



# Evaluation of Normal Students' Teaching Ability from the Perspective of Wisdom Education—Taking Chongqing Normal University as an Example

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**Abstract.** Teacher education is the working machine of education and the source of the building of the teaching team. Normal colleges are responsible for cultivating future elementary and middle school teachers. The level of education and teaching ability of normal students is an important yardstick for evaluating the quality of normal students cultivated by normal colleges. At present, due to the absence of a unified national-level guiding evaluation standard for teacher education and teaching ability, the evaluation standards for teacher education and teaching ability of normal students in various universities are uneven, and the education and teaching ability of normal students is not yet fully adapted to the needs of primary and secondary schools. Highlighting the theoretical necessity of studying how to construct the evaluation index system of teacher education and teaching ability. Based on this, this research focuses on “the construction of evaluation index system for normal students’ education and teaching ability”.

**Keywords:** Online learning · Learning participation · Influencing factors · Directed topology

## 1 Introduction

The COVID-19 epidemic is leading global changes, which cover a wide range of social, economic and cultural aspects [1]. In higher education, the key change is the rapid virtualization of teaching process, which is manifested by the implementation of large-scale and unprecedented online learning [2]. This is especially challenging, because before the epidemic, online learning in higher education was often in a marginal position compared with offline contact learning. To solve these problems, it is urgent to study the influencing factors of college students’ online learning participation.

## 2 Identification of Influencing Factors and Construction of Index System

### 2.1 Investigation and Research on the Influencing Factors of College Students' Online Learning Participation

By using the literature search method, combining the relevant research results at home and abroad, and expert consultation method, the influencing factors set is determined and the direct binary relationship among the influencing factors is clarified.

### 2.2 Determination of Evaluation Index System of Influencing Factors of College Students' Online Learning Participation

By distributing questionnaires to 10 experts who are engaged in higher education and have online teaching experience, and combining them with the characteristics of college students' online learning, they are merged, sorted and screened. Finally, it is determined that college students' online learning is influenced by a total of 7 factors [3]. The evaluation index system of influencing factors is shown in Table 1.

**Table 1.** Evaluation index system of college students' online learning participation factors

Index category	Index name	Index symbol	Index content
learner	Learning atmosphere	F1	The overall atmosphere of students' learning
	learning strategy	F2	The overall plan for students' study.
	Learning background	F3	Students' majors and abilities. Knowledge level, etc.
	Learning motivation	F4	Willingness to participate in online learning or continuous learning
course	Curriculum resources	F5	Learning materials and various resources of the course
teacher	teaching ability	F6	The overall teaching level of teachers
	Teacher-student interaction	F7	Interaction between teachers and students in teaching

### 3 AISM Modeling of Influencing Factors of College Students' Online Learning Participation

The core method of this paper is to introduce the opposite idea on the ISM result-oriented hierarchical sorting rules, add the cause-oriented sorting rules contrary to ISM sorting rules, place the elements from bottom to top, find the causal reachable sequence by using results and causes, and construct a set of directed topological graphs contrary to ISM sorting rules [4].

#### 3.1 Establish Adjacency Matrix

According to the seven influencing factors of college students' online learning participation in Table 1, the internal relationship among the influencing factors is determined by expert scoring method, and then the adjacency matrix is established, and the expression is shown in formula (1). Based on this assignment rule, the adjacency matrix is constructed as shown in Table 2.

$$a_{ij} = \begin{cases} 0 & i \neq j \\ 1 & i = j \end{cases} \tag{1}$$

#### 3.2 Establish Reachable Matrix

Reachability matrix refers to the degree that nodes of a directed connection graph can reach after a certain length of path [5]. For any original matrix, the calculation method of its reachable matrix is as follows: A, The calculation method of reachability matrix is as follows:

$$B = A + I \tag{2}$$

where it is the multiplication matrix, that is, the diagonal lines are all added with 1, and it is the identity matrix [6]. The reachable matrix is obtained by continuous multiplication:

**Table 2.** Adjacency matrix

		F1	F2	F3	F4	F5	F6	F7
	F1	0	0	1	0	0	0	0
	F2	1	0	0	0	0	0	1
A =	F3	1	0	0	0	0	0	0
	F4	1	0	1	0	0	0	0
	F5	0	1	0	0	0	0	0
	F6	0	0	0	0	1	0	0
	F7	0	1	1	0	0	0	0

**Table 3.** Reachable matrix

		F1	F2	F3	F4	F5	F6	F7
	F1	0	0	1	0	0	0	0
	F2	1	0	0	0	0	0	1
<i>R</i> =	F3	1	0	0	0	0	0	0
	F4	1	0	1	0	0	0	0
	F5	0	1	0	0	0	0	0
	F6	0	0	0	0	1	0	0
	F7	0	1	1	0	0	0	0

**Table 4.** Results of confrontation level extraction

Levels	Result priority-up type	Priority-down type
Level 1	F1, F3	F1, F3
Level 2	F2, F4, F7	F2, F7
Level 3	F5	F5
Level 4	F6	F4, F6

*B* is the multiplication matrix, that is, the diagonal lines are all added with *I* as the identity matrix, and the reachable matrix *R* is obtained by continuous multiplication of *B*:

$$B^{k-1} \neq B^{k-1} = R \tag{3}$$

Therefore, the reachable matrix is shown in Table 3.

### 3.3 Hierarchical Extraction

The essence of this method is that the elements of the system that are the root causes are first extracted and placed at the bottom of the hierarchy, and then extracted by analogy. The results are shown in Table 4.

### 3.4 Draw a Hierarchical Graph of Directed Topology

According to the relationship between elements and the extraction result of confrontation level, a directed topological level diagram can be drawn. The hierarchical diagrams of UP-type and DOWN-type directed topologies are shown in Fig. 1.

## 4 Analysis Results

### 4.1 Hierarchy Analysis of AISM Influencing Factors

It can be clearly seen from Fig. 1 that there are active elements in the topological hierarchy of UP and DOWN, and the system is an active system. According to the principle that the upper level is more superficial and the lower level is more root-oriented, it is concluded that:

The upper layer belongs to the surface factors, namely, learning atmosphere (F1) and learning background (F3);

Secondly, the middle layer belongs to potential factors, such as learning strategies (F2), curriculum resources (S5) and teacher-student interaction (F7);

Thirdly, the lowest level belongs to the root factors, namely, learning motivation (F4) and teaching ability (F6).

### 4.2 Analysis of the Relationship Between Influencing Factors

After comparing the UP-type and DOWN-type hierarchical diagrams, it can be found that the directional line segments of each factor point in the same direction and the hierarchical division is basically the same [7]. According to the hierarchy of influencing factors, and the causal relationship among the factors is as follows:

The influence of surface factors on college students' participation in online learning. The factors include learning atmosphere and learning background [8]. These two factors form a loop in the hierarchical graph of directed topology, which indicates that they are mutually reachable. That is, students' learning atmosphere and learning background are interrelated, and learning background is a direct factor that directly affects the learning atmosphere, which has the most direct impact on college students' online learning participation. Therefore, learning atmosphere and learning background are the most direct influencing factors of college students' online learning participation, and the rationality of constructing the model is explained.

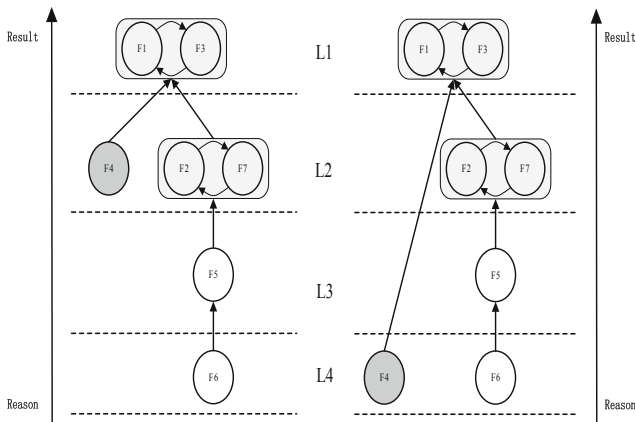


Fig. 1. UP and DOWN Directed Topological Hierarchical Graphs

The influence of middle-level factors on college students' online learning participation. Class 3 elements are the key to college students' participation in online learning. They are involved in the whole life cycle of college students' online learning, and they are in the middle of the learning process. They are influenced by the root factors, and at the same time they act on the shallow factors, serving as a connecting link between the preceding and the following. These two factors, including learning strategy and teacher-student interaction, form a loop in the hierarchical graph of directed topology, which shows that they are mutually reachable. That is, students' learning strategies and teacher-student interaction are mutually influential, which shows that students' learning strategies affect teacher-student interaction. These are all potential factors that affect college students' online learning participation.

The influence of root factors on college students' participation in online learning. The fundamental influencing factors are at the highest level of the system, not influenced by other factors, and can directly or indirectly influence other factors in the system. Teachers' teaching ability and students' learning motivation directly affect the system. Therefore, the root factors are the most critical.

## 5 Conclusion

According to the research, although the current state has stipulated the standards of teachers' education and teaching ability in the relevant policies, there is no unified guiding standard on the evaluation of teachers' education and teaching ability. This highlights the necessity of constructing a universal evaluation index of Normal University Students' educational and teaching ability.

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