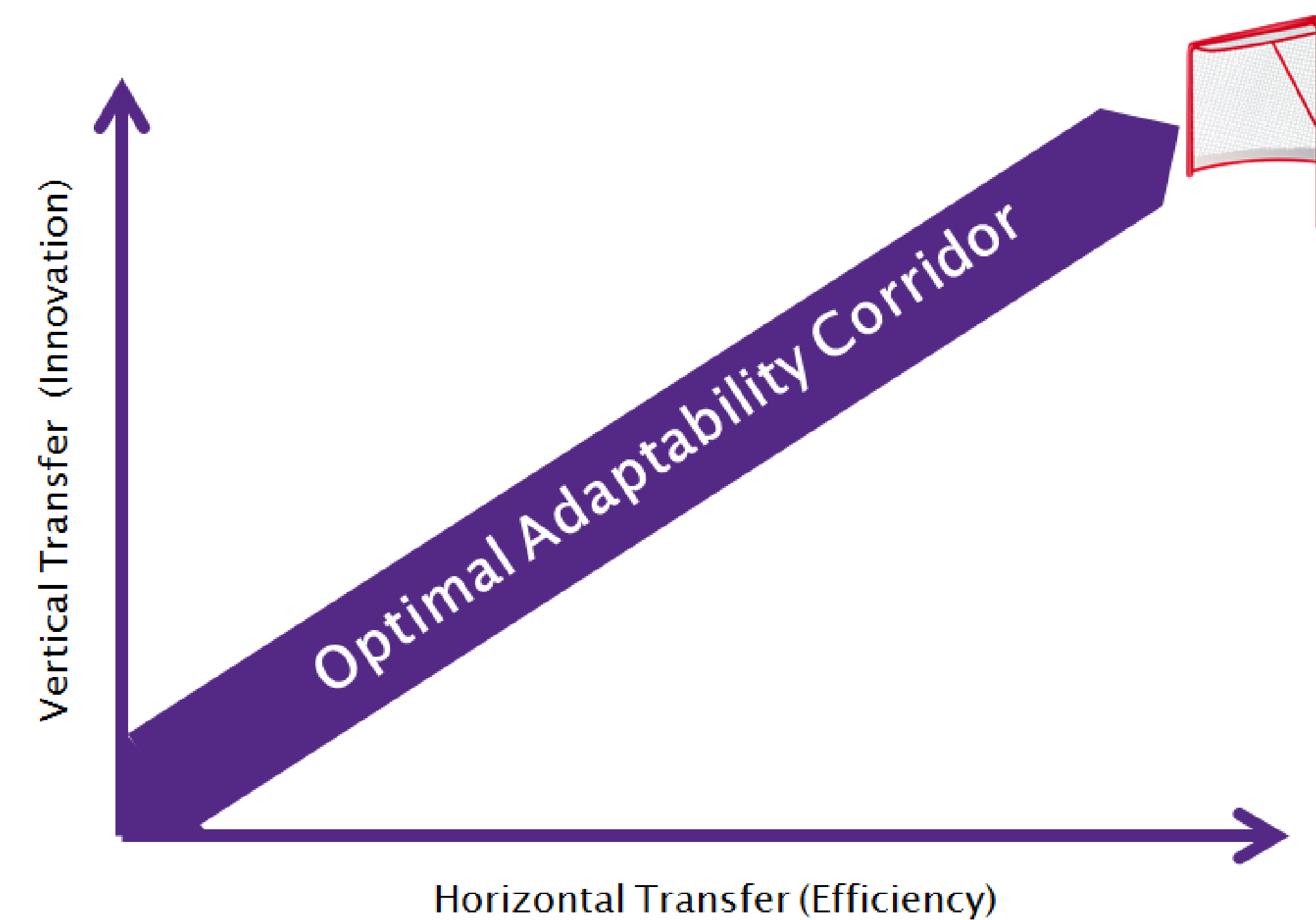
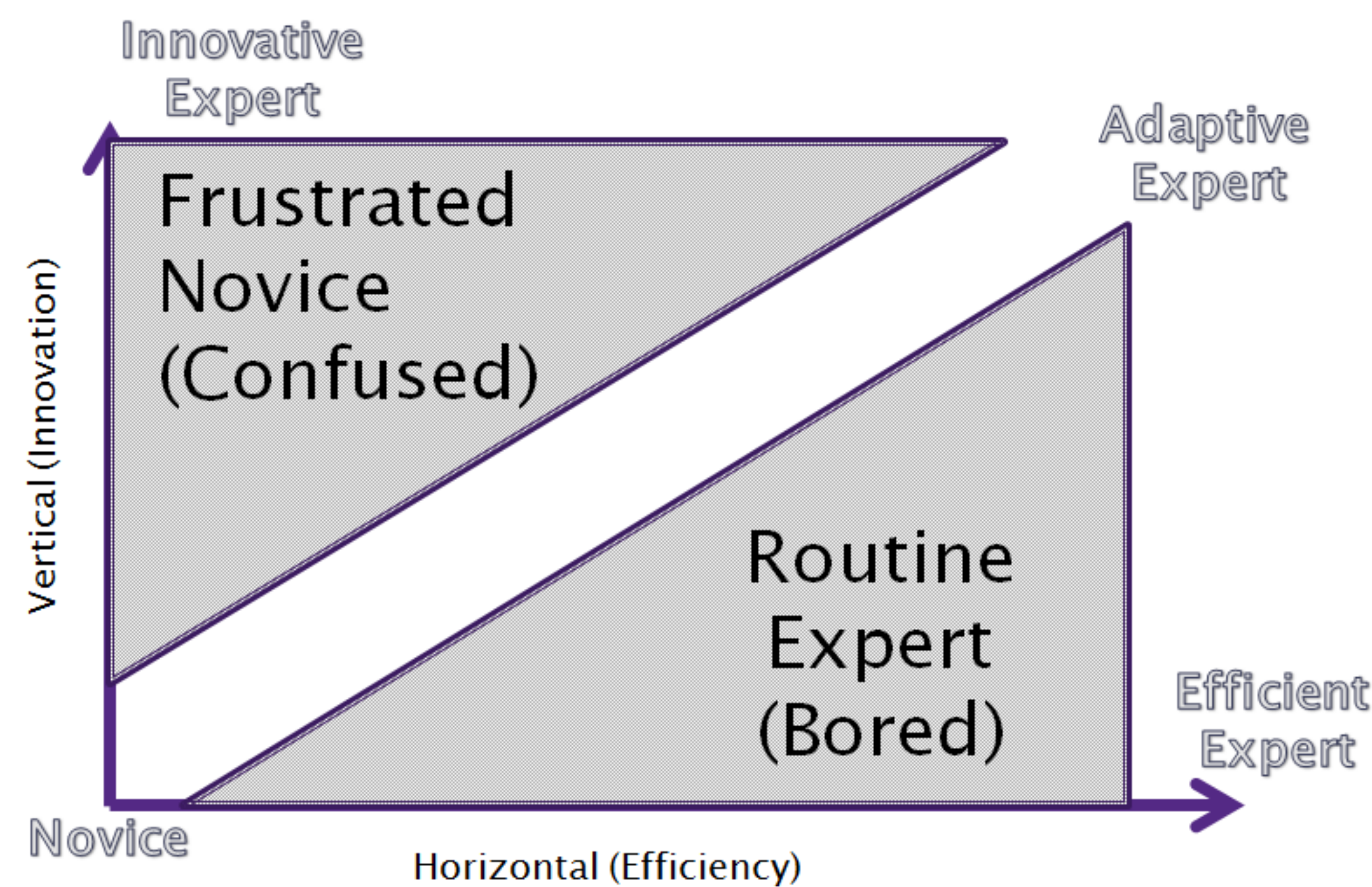
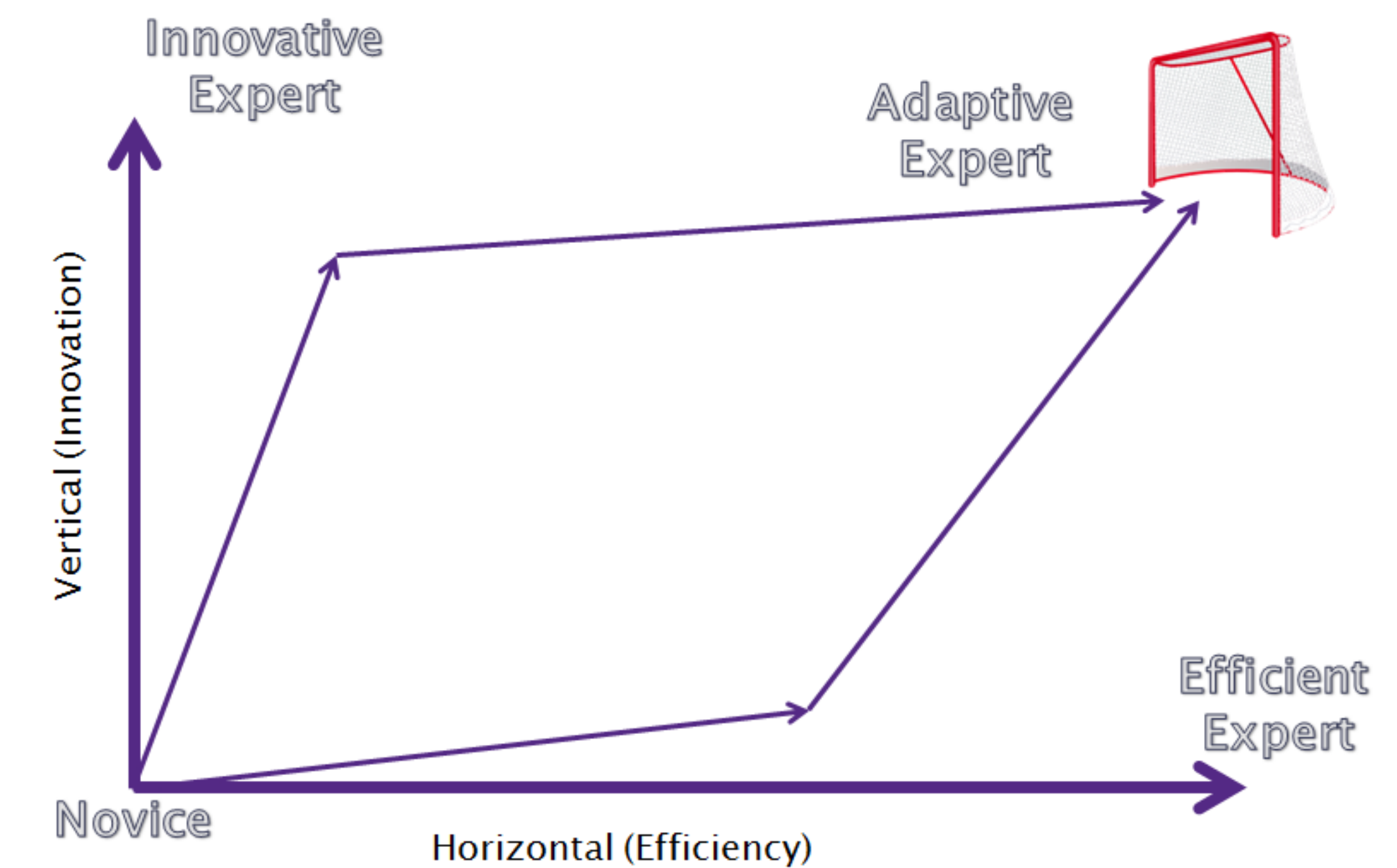
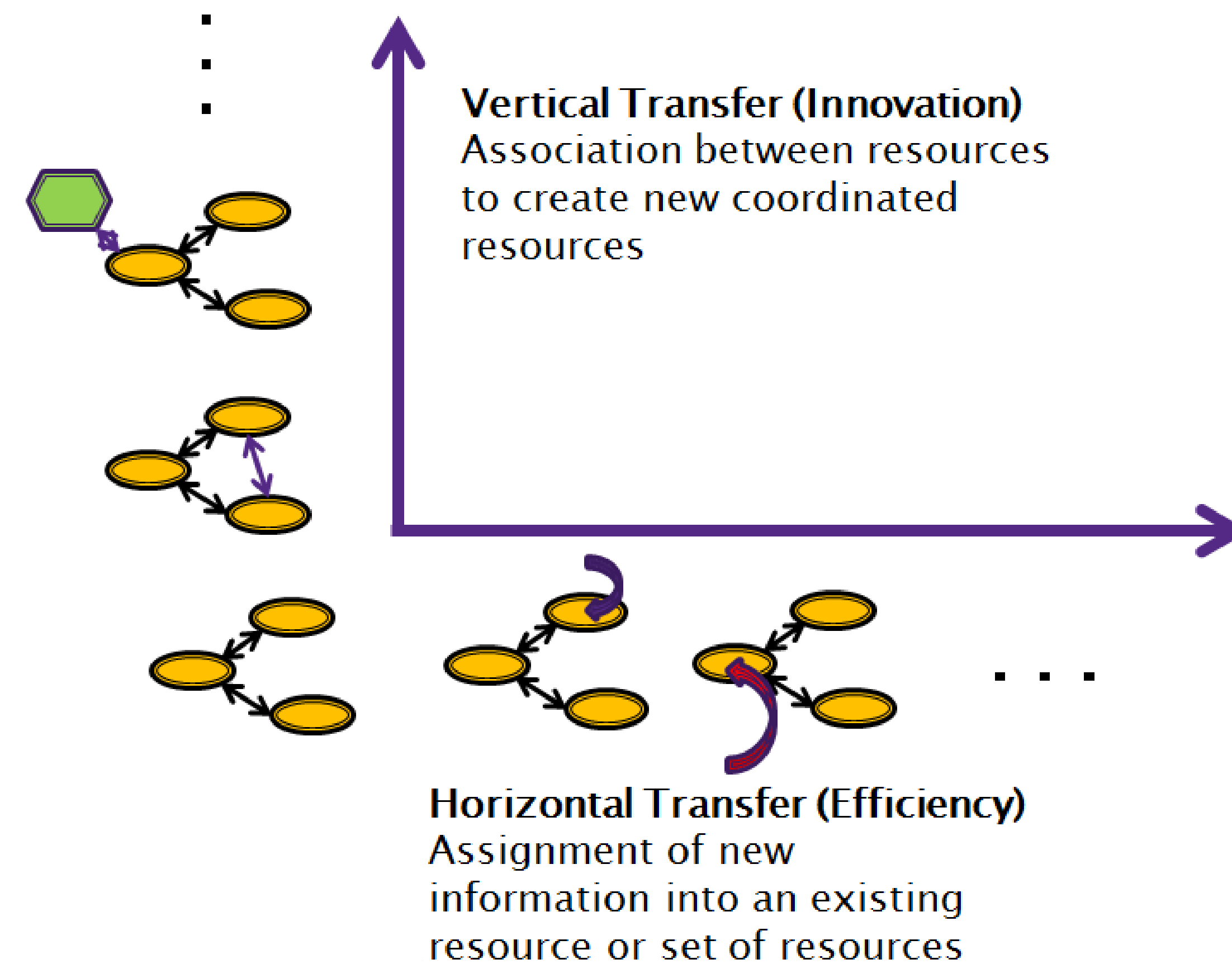
Creates efficiency at solving certain types of problems

### Vertical

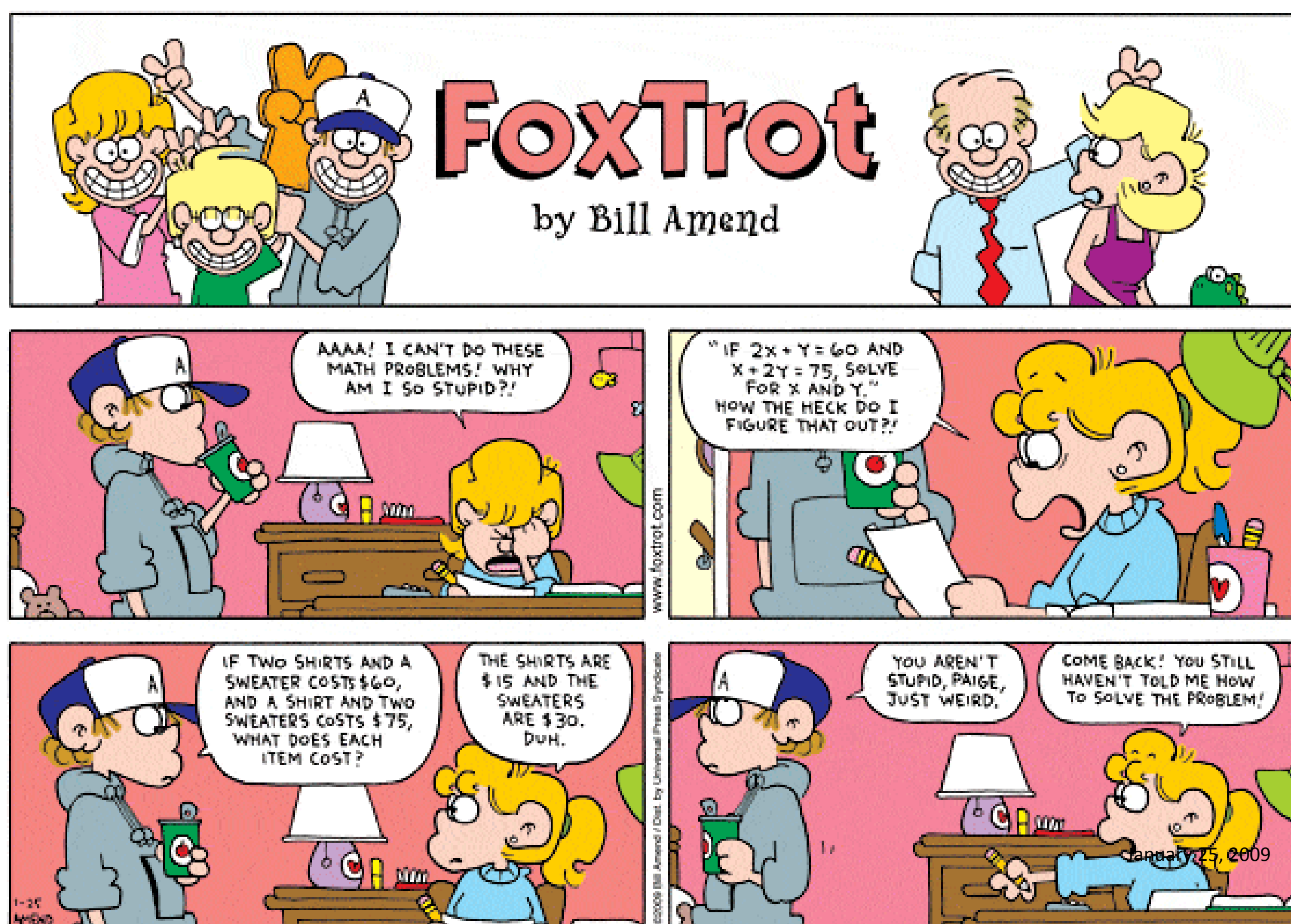


Creates the ability to innovate by modifying models

New knowledge elements are incorporated to modify the model or create a new one.



A change in context and representation makes all the difference in solving a specific problem, but ...

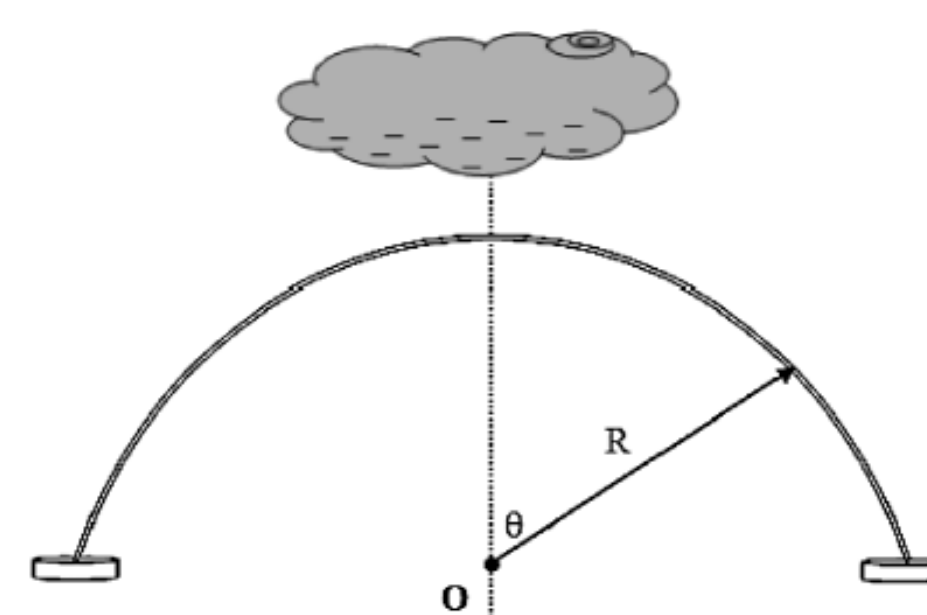


... transfer still did not occur.

## Study of Change in Context & Representation

Students who are taking physics & are able to do integration problems as done in math classes were presented with the physics problems requiring integration

### Example



You are standing at the center of a non-conducting circular arch on a stormy day. The charge distribution on the arch varies as

$$\lambda = \lambda_0 \cos \theta$$

Find the direction and magnitude of the electric field at your feet.

### Students

- recognize that they need to use integration
- have difficulty setting it up
- have trouble connecting variables in equations with physical quantities
- did not apply summation of infinitesimals properly
- were able to complete the problems with guidance
  - including helping transfer ideas learned in Calculus

### Conclusions of the study

- Some transfer occurs spontaneously, but not enough to complete the problem.
- The guidance helped the students make small vertical and horizontal steps and follow the Adaptability Corridor.

Nguyen & Rebello, *Phys. Rev ST-PER* 7, 010113 (2011)