

Virtu@I CC:

Modeling Student Behavior, Student Outcomes and Student Success

(work in progress)

Modeling student behavior, student outcomes and student success is a transdisciplinary venture which constitutes the heart of the game. The supporting theories and the empirical research that converge into the Virtu@I CC game span across several disciplinary domains, including Management Science, Student Development, Psychology, Cognitive Science, behavior simulation, and agent-based modeling, to name a few. It needs to be so in order for the game to be theoretically robust from the human dimension of the student, and mathematically justifiable from the modeling and simulation standpoint.

We list a few subject areas we need to address as especially significant in the development of the game. We list also some authors that will have strong bearing on the design strategies of *student models* as well as college models in the Virtu@I CC game:

Subject Area/Domain(s)	Sources/Author(s)
Student Preferences Modeling, College Simulation	William Massy
Higher Education Management	Alexander Astin, Arthur W. Chickering
Student Retention/Persistence models	Vincent Tinto, John P. Bean, Ernest T. Pascarella, Patrick T. Terenzini
Assessment in Student Affairs	M. Lee Upcraft and George D. Kuh
Student Development Theories	Nancy J. Evans, Deanna S. Forney, Florence Guido-DiBrito; M. E. Wilson and Lisa E. Wolf-Wendel
Learning Theories	Dale H. Schunk
Management Science	Jeff Camm and James Evans; John A. Lawrence and Barry A. Pasternack
Scorecard	Robert S. Kaplan and David P. Norton;
Performance Management	Aubrey C. Daniels, James E. Daniels, Bernard Marr, August-Wilhelm Scheer, Gary Cokins
Strategic Planning	Douglas Allen Druckenmiller, Graham Kenny, John M. Bryson, C. Davis Fogg, Michael Allison, Jude Kaye, Michael J. North, Charles M. Macal, Michael A. Hitt
Agent-Based Modeling	Simon Parsons, Piotr Gymtrasiewicz, Kiyoshi Arai, Takao Terano, Francesco C. Billari, Joshua M. Epstein, Thomas Fent, Alexia Prskawetz, Jürgen Scheffran, Timothy A. Kohler, Zili Zhang, Chengqi Zhang, Jaime S. Sichman, Craig L. Oeltjen, Amy L. Baylor, Matthew Berman,
Human Behavior Simulation	James W Ness, Kevin A. Gluck, Richard W. Pew, Courtland L Smith, Hannes Werthner, William B. Gevarter
Organizational Behavior Simulation and Games	Robert H Miles; George C. Thornton, Francesco C. Billari, Alexia Prskawetz, Anne S. Mavor, and Richard W. Pew

We will treat each of the three concepts (i. e. Student Behavior; Student Outcomes; and Student Success) separately for convenience in addressing modeling frameworks and simulation strategies in each area. The challenges that we face in building Virtu@I CC are those associated with any innovation in modeling and simulation as they are applied to both human and organizational behavior in general, and more specifically to student success and college management.

(As a side note, we are providing a hyperlink <http://www.osa.umn.edu/outcomes/index.html> to the University of Minnesota website, which we found very interesting in its view of “student success” from an institutional perspective).

The modeling and simulation areas that we will research on the three concepts are presented in the following page. Please, read and provide us with your feedback:

Modeling and Simulation of Student Behavior

- Theoretical models of human behavior as they applied to Virtu@I CC (e. g. psychological models, consumer models, etc.)
- Theoretical models of **student behavior**. (Student preference modeling)
- Computational Approaches to Modeling and simulation (e.g. types of methodologies)
- Hybrid approaches: Statistical, mathematical and artificial intelligence approaches)
- Definition and Conceptual Map of **Student Behavior**
- Feasible approaches and their justification.

Modeling and Simulation of Student Outcomes

- Theoretical models related **Student Outcomes** as they applied to Virtu@I CC
- Toward a taxonomy of **student outcomes**
 - Based on who defines it:
 - o Self (the student)
 - o The institution
 - o Student Development theorists
 - o Parents
 - o Teachers, Counselors, and Advisors
 - o Employers
 - o Legislators
 - Based on observable stimuli and responses
 - o Inputs
 - o Processes
 - o Outputs
 - o Attractors
 - o Rejecters
 - o Stimuli
 - o Responses
 - o Predictors
- Computational Approaches to Modeling and simulation of **Student Outcomes** based on definitions above
- Conceptual Map of **Student Outcomes** based on definitions above
- Feasible approaches to modeling and simulating **student Outcomes** and their justification.

Modeling and Simulation of Student Success

- Theoretical models related **Student Success** as they applied to Virtu@I CC
- Toward a taxonomy of **Student Success**
 - Based on who defines it:
 - o Self (the student)
 - o The institution
 - o Student Development theorists
 - o Parents
 - o Teachers, Counselors, and Advisors
 - o Employers
 - o Legislators
 - Based on observable stimuli and responses
 - o Inputs
 - o Processes
 - o Outputs
 - o Attractors
 - o Rejecters
 - o Stimuli
 - o Responses
 - o Predictors
- Computational Approaches to Modeling and simulation of **Student Success** based on definitions above
- Conceptual Map of **Student success** based on definitions above
- Feasible approaches to modeling and simulating **student success** and their justification.