

DynaLearn: 'Modelling for Systems Thinking' videos exercises

<http://www.dynalearn.eu/education/>

- **Systems thinking through conceptual modelling**
- **Incremental learning of systems thinking**
- **LS1 – Conceptual modelling**
- **LS2 – Modelling structure and behaviour**
 - Exercise 1: Model the structure and behaviour as shown in the video.
 - Exercise 2: Model the structure and behaviour for a bathtub with water, a faucet and a drain.
- **LS2 – Causal relations and simulating trends**
 - Exercise 1: Model the causal relations shown in the video and run the simulations.
 - Exercise 2: Model the causal relations governing the amount, height and pressure of water in a bathtub.
- **LS3 – Simulating conceptual changes**
 - Exercise 1: Model the quantity space as shown in the video and run the simulations.
 - Exercise 2: Model the quantity space for the height of water in a bathtub.
- **LS3 – Constraining Simulations**
- **LS4 – Modelling causes of change and their propagation**
 - Exercise 1: Model the causal relations as shown in the video and run the simulations.
 - Exercise 2: Model the causal relations for a faucet, water and drain belonging to a bathtub.
- **LS4 – Modelling the relative strength of processes**
 - Exercise 1: Model the relative strengths of processes as shown in the video and run the simulations.
 - Exercise 2: Model the relative strengths of inflow (from the faucet) and outflow (from the drain) in the bathtub system and run the simulations.
- **LS4 – Modelling equilibrium seeking mechanisms**
 - Exercise 1: Model the equilibrium seeking mechanism as shown in the video and run the simulations.
 - Exercise 2: Model the equilibrium seeking mechanism in a communicating vessels system.
- **LS4 – Modelling System boundaries**
 - Exercise 1: Model human carbon emissions as an exogenous process as shown in the video.
- **LS4 – Causal relations exercises**
 - Exercise 1: For each of the following types of causal relations, provide 2 examples of pairs of quantities that are related through such a causal relation: (1) positive influences, (2) negative influences, (3) positive proportionalities and (4) negative proportionalities.
 - Exercise 2: Provide 2 examples quantities that are causally affected by opposing causal relations (positive and negative) and the quantities that affect them for: (1) opposing influences and (2) opposing proportionalities.
- **LS4 – Causal relations exercises (answers)**
- **LS4 – Feedback loops**
 - Exercise 1: Prove examples of the following feedback loops: (1) a positive direct feedback loop, (2) a positive indirect positive feedback loop, (3) a negative direct feedback loop, and (4) a negative indirect feedback loop (different from those shown in the video).