



# Research on the Mechanism of Knowledge Transmission in College Classroom Based on Knowledge Potential Difference

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**Abstract.** In view of the specific scenes of knowledge dissemination in college classrooms, the concepts of knowledge potential and knowledge potential difference are introduced, and the knowledge dissemination mechanism in college classrooms based on knowledge potential difference is put forward through an in-depth study of the generalized knowledge dissemination mechanism: that is, on the basis of certain common knowledge, the knowledge potential difference between teachers and students is more conducive to the dissemination and absorption of knowledge within a reasonable range. At the same time, the effectiveness of knowledge dissemination also depends on the effective use of information technology by knowledge disseminators. Based on the above mechanism, the paper provides useful suggestions for knowledge dissemination in college classroom.

**Keywords:** knowledge dissemination · knowledge potential difference · information technology · college classroom

## 1 Introduction

With the popularization of the Internet and smart terminals, the convenience of access to information for college students has improved unprecedentedly. Many college students confuse the search for information with the use of information, treating the process of searching for information as the process of learning knowledge, ignoring or even abandoning the valuable learning opportunities in the college classroom. The underlying reason is that they confuse the concepts of knowledge and information [1].

In fact, the acquisition of knowledge is still the core task at the college level, as shown in the latest training program issued by the author's college, which has the following objectives for students: "to systematically master the basic theories and basic knowledge of academic disciplines and specialties; to have strong basic professional skills and preliminary practical working abilities". Thus, it can be seen that although the training program also emphasizes the mastery of basic skills and work skills, the mastery of knowledge is the first and most basic requirement for the training of students. In other words, the most central task of the college classroom is the dissemination of knowledge.

Knowledge dissemination is defined as a social activity process in which a part of society transmits specific knowledge and information to another part of society in a specific social environment, with the expectation of achieving the expected dissemination effect [2].

The ultimate goal of knowledge dissemination is to make it known and used as much as possible. The faster knowledge spreads, the more widely it is applied, and the more beneficial it is to the whole society. The spread of knowledge is of great significance, and it is an important guarantee and prerequisite for the continuous development of science and the continuous progress of human civilization.

Knowledge dissemination, as an important part of knowledge management research, has attracted the attention of many scholars, such as Du Jing and Jiang Wei, who analyzed the mechanism of knowledge stock growth [3]. Li Shuncai and Zou Shangang analyzed the mechanism of knowledge flow with the framework of fluid mechanics. [4]. Chen Wu explained the knowledge flow from the angle of knowledge potential difference [5]. And Liu Rong and Zhao Xiaoyi are more specialized in studying the knowledge flow within the enterprise [2]; Zhang Haitao and Wu Yanling studied the specific and mechanism of knowledge transfer of college research teams [6]. The aforementioned scholars have studied the characteristics of broad knowledge dissemination or research or knowledge dissemination in business. There is no research to show that in the college classroom with knowledge learning as the core, the mechanisms of knowledge dissemination.

The teaching and learning process in the college classroom is the process by which teachers and students work together to achieve the goals of teaching and learning through the mediation of content and relying on other elements. And at the heart of the pedagogical objectives is the imparting of knowledge. This is certainly a specific and typical scenario for knowledge dissemination. It also necessarily satisfies the generalized law of knowledge transmission. In view of this, this paper introduces the concepts of knowledge potential and knowledge potential difference for the specific scenario of knowledge transmission in college classrooms, and gives a mechanism of knowledge transmission in college classrooms based on knowledge potential difference through an in-depth study of the generalized knowledge transmission mechanism: that is, on the basis of certain common knowledge, the knowledge potential difference between teachers and students is more conducive to knowledge transmission and absorption within a reasonable range. On the basis of this mechanism, some useful suggestions are provided for the college classroom.

## **2 Definition and Characterization of Knowledge**

### **2.1 Definition of Knowledge**

From a philosophical point of view, knowledge is the sum of the achievements of human beings in exploring the material and spiritual world, which is consistent with the direction of civilization. However, this definition is not concrete enough; if we take the perspective of information, knowledge is all the information that human beings summarize and consider to be correct and true, and that can guide them in solving practical problems. The essence of it is structured information that can be used to solve problems.

Knowledge is obtained through a dynamic integration of background, experience, insight and values. In addition, knowledge is the flowing synthesis of structured experiences, values and recorded information, as well as the unique input of experts and the evaluation, integration and provision of new experience information frameworks.

In terms of psychology, knowledge has a richer connotation. According to the differences of knowledge types, it can be divided into factual knowledge (what is it), subject knowledge (why is it) and skill knowledge (how to do it); According to the characteristics of knowledge presentation, it can be divided into explicit knowledge and implicit knowledge. In the classroom, the knowledge expressed, disseminated and shared by teachers in normal language is explicit knowledge, while the accumulated knowledge of highly personalized, difficult to format, difficult to express and disseminate in language is tacit knowledge.

## 2.2 Characteristics of Knowledge

The definition of knowledge itself also contains some features of knowledge. On this basis, Du Jing and Jiang Wei have made a good summary of the features of knowledge. Among the characteristics of knowledge that are relevant to knowledge dissemination are [3, 8–10].

### 1. Intangibility of knowledge

Knowledge is the crystallization of human wisdom and the result of human initiative to explore the objective world. It belongs to the spiritual field and is invisible. This intangibility is relative to the tangibility of the objective world. A part of the whole knowledge can be expressed and recorded by means of language, words, charts and other media, which we can call explicit knowledge. A considerable part of knowledge stored in the human brain is the product of extreme personalization, and it is difficult to be textualized or format in an objective medium, which is tacit knowledge. In the literature [3], Jing Du and Wei Jiang suggest that recordable knowledge is not intangible, but tacit knowledge is. The author thinks there is something wrong with this view. We believe that they are invisible, no matter whether they are explicit or recessive.

### 2. Diffusion of knowledge

Knowledge has the characteristics of being diffused, which is the inevitable requirement for knowledge spread. More specifically, horizontal diffusion of knowledge is called diffusion, and vertical diffusion is generally called continuation.

By transforming explicit and tacit knowledge into each other and into each other, knowledge can be diffused across subjects. It is through the spread of knowledge that knowledge can be spread and applied to a wider range of roles, while avoiding the cost of copying knowledge creation. It is through the spread of knowledge that knowledge can be spread and applied to a wider range of roles, while avoiding the cost of copying knowledge creation.

### 3. Continuity of knowledge

Once knowledge is generated, it can be reused after being memorized and preserved, thus realizing the intergenerational transmission with time. Once knowledge is generated,

it can be reused after being memorized and preserved, thus realizing the intergenerational transmission with time. The continuity of knowledge also partly answers the question of the origin of knowledge.

4. Unevenness in the distribution of knowledge

The distribution of knowledge in time and space is uneven, which shows that the quality and quantity of knowledge possessed by different knowledge sub-jets are different, that is, the knowledge stocks are different. It is because of the non-equilibrium nature of knowledge distribution that knowledge subjects develop the motivation and pressure to learn from other knowledge subjects.

5. Multiply of knowledge

Knowledge will not be reduced because of transmission, but will have a multiplier effect. There are at least two pieces of knowledge shared by two people. It is precisely because of the multiplicative character of knowledge that Goddard sees “communication as the process of making the exclusive into the common,” from the perspective of sharing.

In other words, the transmission of knowledge in the college classroom is the process of changing from the teacher’s exclusive knowledge to a process shared by both teachers and students, a process that reflects the multiplier characteristic of knowledge.

The proliferation of knowledge is an external manifestation of the intangible nature of knowledge. A computer in the objective world is still a computer through transfer and transmission, while knowledge can be multiplied through transmission, from being unique to being shared by many people. Its philosophical roots lie in the intangible nature of knowledge itself as a product in spiritual field.

In a word, knowledge, as a product of the spiritual field, is invisible, and its external-ization shows that the diffusion of knowledge leads to the multiplication of knowledge; The nonequilibrium knowledge distribution is the source of power, and the diffusion and continuity of knowledge is the inevitable result of the nonequilibrium of knowledge. The logical relationship of this knowledge is illustrated in Fig. 1.

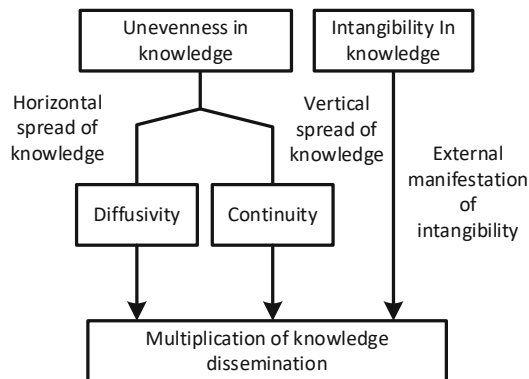


Fig. 1. Logical relationship of knowledge characteristics related to knowledge dissemination

### 3 Knowledge Potentials and Knowledge Differences

Potential energy is a concept in physics, which represents the energy reserve or energy level state of matter. There are high and low potential energies. The potential energy of a substance is judged by referring to other substances, and any substance tends to move from a high potential to a low potential. The concept of potential energy of knowledge can be defined based on potential energy.

#### 3.1 Knowledge Potential

The flow of knowledge is like water flowing from a place of high potential energy to a place of low potential energy, and the flow of knowledge flows from a place of high knowledge potential energy to a place of low knowledge potential energy in the process of propagation. Knowledge potential energy is the state of an individual or organization's knowledge level in a certain period or a certain point in time relative to a reference individual, organization or region, that is, the level of knowledge stock.

#### 3.2 Knowledge Difference

Knowledge potential difference refers to the knowledge potential difference between two individuals at the same time relative to the same frame of reference. It is the potential difference of knowledge that leads to the transfer, flow and dissemination of knowledge. In the study of knowledge growth mechanism, Du Jing put forward a similar concept of "knowledge potential", which is used to describe the potential of knowledge subject because of knowledge stock. The lower the knowledge niche of the knowledge subject is, the more knowledge needs the subject will have, and more knowledge will be absorbed from the outside world through various ways. The knowledge potential of the same knowledge discipline varies from time to time. However, the knowledge potential of different knowledge subjects is different from time to time, which leads to the difference of knowledge potential.

It is the existence of this knowledge potential difference that promotes knowledge transfer and the constant balance of knowledge potentials of different knowledge subjects. Knowledge subjects with low knowledge potentials tend to eliminate the knowledge potential difference through learning and imitation. This is the kernel source of the learner's motivation to learn. Figure 2 describes the basic significance of knowledge potential and knowledge potential difference.

#### 3.3 Common Knowledge

The definition of shared knowledge refers to the common knowledge shared by the knowledge transmitter and the knowledge receiver. As shown in Fig. 3.

Common knowledge is the overlapping part of knowledge between knowledge transmitter and the knowledge receiver. In essence, common sense determines the most important aspect of the environment of knowledge dissemination. The role of common sense in knowledge dissemination is also different from the fact that the existence of universal

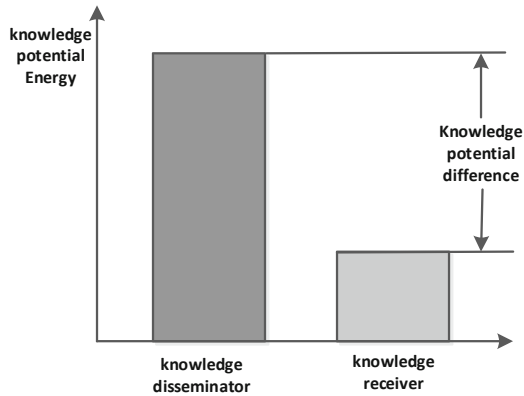


Fig. 2. Diagram of knowledge potential energy and knowledge potential difference

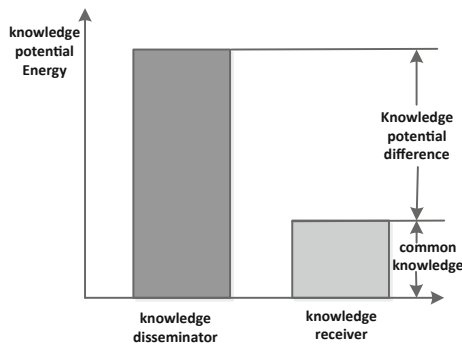


Fig. 3. Diagram of shared knowledge and knowledge potential

physical potential difference has a natural potential to eliminate this potential difference. For example, the water on the dam has a natural potential to generate electricity. However, knowledge potential difference needs the support of common knowledge, so that its knowledge potential can be transformed into the power of knowledge diffusion. This is the difference between intellectual potential energy and general physical potential energy.

## 4 Mechanisms of Knowledge Transmission in the College Classroom

### 4.1 Knowledge Difference as a Basis for Knowledge Dissemination

The premise of knowledge transfer is that teachers’ knowledge potential as a knowledge provider is higher than that of the student ‘knowledge receiver. The knowledge potential difference represents teachers’ knowledge leading relative to students.

Intuitively, the greater the degree of knowledge leadership, the easier it is for knowledge transfer. Intuitively, the greater the degree of knowledge leadership, the easier it

is for knowledge transfer. The academician classroom at Wuhan University's School of Surveying and Mapping is highly regarded and well-publicized [7], essentially because the knowledge potential difference between knowledge providers and knowledge recipients in this classroom is almost as great as that in the college classroom: academicians teach college students in the college classroom.

However, this maximum potential difference is not the norm in the university classroom, partly because the greater the potential of knowledge, the better the knowledge transfer in the university classroom. However, this maximum potential difference is not the norm in the university classroom, partly because the greater the potential of knowledge, the better the knowledge transfer in the university classroom.

As mentioned in the previous section, the knowledge difference is the basis for knowledge dissemination, but this does not mean that greater difference is more conducive to the dissemination of knowledge in the college classes. On the one hand, the knowledge difference between students and teachers, who are knowledge recipients, needs to be within reasonable range. If the knowledge potential difference is large, the student, as the receivers of the knowledge, does not have the basis for receiving the knowledge provided by the teacher, and it takes a lot of energy and time for the student to absorb the knowledge. Students will give up listening in these situations.

On the other hand, if the knowledge receiver's knowledge in a particular field is similar to that of the knowledge provider's (i.e., the knowledge potential difference is small), the knowledge receiver may also choose not to accept the knowledge to avoid unnecessary returns. Therefore, only when the knowledge potential difference between the knowledge receiver and the knowledge provider is within a proper range, the knowledge receiver can choose to receive knowledge from the knowledge provider.

In other words, if the knowledge potential difference between teacher and student is too small to provide little knowledge flow in the classroom, then students will find that the knowledge return of focusing on the classroom is too low, and they will stop attending classes.

## **4.2 Appropriate Common Knowledge for Better Dissemination of Knowledge**

Because knowledge has certain specificity, from the requirements of knowledge transmission, there should be a certain amount of knowledge overlap between knowledge providers and receivers within the appropriate knowledge potential. This part of the common knowledge mastered by teachers and students is overlapping, which lays a good foundation for students to better absorb the classroom knowledge provided by teachers.

## **4.3 Information Technology is a Necessary Means to Disseminate Knowledge of College Classrooms**

In the process of modern teaching practice, all knowledge and cases are displayed through multimedia, and lecturers use the new teaching tools produced by various information technology communication terminals that are spawned by information technology for education. Educational tools promoted by information technology have completely changed the original teaching tools [11].

## **5 Implications of the Mechanisms of Knowledge Transmission for Teaching and Learning in the College Classroom**

### **5.1 Explanation of the Teaching Phenomenon by the Mechanism of Knowledge Transmission in College Classrooms**

#### 1. The essence of teaching to the individual

The idea of teaching students in accordance with their aptitude promoted by many educators is actually to get to know the state of their knowledge potential by being close to students. By summarizing the mechanism of knowledge transmission in the college classroom, we can explain the essence of tailoring education to students' needs: providing different pedagogical knowledge potentials based on differences in common knowledge, thus allowing students to gain maximum knowledge absorption.

#### 2. The Nature of Progressive Teaching

According to the mechanism of knowledge transfer in the college classroom: "the conclusion that knowledge potential is more favorable in a reasonable range", we can explain the gradual nature of the teaching process: on the one hand, to keep knowledge potential in a reasonable range, and on the other hand, to accumulate the common knowledge of the teacher and students. This enables the university classroom to obtain the greatest knowledge transfer.

### **5.2 Implications for Teachers of the Mechanism of Knowledge Dissemination in College Classrooms**

As far as teaching is concerned, the essential difference between instructors and learners lies in their knowledge potential difference. In other words, what makes a teacher a teacher to a student is that the teacher has a higher knowledge potential in the subject area than the student, so for the teacher, acquiring the greatest possible knowledge potential relative to the student is the basis for standing on the podium and is necessary to complete the teaching.

It is worth noting that, in the process of imparting knowledge in college classrooms, it is not that the greater the knowledge potential, the better, but that teacher should acquire as much knowledge potential as possible. By explaining the terms of "individual teaching" and "progressive teaching", we know that a teacher 'obtaining the greatest possible knowledge potential does not mean that the greatest possible knowledge potential will be used in any classroom, but that the teacher will be provided with various teaching options with different knowledge potentials.

In other words, if the teacher does not have a high reserve of knowledge potential, the students with high knowledge potential in the classroom will face the dilemma of "having no potential" to use.

At the same time, in order to enhance the common knowledge with students, the teacher need to fully understand the knowledge base of the target audience through various means, so as to truly grasp the scope of common knowledge and the size of the knowledge potential difference in the classroom, and lay a solid foundation for the successful knowledge dissemination in the university classroom.



## 6 Conclusions

Through the in-depth study of the generalized knowledge dissemination mechanism, a knowledge dissemination mechanism in college classroom based on knowledge potential difference is put forward: that is, on the basis of certain common knowledge, the knowledge potential difference between teachers and students is more conducive to the dissemination and absorption of knowledge within a reasonable range. This mechanism is the basis of explaining the nature of the knowledge potential difference in the background of differential and progressive teaching methods, and provides useful suggestions for college classroom teaching. The next step of research should give the mechanisms and laws of knowledge dissemination for different types of knowledge.

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