

Interdisciplinary research in education science: the system dynamics perspective

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Abstract. Most people perceive the world in linear, non-feedback terms. They do not realize that changes over time occur due to the controlling power of feedback loops, where a change in one variable affects other variables over time, affecting the original variable, and so on. They base their decisions on assumptions about separate parts of real systems and try to fit those parts of knowledge into forecasting outcomes using intuition. Mental models that people hold are rich with information about the fragments of a system, and most of the systems (families, schools, companies, governments, etc.) are operated based on the information held in people's heads gained from observations of the real system. A small part of the knowledge held by the mental models is stored in written databases like books, newspapers, and articles. Scientists numerically record the marginal portion of it.

Many systems and problems that arise from the system's structure can be built as computer models. System dynamics is a modeling approach based on computer models, which are of great complexity and help to run more simultaneous calculations than the mental model of the human mind can. System dynamics models are built on all available information, including mental, written, and numerical databases.

Education is a complex nonlinear system. Education research shows that commonly used research techniques are valid for studying the linear dynamics of educational systems. System dynamics modeling is being extensively used for studying nonlinear characteristics of complex systems in other fields and can provide a methodological complement to quantitative and qualitative education research approaches, which can help advance education research and inform policy.

Today interdisciplinary research is receiving higher priority than before due to its transcending value. This research type accelerates scientific discovery by advancing fundamental understanding and solving problems with solutions that are beyond the scope of a single discipline. It prepares a workforce that can address scientific challenges in innovative ways. The joint forces of education researchers and system dynamicists would help the education system's stakeholders understand the system's complexity, investigate current decision-making, and help decision-makers learn and make better decisions.

Various cases from the education system from the system dynamics perspective will be presented.