ENGINEERING MODELING SELF-EFFICACY SCALE (Version 2.0)*

T.P. Yildirim, M. Besterfield-Sacre**, L. Shuman

Instructions

Please think of a real life **SYSTEM** that you would be expected to build or design within your engineering discipline (e.g. bridges, buildings, an automobile, a machine, a factory, a computer software etc.)

Assume that you are building a model of this system (such as a physical or symbolic model, like a mathematical or computer simulation representation), and that you are the only one in charge of the following tasks. Sincerely rate how well you think you can do each of them.

	ITEMS	Cannot do at all	Can do Poorly	Can do Just OK	Can do Well	Can do Very Well
1	Decide what data is necessary to use in the model.					
2	Search databases to find necessary data.					
3	Determine whether the collected/given data sample is representative of the population.					
4	Decide whether the data is reliable and sample size is large enough.					
5	Identify which parts of the dataset are irrelevant to the model.					
6	Develop/use a method to estimate missing data.					
7	Create a schematic representation of the system in two or three dimensions (create a prototype).					
8	List the sub-processes within the system (e.g. physical, biological, and/or chemical, economical relationships, etc.)					
9	Identify the relationships between sub-processes (how changes in one affect changes another).					
10	Identify inputs and outputs of the system.					
11	Determine the (initial and boundary) conditions for the system to start/ stop functioning.					
12	Determine the necessary conditions for a system to exist/ survive once started functioning.					
13	Predict how the system will function in extreme cases.					
14	Determine the criteria to decide if the model performs well.					
15	Determine whether the performance criteria chosen are appropriate for the system.					
16	Find ways to modify the performance criteria to make it better.					
17	Quantify the impact of sub-processes on the performance criteria (goal of the model).					
18	Simplify the relationships between processes that exist in the system.					
19	Identify the variables and parameters in a model.					

ITEMS		Cannot do at all	Can do Poorly	Can do Just OK	Can do Well	Can do Very Well
20	Identify the constraints on the model.					
21	Write a computer program to calculate the outcomes of the model.					
22	Choose a mathematical/ statistical model to calculate the performance criteria/ results of a developed model.					
23	Calculate the outcomes of the model by hand.					
24	Calculate the outcomes of the model using a computer code.					
25	Create tables and graphs of the results (manual or computerized).					
26	Determine the uncertainty in the parameters and data.					
27	Conduct a sensitivity analysis on the numerical results.					
28	Understand/ evaluate the results of a calculational model					
29	Determine if the results indicate an error.					
30	Use the results to predict future behavior of the system.					
31	Determine if the uncertainty in results indicates a need for an update or redesign of the model.					
32	Explain how the results of a calculational model are obtained.					
33	Determine qualitatively if the developed model looks 'alright'.					
34	Determine numerically if the model results are valid.					
35	Determine ways to measure if the created model generates results in line with the actual system.					
36	Determine how the model developed compares to other models of the same system.					

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** For information, contact Mary Besterfield-Sacre (mbsacre@pitt.edu); 1040 Benedum Hall, University of Pittsburgh, Pittsburgh, PA 15261.