

Research Article

On the "Double Adaptation" of Teaching and Its Comprehensive Effect —— Simple and Efficient Teaching Principles and Approaches

Shoutian Lan¹, Hui Lan^{2,*}, Lian Chunlei³

¹Suizhou Institute of Education, Suizhou, China

²School of Art and Design, Zhejiang Gongshang University, Hangzhou, China

³No. 1 Middle School of Shan County, China

Abstract

The teaching methods of each subject should not only adapt to the internal needs of students, but also adapt to the objective laws of the development of external things, and should make the two skillfully combined and promote each other, so as to achieve the "double adaptation" of teaching. After repeated research and experiments, we found that the "learning guide" implemented according to a "four-step procedure" can comprehensively solve this problem. This can also bring about a high degree of integration of "teaching" and "learning", a high degree of integration of teaching plans, textbooks, assignments and exams, a high degree of integration of teaching materials and teaching methods, a high degree of integration of teaching methods of various disciplines, and a high degree of consistency between school education and social needs. The role, energy and various effects of "highly integrated" and "highly consistent" can not be underestimated. It can not only ensure that all teaching tasks can be easily completed within the specified teaching time, but also expand the depth and breadth of knowledge on the original basis, creating extremely favorable conditions for the cultivation of talents and even talents.

Keywords

Inner Need, Objective Law, Double Adaptation, Four-Step Procedure, Highly Integrated

1. Introduction

Why is the current primary and secondary school curriculum burden has been too heavy, while the quality of teaching has been stagnant? The basic reason is that there are two disadvantages in teaching which are hard to overcome for a long time and easy to be ignored. The second is to disperse the teaching of new knowledge, and then summarize or summarize, from the whole to part of the cognitive law. We

call the two maladies, which are separated from the students' reality and from the cognitive law from the whole to the part, "Double disconnection".

In order to solve this problem, through long-term research and experiments, we have finally found a more appropriate solution strategy, using "Double adaptation" instead of "Double disconnection", that is to say, teaching should not

*Corresponding author: 598702799@qq.com (Hui Lan)

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only adapt to the students' internal needs, but also adapt to the objective law of the development of external things from whole to part. In this way, students have clear goals before learning, and then can link up with the existing learning resources in mind, thus establishing a correct and smooth way for teaching, not only can we easily complete all the teaching tasks within the prescribed teaching time, but also can increase the depth and breadth of knowledge, and more importantly, can fundamentally eliminate rather than just reduce the heavy burden of students on their schoolwork, so that teachers and students only need to spend less time and energy, can train for the country in line with the needs of social development of a large number of outstanding personnel [1].

2. The Importance of Teaching to Meet Students' Internal Needs

Students are born with the potential to learn. In addition, when they come to this colorful world, they are exposed to it and have access to all kinds of information, in the brain will gradually form a certain learning resources. Moreover, this kind of learning resources have the instinct to be developed, used and expanded constantly, so students will be interested in any new things, want to ask why, this is the inherent needs of students. The Vasyl Sukhomlynsky said, "There is a deep-seated need in the human heart -- to feel that the self is the discoverer and the seeker, and this need is very strong in the child's mind." [2]. If our teaching can meet the students' inner needs, the students will show the state of being smart, lively and lovely, in a good mood, with high passion, etc., or be ignored when the resources themselves will stagnate, shrink, students will show restless, passive confrontation or even unbearable phenomenon. From which we can see: the expansion of learning resources is not only a psychological phenomenon of students, but also a physiological phenomenon.

3. The Importance of Teaching to Adapt to the Objective Laws of the Development of Things

The basic order of things' development is "cause - process - result". If we only pay attention to the results and ignore the causes and processes, any transaction is untenable. Similarly, if teaching only pays attention to the result and ignores the cause and process, it will certainly be more than worth the loss.

The basic law of people's cognition of things is "whole - part - whole". If we lose the "whole" at the beginning of teaching, but work hard on the "part" again and again, we can only put the cart before the horse, waste students' time and energy, dampen students' enthusiasm, and it is difficult to get out of the dilemma that teaching has been divorced from the

reality of life and what students have learned for a long time.

We call the basic order of the development of things and the basic law of recognizing things as objective laws.

Realizing the objective law of teaching adapting to the development of things is not only conducive to students' current learning, but also conducive to students' future use of the knowledge or ways learned in school to solve the problems that need to be solved in social development.

4. The "Double Adaptation" of Teaching Is the Inevitable Trend of Educational Reform and Development

The "double disconnection" of teaching can not only make students complete learning tasks within the specified time, but also only bring heavy academic and psychological burden to students. The "psychological burden" mentioned here refers to a psychological state of boredom or resistance caused by the teacher forcing students to do things that students do not need or want to do. "The burden of schoolwork" is the appearance, and "the psychological burden" is the essence. These cannot be measured simply by the time spent by students. If learning tasks are imposed, no matter how much, even if they are completed within the specified time, it will also bring heavy academic and psychological burden to students. It would be even more cruel if we imposed learning tasks while working overtime.

If we want to fundamentally relieve students' "psychological burden" and "academic burden" at the same time, and make teaching on the right track of simplicity and efficiency, teaching must not only adapt to students' internal needs, but also adapt to the objective laws of the development of external things. Mr. Tao Xingzhi, a famous educator, said: "Teaching must conform to human nature and the law of development, which is the first and highest law of any teaching". The educational theory and practice of "double adaptation" is designed according to this famous saying. The "double adaptation" of teaching will become the inevitable trend of educational reform and development.

5. Basic Ways to Adapt to Both Internal Needs and Objective Laws

How to realize the "double adaptation" of teaching to meet both the internal needs of students and the objective laws? After repeated research and experiments, we believe that the basic approach is to follow the four-step procedure of "creating teaching situation - sketching knowledge structure - raising a series of problems - solving problems separately". The core of this teaching method is "inspired by teachers to guide students to learn independently", so it is referred to as "guided learning", or "four-step guided learning". This is a brand new teaching method, which can make both adapt to the

students' internal needs and adapt to the objective laws skillfully combine and promote each other to achieve the "double adaptation" of teaching [3].

6. Specific Operation and Reasons of the Four-Step Procedure

6.1. Creating Teaching Situations

Students' internal needs are stimulated under certain circumstances, so the beginning of teaching must be to use various teaching methods to select or create a teaching situation that is related to the teaching content and is also popular with students and starts from the students' foundation.

For example, at the beginning of "using letters to express numbers" in primary school mathematics teaching, the following blank filling questions can be designed first for students to complete:

1 frog () has a mouth, () eyes and () legs

Two frogs () have mouths, () eyes and () legs

Three frogs () have mouths, () eyes and () legs

a frog () has mouth, () eyes () legs. (Guidance: fill in according to the relationship between numbers)

If a frog (a) opens its mouth, (b) has eyes (c) has legs.

Then $b = a$, $c = a$,

In this way, primary school students can be very happy to accept that there are letters in the formula, and can clearly see the relationship between numbers and numbers through the letters, which also naturally involves the relevant content of teaching.

For example, senior high school students have a profound understanding of specific physical quantities such as length, weight, mass, speed, area, volume, etc., but are quite unfamiliar with the new physical quantity "momentum". Therefore, at the beginning of teaching "momentum and momentum conservation", we can ask students: at various sports meetings, do you know that weightlifting, boxing, wrestling and other items are not divided into gender, What else must be divided

(students will rush to answer: weight level is also required) - this shows that the motion effect is related to the object's own mass m in addition to the object's motion speed v . Then the concept of momentum $P = mv$ can be easily formed and can be successfully entered into the teaching of "momentum and momentum conservation" in senior high school physics.

In this way, students can be in an environment that is very conducive to learning from the very beginning. They can not only fully mobilize and use the existing learning resources to participate in learning, so that the learned knowledge can take root from the very beginning, but also this is the "cause" of teaching. Everything is difficult at the beginning. Once the "cause" is solved, the following teaching will be logical. On the contrary, teaching without context is water without source and tree without roots. It is difficult for students to learn knowledge, and even if they learn a little, they will soon forget it.

When creating teaching situations, we should pay attention to the upper and lower links. First of all, the second couplet is to contact students with familiar and easy-to-understand or interesting examples. As mentioned above, in addition to male and female, it also needs to be divided into weight levels; In addition, hanging is to hang the relevant teaching content. The more comprehensive and deeper it is, the better it is. As mentioned above, hanging is almost hung with the main teaching content such as the definition of momentum and the factors that determine the size of momentum.

6.2. Outline The Knowledge Structure

With a certain situation, students will need to understand what it is and why it needs to be solved. At this time, students need to draw the overall outline or structure chart of learning first, and then they can solve it step by step or separately.

For example, to use letters to represent numbers, first of all, we should understand what numbers letters represent here, how to use letters to represent numbers, and what is the basis. Namely:

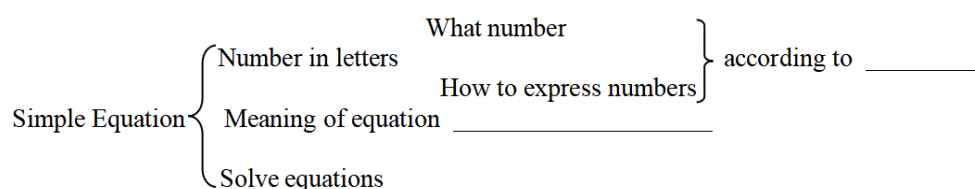


Figure 1. Knowledge Structure of Using Letters to Represent Numbers.

Another example is that the motion effect is related to the motion velocity v and the mass m of the object itself. Then the product of m and v is a new concept - momentum. So what is

momentum and what is the relationship between the magnitude of momentum are the main contents we will study and study. Namely:

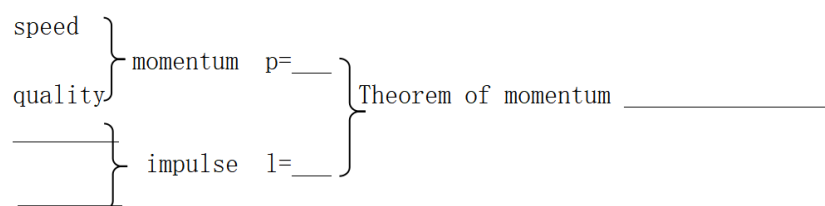


Figure 2. Knowledge Structure Diagram of "Conservation of Momentum".

This is to outline the knowledge structure. It is allowed that the structure initially outlined may be incomplete, not specific, biased, or advanced with the help of the teacher.

Any knowledge has its own constituent structure and also exists within a certain knowledge structure. With the knowledge structure, students can clearly see the interrelationships between knowledge during the learning process. The common saying that "the interrelationships between knowledge are more important than the knowledge itself" is also reflected here. Having a knowledge structure is also more conducive to forming students' cognitive structure, which is both easy to learn and easy to apply. At the same time, this also conforms to the objective law of "whole part whole", and this initial knowledge structure belongs to the previous "whole".

6.3. It Is Necessary to Fill in the Incomplete, Unspecified, or Biased Knowledge Structure Initially Outlined

Realistic, to correct, to improve. At this point, students can be guided or allowed to independently ask a series of questions or questions based on the initial knowledge structure. Brubuck has a famous saying: "The most exquisite teaching art, followed by the highest standard is to let students ask questions."

"Put forward a series of questions" has also entered the middle link of "whole - part - whole".

The so-called series of questions means that these questions are put forward from easy to difficult by closely combining the previous "creating teaching situations" and "sketching knowledge structure", and the latter question is the continuation of the previous question, and the former question is the premise of the latter question.

The structure of the initial sketch may be incomplete, not specific, or biased, or advanced with the help of the teacher, which is allowed.

For example:

1) My father is 30 years older than Xiao Hong. If Xiao Hong is a year old, how old is my father?

(Space below each question.)

2) The price of rice is 2.5 yuan per kilogram. How much is a kilogram of rice?

12. There are chickens and ducks in the farm of Xingfu Village. The number of chickens is more than 100 times that of ducks.

Fill in the blank: if the duck is a, the chicken is

If the chicken is a, the duck is

If the duck is x and the chicken is y, write the relationship between x and y: $y = \text{---}$

Another example:

- 1) What is momentum? What is the size of momentum related to?
- 2) What is the formula for calculating momentum?
- 3) Why did the worker Sifu use a hammer to hit the stone when opening the mine, but use a sea sponge hammer to press the tile?

It must be emphasized here that the starting point of the questions raised at the beginning must be low, and only when the starting point is low can the root be deep, and then the difficulty can be gradually increased, even exceeding the requirements of the existing textbooks. For example, it is easy to ask the first question in the teaching of "using letters to express numbers", and finally put forward "write the relationship between x and y: $y = \text{---}$ ", which involves the primary function in junior high school. However, the premise is "if the duck is a, then the chicken is $3a + 100$ ", so it is not difficult for primary school students to write the relationship here.

This is "seeking high from low", "seeking high from low, and higher from high".

Space is required below each question, just like homework and exam, which is left for students to answer.

Some key knowledge points can be put forward together with related problems. For example, in the second question above, the knowledge point "the calculation formula of momentum can be determined according to what the size of momentum is related to" is added before the question "What is the calculation formula of momentum". This is very helpful for students to use knowledge points to solve problems and deepen their understanding of knowledge points in the process of solving problems.

6.4. Solve Problems Separately

After a series of problems are put forward, they must be solved separately. For each question, we can use the four-step procedure of "asking questions - exploring and guiding - solving independently - correcting and strengthening". Here we call it "small four steps", and the four-step procedure mentioned above is "big four steps".

1) Put forward questions - put forward each question in the "series of questions" in order, and encourage students to use

the acquired knowledge and consider how to solve independently, that is, find out the growth point of knowledge in the existing learning resources.

2) Exploration and guidance - at the critical moment when students explore how to solve problems independently, or when students encounter difficulties, teachers give necessary guidance to guide students to learn to think. Zankov famously said, "Teaching students to think is the most valuable capital in their life." [4]

Guiding thinking is absolutely different from explaining knowledge: explaining is the knowledge itself or directly answering questions. Even if students know what it is, they don't know why, let alone how the teacher thinks. And guidance is to guide students to establish a connection with the known according to the problem or unknown, and to be able to explain what the connection is, which is also to guide students to gradually grasp the basic law of thinking to solve the problem.

That is, the basic law of thinking for solving problems:

Known \rightleftharpoons unknown

It is interpreted as exploring the "known" based on the need to solve the "unknown", and then solving the "unknown" based on the "known". The general trend is still from known to unknown.

It can be seen that guidance and explanation are not at the same level. Those who can explain can only say that you have a certain level, and those who can guide can only say that you are a qualified teacher.

For example, ask a question: the number of chickens is more than 100 times the number of ducks. If the duck is x and the chicken is y , write the relationship between x and y : $y =$

Exploration and guidance: pay attention to the relationship between number and number - that is, the number of chickens is 100 times more than the number of ducks x - that is, y is 100 times more than 3 times x - that is, y is 100 times more than 3 times x ($y = 3x + 100$)

Another example is to ask the question: What is momentum? What is the size of momentum related to? What is the calculation formula?

Exploration and guidance: Can we use the knowledge we have learned to answer the question? —First of all, we should see what the problem is and what its characteristics are. —The movement of "momentum" is movement, and momentum is to ask what the effect of movement is related to, —and what is the relationship? According to what factors we have discussed before,-- the movement effect is related to - the speed of motion and the mass of the object itself

Of course, we can choose or change according to the actual situation when implementing exploration guidance.

The guidance should be hierarchical and in-depth, and gradually make the solution of the problem clear. There should also be a sense of rhythm. If it is too fast, it is easy to be reduced to practice first, and if it is too slow, it is easy to be reduced to practice first and then speak. It should basically be in tune with the students' thinking.

There is a dynamic balance between teachers' "guidance" and students' "learning". That is, according to the teaching difficulty, teachers can sometimes "quote more", sometimes "quote less", and then gradually enter "not quote". The general trend is "more - less - not quote", or "quote" is to "not quote". The corresponding students' independence can be continuously enhanced, that is, "weak independence - strong independence - strong independence", which is conducive to gradually entering "strong independence".

That is, "introducing \rightleftharpoons learning"

It seems that teachers guide students to learn more slowly than teachers teach students to practice. Especially at the beginning, the teaching progress may also lag behind. Only in this "slow" can middle school students gradually grasp the law of thinking to solve problems. Once the law is mastered, it will naturally be faster. The lagged progress can not only catch up quickly, but also be greatly ahead (at this time, teachers and students will need to increase difficulty). This is "seeking speed in slow", "seeking speed in slow, faster".

3) Autonomous answer - while the teacher guides the students, the students can use their brains to answer questions by autonomous learning with or without reference to the teacher's guidance.

For example, middle school students can fill in the blanks: the relationship between x and y : $y = 3x + 10$.

Students can also answer that the product of the speed of object motion and its own mass is called momentum. The magnitude of momentum is related to the speed of motion of the object and its own mass. The calculation formula is momentum $p = mv$.

These questions are answered by students using their brains and hands. They will be unforgettable for life, or they don't need to consolidate, practice or review at all.

Here, we usually answer in writing, and then make oral communication. The written answer should reflect that we should take it as an examination at ordinary times, and we should not talk to each other, and we should not look left and right. We should present a situation of mutual competition. In oral communication, speak freely and learn from each other.

When the students answer in writing, the teacher can patrol and give guidance again when finding prominent problems, that is, the two steps 2) and 3) can be repeated or crossed.

Every time a problem is solved, the result of the solution will be filled into the knowledge structure, so that the knowledge structure will continue to improve.

4) Rectification and reinforcement - here students can communicate with each other, learn from each other, cooperate extensively, and sometimes discuss or argue. According to the situation, teachers can strengthen the previous "guidance" and correct the problems. At this time, they can also explain the knowledge itself, or even speak deeply.

When the first problem is solved, put forward the second problem urgently, adopt the second round of "small four steps", and so on. The class hours are connected by "knowledge structure", and the "whole" runs through.

2) and 3) of the "small four steps" can be repeated, crossed or carried out at the same time, so that a variety of flexible variants can be adopted according to the actual teaching situation. This will make "strict adherence to procedures" and "flexibility" highly unified.

After using a round of "big four steps" and several rounds of "small four steps" to solve the problem, the initial knowledge structure will be constantly enriched and adjusted, forming a more complete knowledge structure, which is the final conclusion of teaching.

7. "Learning Introduction Plan" Came into Being

The teaching content is written according to the "Four-step procedure" (except for "Self-solving" and so on, which need to be completed by students). "Introduction Plan" is the integration of the original textbooks, teaching plans, workbooks, examination papers, its role and function will be more than the original textbooks, teaching plans, workbooks, examination papers.

The introduction plan is also particularly beneficial to students' self-study. Some students can even complete a large chapter of science on their own in just over an hour. They can learn the whole book in more than ten hours, thus this also creates the extremely advantageous condition for the genius emergence.

8. Highly Comprehensive and Comprehensive Effects of All Aspects

The "double adaptation" of teaching requires that teaching not only meet the internal needs of students, but also meet the objective laws of the development of external things, and use the "four-step" teaching procedure to skillfully combine the two and coordinate the development, which is itself a highly comprehensive. This highly comprehensive effect is mainly reflected in making the teaching simple and efficient. The teaching content of a large chapter or a large topic can be completed in only one round of big four steps and several rounds of small four steps. The four steps are only for the convenience of research and discussion. In fact, they are all done in one step during the implementation, making the seemingly complex teaching quite simple.

Specifically, it also includes the following highly integrated.

"Teaching" and "learning" are highly integrated. The time and energy required by teachers and students to complete the same teaching task must be less than the sum of the time and energy required to implement "teaching" and "learning" in sequence, which is " $1+1<2$ " (simple); In the same time, its effect must be greater than the sum of the effects of imple-

menting "teaching" and "learning" in sequence, that is, " $1+1>2$ " (efficient). This is the simple and efficient effect brought by high integration. The comprehensive expression is:

$$\text{Comprehensive effect} \begin{cases} 1+1<2 & \text{simple and direct} \\ 1+1>2 & \text{Efficient} \end{cases}$$

$$\text{Quote D Learn Comprehensive effect} \begin{cases} 1+1<2 & (\text{Arrow Swift}) \\ 1+1>2 & (\text{Efficient}) \end{cases}$$

Figure 3. The Comprehensive Effect Diagram of Dual Adaptation in "Guidance" and "Learning".

It can also bring a high degree of integration of teaching plans, textbooks, assignments and examination papers, so that they are all integrated into the "learning plan".

The teaching materials are arranged according to the "four-step procedure", and the classroom teaching is also operated according to the "four-step procedure", which brings about a high degree of integration of the teaching materials and teaching methods, and at the same time, the teaching methods can be standardized with the teaching materials.

Teachers and students share the "learning introduction plan", which makes the learning method and teaching method highly integrated, and is extremely helpful for students to master the learning rules.

It can bring a high degree of integration of many teaching links, such as preview, new lesson, practice, consolidation, review, etc., that is, all are run according to the four-step procedure, or all are new lessons, and other links (especially repeated review) are unnecessary.

The teaching of arts, sciences and arts should adapt to both the internal needs of students and the external objective laws, that is, they should not violate the principle of "double adaptation", so all disciplines can be taught according to the "four-step procedure", which can bring about a high degree of integration of teaching methods of all disciplines. The achievements made in the first discipline can benefit all disciplines, and completely break the old pattern of non-communication among all disciplines. At the same time, for a certain student, the original student had to cope with the different requirements of teachers in various subjects, and was at a loss; At present, teachers of all disciplines are serving every student, teaching in the same way, enlightening and guiding, thinking in the same way (that is, the commonness of teaching), learning several dozen disciplines, such as learning one discipline, which shows how easy it is for students to learn.

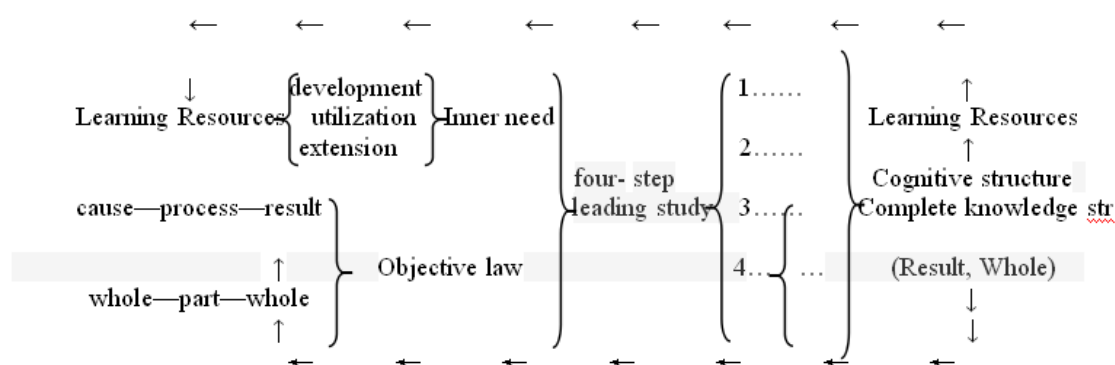


Figure 4. Schematic diagram of the virtuous cycle of the new "dual-adaptive teaching" system.

Einstein said, "If the enthusiasm of students is aroused, then the homework prescribed by the school will be accepted as a gift." [4] Under the principle of "double adaptation" education thought, using the "four-step learning guidance" teaching method to realize the virtuous cycle of teaching can make teaching no longer a burden, but will become a need of teachers and students, a joy, a enjoyment, and a manifestation of self-worth.

9. Conclusion

It can be seen that students' existing "learning resources" produce the "internal needs" of learning. According to this internal need, we have established a "four-step learning guide". According to this teaching method, students can form a "complete knowledge structure", and then form a new "cognitive structure" of students. This cognitive structure is transformed into "new learning resources", It will further expand the "internal needs" of students' learning... This is a virtuous circle. Similarly, the "complete knowledge structure" is the "result" in the "cause - process - result" and the "whole" behind the "whole - part - whole", so that students can better complete the new "cause - process - result" and the new "whole - part - whole"

It can thus be concluded that the "dual-adaptation" teaching approach constitutes a relatively comprehensive and virtuous cycle of a new system.

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] Tao Xingzhi's famous saying: Teaching must conform to human nature and the laws of development. This is the first and highest law of any teaching.
- [2] Sukhomlinsky's famous saying: There is a deeply rooted need in the human heart—to always feel like a discoverer and explorer. In the spiritual world of children, this need is exceptionally strong.
- [3] [Ye Shengtao] Famous quote: The essence of teaching lies not in imparting everything, but in skillfully guiding students to discover.
- [4] [Einstein] Famous quote: If students' enthusiasm is ignited, then the school's prescribed curriculum will be received as a gift.

Biography

Shoutian Lan, male, senior teacher, research fellow, Suizhou Institute of Education, Hubei Province, retired today. In September 2009, he began to carry out a three-year experiment of teaching reform in the classroom of "Learning-based teaching" at No. 5 Experimental Middle School in Taiyuan.

Hui Lan, male, with the title of associate professor, was born in November 1977, and is the vice president of the School of Art and Design of Zhejiang Business University. Enthusiastic in classroom teaching model research, and personally experiment, vigorously promote. The original article "On the" Double Adaptation "of Teaching and Its Comprehensive Effects" puts forward a new educational concept and specific operating procedures, which are both easy to understand and easy to operate. It is also a high summary, summary and deepening of the previous research and experiment.