

# Analysis of the development level of Internet teaching in primary and secondary school teachers - -Based on a survey of more than 40,000 teachers in China

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**Abstract:** Under the background of "Internet +" education, Internet teaching has become a teaching way to leverage the teaching reform and promote the development of students. It is found that there are significant differences in the development of teachers in the eastern, central and western regions, and teachers in primary and primary schools teachers' Internet teaching are the best. It need to improve the infrastructure, to carry out related training, selecting pilot schools, further enhance the level of national basic education teachers Internet teaching development.

## 1. Foreword

China has gradually stepped towards the process of "Internet + education". Internet teaching is a behavior closely related to Internet learning. Internet teaching focuses more on the direction of education informatization and the development of "learning". Internet learning refers to the network learning in which learners use the Internet to obtain information, acquire knowledge, carry out communication, improve their learning ability and problem solving ability, stimulate their learning interest and motivation, and improve their learning experience and self-value realization level<sup>[1]</sup>. Internet teaching focuses more on the direction of education informatization and the development of "learning". It is to see the trend and significance of education informatization in the sense of "openness, sharing, symbiosis and innovation" in the Internet era, and it is the ultimate goal and significance of education informatization<sup>[2]</sup>.

In order to find the development law of Internet teaching, find out the existing problems and deficiencies, provide decision-making basis and policy suggestions for the development of teachers' Internet teaching, and improve the modernization level of education governance system and governance ability. Through questionnaire to find the development level of Internet teaching of basic education teachers. In order to accurately grasp the development level of Internet teaching for primary and secondary school teachers, find the development law of Internet teaching development, find the existing problems and deficiencies, provide decision-making basis and policy suggestions for the development of Internet teaching, and improve the modernization level of education governance system and governance ability.

Through expert discussion and network survey, a systematic study was conducted on the development level of basic education teachers in 2020. From the perspective of teachers, understand the development level of Internet teaching in 2020 by ability, support, environment and application.

## 2. Data description and index system

Questionnaire has Ability, Support, Environment and Application as its first level indicators, and has 17 second level indicators. "Ability" aims to understand the ability level of teachers to carry out Internet teaching, including six second-level indicators which are the ability of technical knowledge, resource integration, teaching promotion, learning evaluation, subject teaching, ethics and safety. "Support" aims to understand the support that teachers can get in Internet teaching, including four second-level indicators which are content and resources, evaluation and feedback, strategies and skills, motivation and emotion. "Environment" aims to understand the environment of teachers in the process of Internet teaching, including four second-level indicators which are platform and system, terminal device, basic equipment, policy environment. "Application" aims to understand the application situation of teachers' Internet teaching including three second-level indicators which are motivation and expectation, application scenarios, attitude and experience.

Using the "questionnaire star" platform and the online survey, teachers were randomly selected in 31 provinces and cities to fill in the questionnaire, and a total of 47,495 valid questionnaires were collected.

Comparing the scores of each level index, the scores of "ability", "support", "environment" and "application"

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were 76.98,76.97,76.24,78.61 respectively, with a total score of 77.31. It shows that the Internet teaching of basic education teachers has developed well, but there are still the problems of inadequate development. Application dimension evaluates the development level of Internet teaching application from a subjective perspective in the questionnaire. The score of application dimension is higher than the total score, indicating that the development of teacher Internet teaching application is better than the development of other dimensions.

The overall reliability validity test value of the questionnaire is 0.993, the reliability meets the requirements. The validity test of the questionnaire used KMO statistics, and the KMO value of the sample was 0.994 indicating that the questionnaire can be used for factor analysis.

The overall reliability test value of the questionnaire was 0.993, the capability dimension is 0.988, the applied dimension is 0.979, the environmental dimension is 0.956, the reliability meets the requirements. The validity test of the questionnaire used KMO statistics, and the KMO value of the sample was 0.994 and the Bartlet chi-square value was 7080549.234 ( $p=0.000$ ), indicating that the questionnaire can be used for factor analysis. From the

reliability and validity test, the overall design of the questionnaire is scientific and reasonable, and the data source is highly credible.

Independent sample t-test was conducted on each dimension and topic. According to the results of the test, the probability value of the corresponding high and low grouping for each dimension and question was less than 0.05, indicating that there are significant differences between high groups and low groups between each question and dimension. Therefore, it can be seen that the design of each question in the questionnaire is scientific and effective.

### 3.Data analysis

#### 3.1 Correlation analysis of the scores of each dimension

From the results of correlation analysis, Ability, Supports, Environmental and Application has a positive correlation under the 1% probability level, indicating that each dimension has a mutually promoting effect. The specific correlation data of each dimension is shown in Table 1.

**Table 1** Correlation coefficients of all dimensions of Internet teaching for basic education teachers

	ability	support	environment	apply
ability	1	0.820**	0.781**	0.876**
support	0.820**	1	0.893**	0.891**
environment	0.781**	0.893**	1	0.838**
apply	0.876**	0.891**	0.838**	1

Note: \*  $P < 0.05$ , \*\*  $P < 0.01$ , the same below.

Specific to the questionnaire each topic, ability dimension, each index and application dimension present significant positive correlation, including t13-1 (subject teaching process, combining with the characteristics of the Internet teaching tools) and the application of highest correlation coefficient, combining the characteristics of the teacher using the ability of the Internet teaching tools, the higher, the teacher Internet teaching application, the better. In the support dimension, each index is significantly positively correlated with the application dimension, in which t33-5 (the teacher using the Internet tools can meet the teaching needs) and the application correlation coefficient is the highest, with the correlation of the application dimension, t37-5 (the degree to which the Internet teaching platform can meet the teaching needs) and the application correlation coefficient is the highest, indicating that the Internet teaching platform can meet the teaching needs and the application is better. The three dimensions and the application of the highest correlation coefficient item all point to the Internet teaching tools and platform, known tools and platform has become the influence teachers Internet teaching application "gap", only hold the Internet teaching tools and platform of the "gap", fully develop the Internet teaching tools and platform, to enhance the level of basic education teachers Internet teaching application at this stage.

#### 3.2 Comparison of different dimensions of different categories

##### 3.2.1 Effect of different regional levels on the differences in the scores of each dimension

Schools are classified according to urban, township and rural areas. By variance analysis, the probability of significance of each dimension and total score is less than 0.05, indicating that there are significant differences at different regional levels.

The scores of urban teachers' ability, support, environment, application dimension and total score (77.80,77.60,77.00,79.20,78.00) are generally higher than those of rural schools (76.80,76.80,76.20,78.40,77.20). The scores of township teachers are higher than those(76.20,76.00,75.00,77.80,76.40) in rural schools.

##### 3.2.2 Correlation analysis of the scores of each dimension by teacher background

In order to study the influence of teachers' personal background information on Internet teaching, the teachers' background data were sorted out. The details are shown in Table 2.

**Table 2** Correlation coefficients of teachers in background questions and questionnaire

project	ability	support	environment	apply	total points
school age	-0.164**	-0.154**	-0.152**	-0.147**	-0.165**
record of formal schooling	-.019**	-.007	-0.005	-0.019**	-0.016**
teaching subjects are important in the entrance examination	-0.041**	-0.036**	-0.045**	-0.043**	-0.044**
frequency of Internet teaching related training	0.251**	0.231**	0.231**	0.225**	0.251**

There is a negative correlation between ability, support, environment, application dimension and total score dimension and teacher teaching age at 1% probability level, indicating that the shorter the teaching age, the higher the average score of ability, support, environment, application dimension and total score dimension.

### 3.2.3 Effect of the school region on score differences in all dimensions

Arrange The national dimensions and total scores of the

eastern, central and western regions make a comprehensive and intuitive observation of the development of Internet teaching among teachers from a regional perspective. The specific results are shown in Table 3 make the level of Internet development in western regions is higher than that in central and eastern regions, and the integrated application of information technology and teaching has gradually become the way of education development in economically under developed areas, providing the possibility for them to realize overtaking on the educational curve.

**Table 3** Scores of each region of the country

In the area	total points	ability	support	environment	apply
The east	77.39	77.15	76.81	76.35	78.70
The middle	77.37	77.01	77.20	76.12	78.69
The west	77.88	77.41	77.55	77.18	79.15

## 4. Finding

First, there is a significant positive correlation between the various dimensions of teacher Internet teaching. It shows that with the improvement of the level of one dimension indicators, the level of other dimension indicators will be further improved.

Second, there are certain differences in the development level of Internet teaching among teachers in each learning section. According to the comparison of various dimensions and total scores in the dimensions of Internet teaching of teachers in each section, the national data shows that the development of Internet teaching of primary school teachers is better than that of middle school and high school teachers, and there is no obvious difference in the development of Internet teaching between middle school teachers and high school teachers.

Third, there are some differences in the Internet teaching level among school teachers at different regional levels. According to the comparison of each dimension and total score of school teachers at different regional levels, the national data shows the best urban teachers in the area of the Internet development level, followed by township teachers, and weak rural teachers.

Fourthly, through the analysis of teachers' background

data, the importance of teaching age and teaching subjects in the entrance examination is negatively correlated with the development level of teachers' Internet teaching, and improving the frequency of teachers' participation in Internet teaching related training can improve the development of teachers' Internet teaching.

Fifth, according to the statistical analysis results of the eastern, central and western regions, the development level of Internet teaching of teachers in the eastern region is best among primary school teachers, secondary to junior middle school teachers, high school teachers are weak, urban teachers are best among the regional levels, and township teachers and rural teachers are weak. The development level of Internet teaching in central China is the best among primary school teachers, followed by high school teachers, junior middle school teachers are weak, township teachers are better, urban teachers are second, and rural teachers are the weakest. In the western region, primary school and high school teachers are good among different school segments, while junior middle school teachers are weak. There is no significant difference between urban teachers, township teachers and rural teachers among different regional levels. In the eastern, central and western regions, the best characteristics of the development of Internet teaching among primary school teachers.

## 5. Suggestions

### 5.1 Construction of Internet teaching infrastructure

The score of the Internet teaching environment dimension for basic education teachers is 76.24, which is the lowest score among the four first-level dimensions. The infrastructure secondary dimension score is 74.19, which is lower than the "environment" dimension score. It shows that the development level of Internet teaching infrastructure for basic education teachers still needs to be further improved. Although the long-term construction of the infrastructure in the development of educational informatization has extended its tentacles to every corner of the education on the land of China and created the speed of educational informationization in China<sup>[3]</sup>, However, in the stage of education informatization 2.0, it is necessary to change the investment and evaluation mode of infrastructure, from emphasizing the number of PC devices, vitality ratio, the number of multimedia classrooms to the emphasis of mobile devices, network connectivity and so on<sup>[4]</sup>, Mobile terminal may be the breakthrough point to promote the overall work of Internet teaching<sup>[5]</sup>. Schools should actively build and intelligent campus and network learning space connectivity, data sharing of mobile intelligent terminal, and explore allows students to school mobile intelligent terminal carry home learning system, can also be explored in economically developed areas to develop the BYOD (bring your own device) teaching application, the purpose of these measures is to promote the normalized application of mobile intelligent terminal, in order to realize the learning data acquisition, for students to give the whole process of accurate guidance, evaluation and intervention.

### 5.2 Carry out teacher training for Internet teaching.

In training, we should develop teachers' Internet teaching ability and application efficiency, make teachers understand and identify with Internet teaching, and insist on carrying out Internet teaching.

The national data and regional data show that teachers' participation in Internet teaching related training is significantly positively correlated with the scores of all dimensions in Internet teaching, indicating that Internet teaching related training can improve the development level of all dimensions. In the process of promoting the application of Internet teaching, it is not only necessary to actively carry out the training for teachers to improve the Internet teaching ability, but also necessary for principals and managers to improve the Internet teaching support ability. In teaching and training, it not only focuses on the development of teachers' Internet teaching ability and application efficiency, but more importantly, to make teachers understand and identify with Internet teaching, and can continue to carry out Internet teaching, and finally to carry out Internet teaching innovatively.

### 5.3 Select the pilot schools for Internet teaching

In the development of pilot schools, with the help of colleges and universities experts, scientific research personnel, relying on the pilot project drive, related theme research activities, backbone teachers lead, it is important to note that the backbone teacher selection criteria is not to teaching discipline, education, and teaching age as a basis, to investigate the Internet teaching ability and application level, concise in practice appropriate Internet teaching application mode, explore a suitable for the development of teachers' Internet teaching path. On the one hand, the pilot schools need to continuously practice the application, summarize and reflect, and make iterative correction during the pilot period. On the other hand, the pilot schools should continuously, long-term and actively integrate the Internet teaching into the school teaching and into the future teaching reform of the school. In the process of promotion, it should not only pay attention to the output of Internet teaching application mode, but also pay attention to sharing teachers' growth cases and telling good Internet teaching application stories, so as to drive and help other schools to effectively improve the development level of teachers' Internet teaching.

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