The Management Mechanism Analysis for Teaching Unit

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\textbf{Abstract.} From the viewpoint of the teaching unit, we have analyzed the systematic elements of the teaching unit system. From the relationships of the elements of the teaching-learning system, we can obtain the relationship matrix of the system. Based on the system relationship figure, we use the graphic method to analyze the input-output formula of the systematic elements, and construct the finance-based management model by using currency equivalence relationship of the teaching unit. Thus we can explore the mean to improve the systematic performance of the teaching unit, and construct the efficiency operation mechanism of the teaching unit.

\textbf{Introduction}

The understanding and transformation process of the mankind is just the continuous development of the mankind, in which the knowledge play an important role in the development of mankind. So the knowledge is an important competitive power\cite{1}. The education can effectively enrich the knowledge system of mankind. Especially the high education function as the foundation of a person’s career. Thus it can promote the development of the society\cite{2}. The elements architecture, the relationships among the elements, and the dynamic operation of the teaching unit play an important role function on the cultivation of the students, which means that the system determined the number and quality of the students of the teaching unit. From the aim of the cultivation of the students, by analyze the systematic elements and study the relationships of the elements of the teaching-learning system, we discuss how to construct dynamically the relationships among the systematic elements. Then we can obtain the operation mechanism model of the teaching unit. According it, we can provide the reference of performance innovation to the teaching unit and support its continuous development.

\textbf{The Systematic Elements of the Teaching Unit}

The person’s learning is lifelong learning, it just as the France scholar Paul Lengrand said in the Adult Education Conference of the United Nations Educational, Scientific and Cultural Organization which held in Paris: the learning is lifelong, we cannot separate the learning period and working period unilateral\cite{3}. It just as the Education Law of the People’s Republic of China said: construct and improve lifelong education architecture, and improve the quality of the whole nation\cite{4}. The teaching unit undertake the teaching task of the education, it not only effect the result of the learning period for a person, but also play and important role to the further study while on the work period. So the education of the teaching unit establish the foundation for lifelong learning of persons.

Form the view points of the system theory, the most fundamental functions of the teaching unit include: the cultivation of students, the scientific research, the society service, and the cultural transmission\cite{5, 6}. As for the most fundamental teaching unit, the cultivation of students (teaching) become its core task. So the teaching unit ought revolve round the cultivation of students to plan the manual labour, the capital, and the resource. The teaching process involves the teachers, the management persons, the assistant persons of the teaching, the students, and the mean of labor such as the classroom, the laboratory, the equipment, the courseware, and so on. If we analyze the system
form the function dimension, refine the elements of the system, we can obtain the fundamental elements of the teaching unit: the teachers, the students, and the mean of labor. The relationships among the elements include: the construction relationship between the teachers and the means of labor, the teaching-learning relationship among the teacher, the student, and the means of labor. The teaching-learning system is just as figure 1:

Figure 1. Teaching-Learning System.

In the figure 1, the teacher, the student, and the means of labor are the three elements of the teaching-learning system from the function dimension. In which the teacher (include the teaching assistant persons) is the subject of the system, the student is the object of the system, and the means of labor is the teaching auxiliary facilities such as the classroom, the laboratory, the equipment, the textbook, and the courseware, etc..

Form the viewpoints of system theory, the teaching-learning system can be denote as the elements set and the relationships just as (1):

\[
S = \{E, R\} = \{E_t, E_s, E_m | R\}
\]

The core principal of the management is efficiency. So the essence of the management of the teaching unit is to analyze the systematic elements, describe the correlation of capital equivalence among the systematic elements, and dynamically explore the optimal ration between the ability increase of the student and the capital assumption of the system.

The Operation Mechanism of the Teaching Unit

The teaching-learning system form the function dimension viewpoints cannot fully reveal the inner relationships and the dynamic operation. In order to analyze the inner relationships and dynamic operation, the additional dimension must be added to the system. The currency is the equivalent exchange medium, so there is not involved the capital in the function system. So the teaching-learning system described in figure 1 and equal (1) need add the additional dimension of currency, thus we can construct the finance management based teaching-learning system, and thus can further analyze the inner relationships and the dynamic operation mechanism. Then the capital become the linkage among the teacher, the student, and the means of labor of the teaching-learning system. Ultimately, the teaching-learning system can be denote as equal (2):

\[
S = \{E, R\} = \{E_t, E_s, E_m, E_c | R\}
\]

In the above equation (2), the teaching-learning system have four elements: the teacher, the student, the means of labor, and the capital which function as the equivalent exchange medium. In which, the teacher is the subject of the system, and form the viewpoints of input-output model, the input is the energy pay on the student and the means of labor while the output is the pay for the teaching. The student is the object of the system, the input is the pay and energy of the student while the output is the increase of knowledge and ability. For the means of labor, the input is the assumption by the teaching-learning process while the output is the capital paid by the teaching unit and students to buy the means of labor. The core of management is the efficiency, and the management essence of the teaching unit is to analyze the systematic elements and the capital correlation among the elements, and dynamically explore the optimal ration between the ability increase of the student and the capital assumption of the system. The relationship among the systematic elements described as equal (2) can be write as the matrix of (3):
In the above (3), the $R_{CT}$ denote the quality and ability promotion after the training of the teaching unit. The $R_{CS}$ means that the teacher pay energy to improve the student’s ability. The $R_{CM}$ means that the teacher pay energy to improve the performance of the means of labor. The $R_{SC}$ means the student have to pay the teacher because of the teaching-learning relationship. The $R_{SCS}$ means that the student must paid for himself for the living. The $R_{CM}$ means that the student must paid the apart fee of the means of labor. The $R_{SCM}$ means that the teaching unit must paid to the teacher for the construction fee of the means of labor. The $R_{CSM}$ means that the assumption of the means of labor to improve the students ability. The $R_{CM}$ means that the teaching unit paid capital to construct the means of labor.

Former system do not take the capital into account form the function dimension viewpoints. Today, the finance management for the teaching unit become the core task. And from the thinking of the system theory, the system boundary is determined by the subject of the system, which means that the ability of the subject can confine the system thinking. Refinement the system elements can help to understand the upper operation mechanism, so the capital must be treated as the systematic element of the teaching-learning system. Thus we can effectively analyze the correlation mechanism among the teacher, the student, and the means of labor, and further analyze the capital based equivalent relationship. As a additional dimension, the capital can be integrated into the former function dimension of the teaching-learning system. So, we can take the capital as the core of the teaching-learning system to manage the performance, and according it, the teaching-learning system can determine the distribution system and develop the teaching-learning system. The figure 2 is the System Structure of Teaching Unit which have added the capital dimension.

In figure 2, the element note of the function dimension include teacher, student, and means of labor. The teacher’s function can be refined as the cultivate the student and construct the means of labor, which just describes as $S, M$. While the reward of the teacher equal to the equivalent capital of the cultivate the student and construct the means of labor, which describes as $C_S, C_M$. the input-output function can be denote as equal (4):

$$
\text{Teacher} : \begin{cases} 
C_S = f(S) \\
C_M = f(M)
\end{cases} \Rightarrow C_t = f(S_t) + f(M_t)
$$

(4)

The student need to pay the teacher’s cultivation and the assumption of the means of labor, which can partly describe as $C_s$, while the other are paid by the teaching unit and can be describe as $C_G$. 

Figure 2. System Structure of Teaching Unit
We can refine as $C_{St}, C_{Sm}$, the relationship just as $C_s + C_G = C_{St} + C_{Sm}$, and the reward of the student is just as the promotion of student’s ability, we can describe as the contribution of the teacher’s cultivation and the assumption of the means of labor just as $S_t, S_m$. the input-output function can be denote as equal (5):

$$S_t + S_m = f^{-1}(C_{St}) + f^{-1}(C_{Sm})$$

(5)

In the equal (5), we use the inverse function to describe the input-output function because that the aim of the teaching unit usually predetermined to cultivate the student to the expectation level, while the expectation cultivate need the corresponding capital. So we use the inverse function to describe the student’s input-output function.

For the means of labor, the student use the means of labor to practice and improve ability. So the assumption of the means of labor transfer to the ability of the student. While the construction of the means of labor refer to that the teaching unit construct the means of labor using the capital of the teaching unit and the capital of the student. The input-output function of the means of labor can describes as equal (6):

$$M_t + M_s = f^{-1}(C_{Sm}) + f^{-1}(C_{Mt})$$

(6)

The essence of management of the teaching-learning system is that maxing target optimize under the confine of the resource elements. So the finance based management of the teaching unit can refine as under the different viewpoint to optimize the equal (4) to (6). For the teaching unit, the optimization can be described as: under the fixed capital, explore the maximum improvement of the student’s ability. We can describe as equal (7):

$$(Max(S_t + S_m)|C_G) = (f^{-1}(C_{St}) + f^{-1}(C_{Sm})|C_G) = C_{St} + C_{Sm} - C_s$$

(7)

Formula (7) is the target function model of the teaching unit needed to optimize.

Conclusion

We have analyzed the systematic elements of the teaching unit system from the viewpoint of the teaching unit. From the relationships of the elements of the teaching-learning system, we have obtain the relationship matrix of the system. Based on the system relationship figure, we have used the graphic method to analyze the input-output formula of the systematic elements, and have constructed the finance-based management model by using currency equivalence relationship of the teaching unit. Then we explore the mean to improve the systematic performance of the teaching unit, and construct the efficiency operation mechanism model of the teaching unit.

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