Student Models in Computer-Based Education

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Abstract

The paper describes student model using possibilities in computer-based education. Models' classification is given. The results of comparable analysis of nowadays-available student models are shown in the paper too. Analysis was made after parameters that are considered to be essential for teaching process effectiveness. Offers of developing student model are given.

Nowadays there are available and being developed various computer-based teaching and learning systems. For the purpose of implementing a qualified and useful teaching course it should be adapted to a student. Therefore a student model should be developed while implementing such kind of systems.

Student model includes information about a certain student – knowledge level, skills level, tasks performance ability, psychological and other characteristics that are needed for effective adaptive teaching process organization.

Student models can be divided into two big groups: fixing (scalar models, overlay models (vector and net model) and genetic graph) and imitation.

During the research there were reviewed various student models. The analysis was made taking into account several components that are essential for effective teaching process organization. These components are as follows: (1) knowledge level; (2) psychological characteristics; (3) learning speed/style; (4) tasks performing; (5) learning ability (very careful, average careful, low careful); (6) skills level; (7) teaching strategy, method; (8) knowledge graph.

The results of researched models analysis are given in the Table 1, which columns are in correspond with aforementioned components. The most usable parameter is '*Knowledge level*'. Unfortunately, psychological characteristics considering is very poor.

The student model should include all the parameters that influence teaching results and parameters that show these results. That's why the structure of it should be complex and consists of different models types.

Table 1: Comparable student models analysis

System/model	Parameters							
	1	2	3	4	5	6	7	8
HBLE	+							+
OLAE	+							
POLA	+							
ATS	+		+					
Cascade	+	+				+		
Procedural Problem Solving	+			+				
MicroWeb	+							
Eon	+						+	+
FLUTE	+			+	+			+
SMART	+		+			+		
Spiral model	+				+		+	+
KBS Hyperbook System	+	+			+			
IDEAL	+					+		
5 components model	+							+
JTS	+	+			+			+
Web PVT	+				+			

So, more formal: $M_{st} = \{M_1, M_2, M_3, M_4, M_5, M_6\}$

M_1 – preliminary knowledge, which can be represented as a vector or graph.

M_2 – current knowledge. This component can be represented by vector: M_2 = {Perform, Tries, Recourse, Knowledge, Speed}.

M_3 – personal psychological characteristics, e.g., personal type PT, representative system RS, a type of memory MT, orientation O, learning ability A, etc.: M_3={PT,RS,MT,O,A}.

M_4 – experience in working with computers, computer-based teaching systems and other relevant information.

M_5 – course structure.

M_6 – teaching strategy.

For effective computer-based teaching system development a student model should be included in it. We consider that it could be with a mixed structure for the most appropriate representing of information about a student, his/her needs, abilities, goals and so on.

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