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The Applications of ISM Model

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Abstract: The students' interest refers to the knowledge of a positive emotional state, is caused by the motivation to learn, an important factor to promote student learning. Students of weariness largely depend of students' interest. There are many factors that affect students' interest in learning, both objective factors and subjective factors. The reasons that affect students learning interest are analyzed by using the interpretative structural modeling (ISM).

Key words: Interest in learning; Students; The Interpretative Structural Modeling (ISM)

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1. INTRODUCTION

Interest in learning has always been important for educators. "Interest is the best teacher", fully explain the relationship between interest and learning. The subjects of keen interest to promote individual exploratory learning, a discipline with a strong stability of interested students will use this as their main direction, the learning initiative to overcome difficulties and eliminate interference. How to cultivate students' interest and good psychological quality is to improve the quality of education, an important way to promote their healthy growth.

In this paper, the ISM model to study factors affecting the students' interest level classification of the key factors, and finally deep-seated reasons to explain and put forward a proposal.

2. ABOUT ISM MODELS

The interpretative structural modeling (ISM model) is a system analysis method developed for the analysis of complex socio-economic system, by the U.S. J. Warfield in 1973, Professor, the method of modern systems engineering has been widely used in the analysis of the system structure is a structural model, ISM method to take advantage of system elements known, but the messy relationship reveals the internal structure of the system, used to analyze the structure of the relationship between the elements of complex systems, the basic method is to use graphics and matrix description of the relationship of a variety of known in the matrix on the basis of further operations, derived to explain the characteristics of the system structure [1–3].

3. TO ESTABLISH THE IMPACT OF LEARNING INTEREST FACTOR STRUCTURE MODEL

Affected by many factors, students' interest in learning, and the inter-linkages between the various factors interact to form a multi-layered, complex system of multi-contact structure. Streamlining and consolidation of the high correlation factors 13 influencing factors, establish the specific factors that affect the students' creative ability set [4,5].

Table 1
Various Factors Affect the Relationship Between the Table

	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}	S_{12}	S_{13}
S_1	1	1	0	0	0	0	0	0	0	0	0	0	0
S_2	0	1	1	0	0	0	0	0	0	0	0	0	0
S_3	0	0	1	0	0	0	0	1	0	0	0	0	0
S_4	0	0	0	1	1	0	0	1	0	0	0	0	0
S_5	0	0	0	0	1	0	0	1	0	0	0	0	0
S_6	0	0	0	0	0	1	0	1	0	0	0	0	0
S_7	0	0	0	0	1	0	1	0	0	0	0	0	0
S_8	0	0	0	0	1	0	0	1	0	0	0	0	0
S_9	0	0	0	0	1	0	0	0	1	0	0	0	0
S_{10}	0	0	0	0	1	0	0	0	0	1	0	0	0
S_{11}	0	0	0	0	0	0	1	1	1	1	1	0	0
S_{12}	0	0	0	0	0	0	1	1	1	1	1	1	0
S_{13}	0	1	0	0	0	0	0	1	0	0	1	0	1

S_1: education system and mode;
S_2: school environment;
S_3: enrollment management and examination system;
S_4: the level of teachers' teaching;
S_5: teachers teaching methods;

S_6: teaching quality;
S_7: students' intelligence;
S_8: students' own interest;
S_9: students will;
S_{10}: student personality;
S_{11}: family education environment;
S_{12}: family economic conditions;
S_{13}: social employment environment.

Then, according to the correlation of each factor listed logical causal relationship between various factors, such as shown in Table 1.

According to the data in Table 1, the adjacency matrix

$$A = \begin{bmatrix} 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 1 & 1 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 1 \end{bmatrix}$$

By Boolean algebra, the above adjacency matrix through the computer software Matlab computing reachability matrix

$$R = \begin{array}{c|ccccccccccccc} & S_1 & S_2 & S_3 & S_4 & S_5 & S_6 & S_7 & S_8 & S_9 & S_{10} & S_{11} & S_{12} & S_{13} \\ \hline S_1 & 1 & 1 & 1 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ S_2 & 0 & 1 & 1 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ S_3 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ S_4 & 0 & 0 & 0 & 1 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ S_5 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ S_6 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ S_7 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 \\ S_8 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ S_9 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 \\ S_{10} & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 0 \\ S_{11} & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\ S_{12} & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 1 & 0 \\ S_{13} & 0 & 1 & 1 & 0 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 0 & 1 \end{array}$$

Reachability matrix before the division between the level, first find out the impact of various factors, of reachability matrix up to set, antecedent set and a common set, which, up set is a collection of factors; antecedent set the factors affecting collection; jointly set up the set and antecedent set intersection. Specific data in Table 2, 3, 4, 5.

A result of the first stage (Table 2), denoted by $L_1 = \{S_5, S_8\}$.

Table 2
Influencing Factors Stratified Division Computation

Set of elements S_i	Reachability matrix $R(S_i)$	Antecedent Set $A(S_i)$	$R(S_i) \cap A(S_i)$	$R(S_i) \cap A(S_i) = R(S_i)$
S_1	{1,2,3,5,8}	{1}	{1}	
S_2	{2,3,5,8}	{1,2,13}	{2}	
S_3	{3,5,8}	{1,2,3,13}	{3}	
S_4	{4,5,8}	{4}	{4}	
S_5	{5,8}	{1,2,3,4,5,6,7,8,9,10,11,12,13}	{5,8}	
S_6	{5,6,8}	{6}	{6}	
S_7	{5,7,8}	{7,11,12,13}	{7}	S_5, S_8
S_8	{5,8}	{1,2,3,4,5,6,7,8,9,10,11,12,13}	{5,8}	
S_9	{5,8,9}	{9,11,12,13}	{9}	
S_{10}	{5,8,10}	{10,11,12,13}	{10}	
S_{11}	{5,7,8,9,10,11}	{11,12,13}	{11}	
S_{12}	{5,7,8,9,10,11,12}	{12}	{12}	
S_{13}	{2,3,5,7,8,9,10,11,13}	{13}	{13}	

Table 3
Influencing Factors Stratified Division Computation

Set of elements S_i	Reachability matrix $R(S_i)$	Antecedent Set $A(S_i)$	$R(S_i) \cap A(S_i)$	$R(S_i) \cap A(S_i) = R(S_i)$
S_1	{1,2,3}	{1}	{1}	
S_2	{2,3}	{1,2,13}	{2}	
S_3	{3}	{1,2,3,13}	{3}	
S_4	{4}	{4}	{4}	
S_6	{6}	{6}	{6}	
S_7	{7}	{7,11,12,13}	{7}	$S_3, S_4, S_6, S_7, S_9, S_{10}$
S_9	{9}	{9,11,12,13}	{9}	
S_{10}	{10}	{10,11,12,13}	{10}	
S_{11}	{7,9,10,11}	{11,12,13}	{11}	
S_{12}	{7,9,10,11,12}	{12}	{12}	
S_{13}	{2,3,7,9,10,11,13}	{13}	{13}	

Table 4
Influencing Factors Stratified Division Computation

Set of elements $\mathbf{S_i}$	Reachability matrix $\mathbf{R(S_i)}$	Antecedent Set $\mathbf{A(S_i)}$	$\mathbf{R(S_i) \cap A(S_i)}$	$\mathbf{R(S_i) \cap A(S_i) = R(S_i)}$
S_1	{1,2}	{1}	{1}	
S_2	{2}	{1,2,13}	{2}	
S_{11}	{11}	{11,12,13}	{11}	S_2, S_{11}
S_{12}	{11,12}	{12}	{12}	
S_{13}	{2,11,13}	{13}	{13}	

A result of the first stage (Table 3), denoted by $L_2 = \{S_3, S_4, S_6, S_7, S_9, S_{10}\}$.

A result of the first stage (Table 4), denoted by $L_3 = \{S_2, S_{11}\}$.

In the same manner, a result of the first stage, denoted by $L_4 = \{S_1, S_{12}, S_{13}\}$.

Reachability matrix to rearrange the rows and columns according to the grade division, have strong connectivity matrix.

$$R' = \begin{array}{c|cccccccccccc} & S_5 & S_8 & S_4 & S_6 & S_7 & S_9 & S_{10} & S_3 & S_{11} & S_2 & S_{12} & S_1 & S_{13} \\ S_5 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ S_8 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ S_4 & 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ S_6 & 1 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ S_7 & 1 & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ S_9 & 1 & 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ S_{10} & 1 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ S_3 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ S_{11} & 1 & 1 & 0 & 0 & 1 & 1 & 1 & 0 & 1 & 0 & 0 & 0 & 0 \\ S_2 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 0 \\ S_{12} & 1 & 1 & 0 & 0 & 1 & 1 & 1 & 0 & 1 & 0 & 1 & 0 & 0 \\ S_1 & 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 0 \\ S_{13} & 1 & 1 & 0 & 0 & 1 & 1 & 1 & 1 & 1 & 1 & 0 & 0 & 1 \end{array}$$

Let S_0 is students' interest in learning, the system architecture model is divided into five (included S_0), draw a system block diagram in Figure 2.

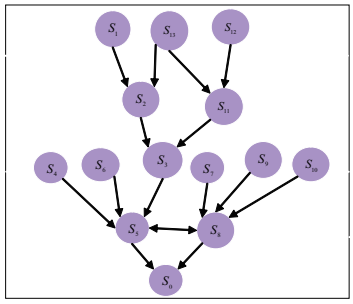

Figure 1
A System Block Diagram

4. CONCLUSION

By the model shows that students' interest in learning is a five-level hierarchical system, which directly affect the students' interest because the teachers' teaching methods and students' interests, which is the impact of the root layer. Therefore, to cultivate students' interest should be the two-pronged approach. From the three-tier analysis the factors affecting the teaching methods of teachers teaching level of teachers and enrollment management and the examination system; students' interest in teaching quality and student personality factors. From four, resulting in three of the school environment and family educational environment, which is the middle layer of the impact of affect students' learning interest in the superficial layer is the education system and mode of social environment for employment and family economic status.

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