

Classrooms; teachers, students and learning

What is it

This a phenomenon-based model plan. Classroom in school are places when students are supposed to learn and the most often do. But things can go awry, the students can play up and that can result in an unruly class and learning can suffer. This model aims to look at how much students learn according to how good the teacher is a classroom control and how good he or she is at teaching *per se*.

How it works

The basic model sets out 30 students in a 6 X 5 array. They can have one of three states: learning, passive and disruptive. The level a variable called Knowledge which start at zero. The teacher has two variables ; Control and Teaching. Each is measured on a five point scale from awful (1) to brilliant (5) and they can be selected using two sliders.

A lesson lasts 40minutes and during that time the teacher teaches and the students occupy one of the three states. Initially they all learn and whilst learning their knowledge increments by 1 point a minute, but at each time point there is a probability that they become passive or disruptive. The probability is related to the Teaching and Control variables respectively.

The students revert to a learning state after 2 minutes

A student's state is also influenced by the state of the other students. A neighbouring (front back or side) disruptive student increases the probability of being disruptive

HOW TO USE IT

Select the desired levels of Control and Teaching

Setup and ten Go

(how to use the model, including a description of each of the items in the Interface tab)

THINGS TO NOTICE

Colours indicate the state of the students

Graphs show the average level of knowledge

(suggested things for the user to notice while running the model)

THINGS TO TRY

(suggested things for the user to try to do (move sliders, switches, etc.) with the model)

EXTENDING THE MODEL

A disruptive and passive student will revert to a learning state over time with a probability dependent on the teacher's Control and Teaching respectively

(suggested things to add or change in the Code tab to make the model more complicated, detailed, accurate, etc.)

The variables

Students

ID: A unique identification number for each student.

Start_maths: The maths scores from PIPS at the start of the year (mean 19.9, SD 7.8)

Ability: The major dimension from factor analysis of PIPS measures of vocabulary, reading, maths at the start of the year (mean -0.24, SD 0.82)

Inattentiveness: Teachers rating of 9 items based on ADHD scale from DSM IV (2013). Ratings put onto a 1-5 scale with 1 being the lowest score (mean 1.10, SD 0.40)

Disruptiveness: Teachers rating of 9 items, relating to impulsivity and hyperactivity, based on ADHD scale from DSM IV (2013). Ratings put onto a 1-5 scale with 1 being the lowest score (mean 1.17, SD 0.65)

End_maths: Updated at each tick starting with Start_maths

State: Three States are available: Green (attentive), Yellow (passive) and Red (disruptive)

Teachers

Control: One point on a 1 to 5 scale to represent class control where 1 is very poor to 5 which is very strong.

Quality: One point on a 1-5 scale to represent the quality of teaching where 1 is very poor to 5 which is very good.

Pseudo code

Initialize

Create 30 Students in fixed positions in a 6 X 5 array

Allocate each student the following variables: ID, Start_maths, Ability, Inattentiveness, Disruptiveness, End_maths, State.

Import levels for each of the variables: Start_maths to Disruptiveness from one class of 30 students from the PIPS project. (End_maths is equated to Start_maths).

Set all States to yellow (passive)

Create one teacher for the class

Allocate the teacher the following variables: Control, Quality

Quality and Control levels are fixed on sliding scales from 1 to 5.

Create a random variable R

R is fixed on a sliding scale from 1 to 6

Fix the number of ticks to 12,000

At each tick decide what State each student is in:

Note: passive students (yellow) are more likely to switch to learning mode (green) if teaching is good and student is not too inattentive

If Quality > a random number and Inattentiveness < a random number and State = yellow change State to green

Note: Likely to change from attentive (green) to passive (yellow) if the teaching quality is low

If Quality < random number and State = green change State to yellow

Note: Likely to be disruptive (red) if already passive (yellow) and control is low and disruptiveness is high

If Control < random number and Disruptiveness > random number and State = yellow change State to red

Note: Likely to change disruptive to passive if control is good

If Control > a random number and State = red change State to yellow

Note: If several neighbours are disruptive a student will cease to be in a learning State

If 3 or more neighbours are red and State = green change State to yellow

Note: If many neighbours are disruptive and a student is passive, he/she become disruptive

If 6 or more neighbours are red and State= yellow change State to red

At each tick learning may happen

Note: In the classroom, if the student is in a learning State, maths increases slightly by an amount related to Developed ability

If State = green maths = maths + random selection from a normal distribution (mean = (Developed ability + Constant_a)/Constant_b SD = Constant_c)

Note: Just by getting older the student's maths increases slightly by an amount related to Developed ability

maths = maths + random selection from a normal distribution (mean = (Deveoped ability + Constant_a)/Coinstant_b SD = Constant_c)

At the end of the allotted number of ticks

Export the data