

TEACHING-LEARNING ECONOMY IN A SECONDARY SCHOOL USING A QUALITATIVE COMPUTER MODELLING SYSTEM

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Abstract This paper discusses some ideas about System Dynamics and computer modeling and its importance in Economy classes. It also presents a study being developed with students aged 15-16 years old in a private technical school in Rio de Janeiro - Brazil using a semi-quantitative computer modeling system called WLinkIt (Sampaio, Ogborn, 1996). From a perspective of System Dynamics (Forrester, 1992), the students have to engage in exploratory tasks intending to externalize and discuss their ideas about some subjects such as inflation and unemployment.

INTRODUCTION

Education has taught static snapshots of the real world. But the world's problem are dynamic. The human mind understand pictures, maps and static relationships in a wonderfully effective way. However, with systems of interacting components that change through time, the human mind is a poor simulator of behaviour. To deal with that we present WLinkIt - a computer modeling tool —and System thinking — the method.

SYSTEM THINKING

System Thinking can be understood as a new way to understand the dynamic behaviour of a phenomena. With this approach the system behaviour is not only seen as the cause-effect relationship between pairs of variables but as a whole that gives the student a higher level of perception of the situation.

The idea of perception of the “whole of a model” is strongly connected to the concept of **feedback loop**. **Feedback loop** can be seen as a structure that *“brings results from past action of the system back to control future action”*. (Forrester, 1971)

WLINKIT MODELLING SYSTEM

WLinkIt allows the construction and simulation of semi-quantitative models. Its direct-manipulated interface uses a causal loop diagram metaphor to relate variables and give them semi-quantitative values. Thus, WLinkIt animates

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causal diagrams containing boxes (which represent variables) with vertical levels inside (which represent semi-quantitative values).

When the model is running the system is responsible for calculating the graphical output of the variables values over time.

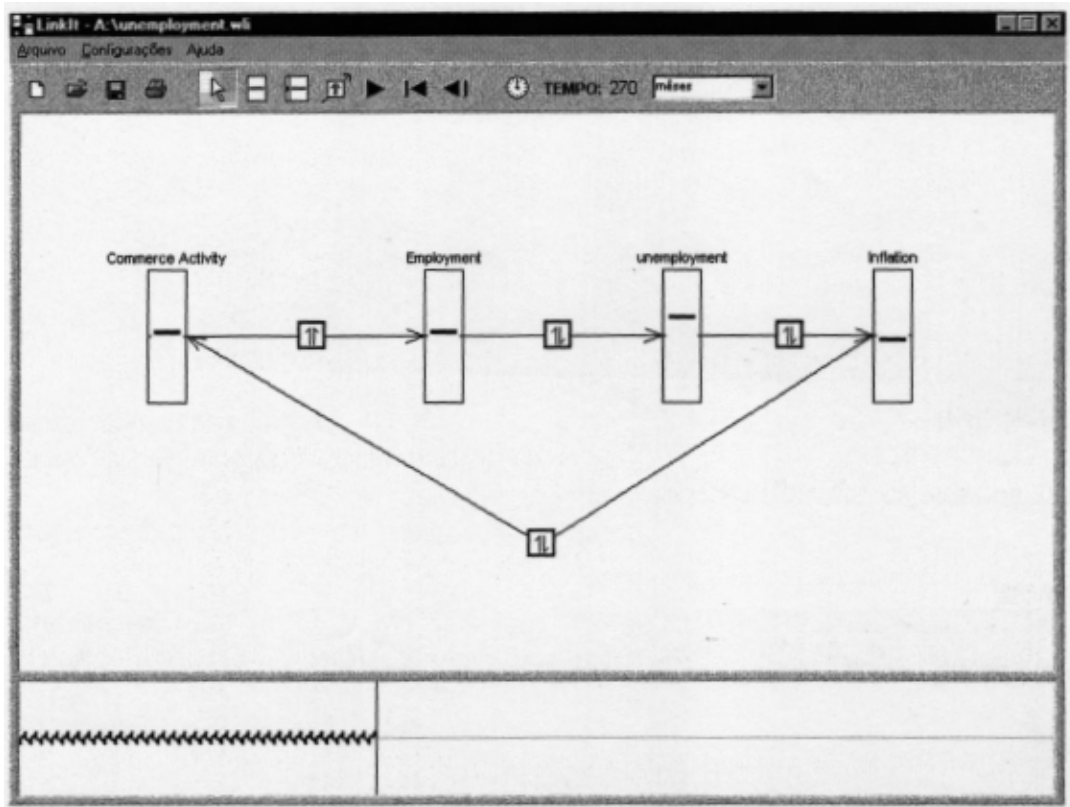


Fig. 1: WLinkIt environment with a model about unemployment showing the graph of the variable unemployment X time

THE CONTEXT OF THE EXPERIMENT

The aim of the experiment is to investigate whether the students are able to think in a system level, using their own knowledge to construct (with WLinkIt) and understand models about economy containing (causal) feedback loops.

The school where the experiment is been developed is a private technical high school located in a low-medium class area of Rio de Janeiro, Brazil. The students are 15-16 years old. Although, they have some computer experience, they never heard about modeling and WLinkIt. Their knowledge about economy is what they read in newspapers and other communication vehicles.

THE TASKS

The modeling tasks were divided in two stages. The first one intend to introduce WLinkIt modeling system and its features. In this stage the students

have to work with (construct and explore) very simple models about subjects not related to economy.

In the second stage they work with two topics related to economy: inflation and unemployment. First they have to produce a text with their own ideas about those subjects. Later, after reading very short motivating text, they are asked to discuss (talk aloud) their ideas about these subjects and represent them using the modeling tool. In a third activity in this stage they are asked to confront their models with the text they produced and asked to re-elaborate their text and their models.

FINAL REMARKS

There are at least two important arguments to justify the use of modeling environment in economy classes.

The first one is that throughout the construction of models the students may develop their own knowledge about the functioning of the system (knowing how and why the system works in a certain way). During such activities, the students have the opportunity to externalize their ideas giving concrete shape to abstract ideas.

The second one is that working with economy is essentially working with dynamic models. We cannot think about economy without thinking about systems evolving over time.

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