

Current Situation and Development Strategies for Informatization Education among County High School Students

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Abstract: This study examines the current state of informatization education among county high school students. While students demonstrate a strong demand for informatization education, they face significant challenges, including inadequate hardware, limited access to online learning resources, and insufficient teacher proficiency in informatization education. Through a questionnaire survey, the research reveals an urgent need for expanded information technology courses and specialized training programs. In response, this paper proposes strategies such as increasing investment in IT education, optimizing teaching methodologies, and providing additional learning opportunities to enhance student engagement and comprehensively improve the quality of IT education and learning outcomes in county high schools.

Keywords: County high school students; Informatization education; Development strategy

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1. Introduction

Under the guidance of modern educational ideas and with the help of modern information technology, information-based education is a new educational mode that takes cultivating and improving students' information literacy as its core objective. In today's digital age, information technology develops rapidly and continues to integrate deeply with the field of education, and information education has become a key development trend in the field of education. As an important feature and strong support in the process of education modernization, educational informatization is an essential way to promote educational equity, improve educational quality, and innovate educational models. China's Ministry of Education promulgated the *Education Informatization 2.0 Action Plan* and other documents aimed at promoting the development of education informatization in the new era, which demonstrates the importance of education informatization to the country. The county is the geographical space of the county as the administrative division, and county education plays an important role in the development of education in China. Actively promoting the informatization

of county education can continuously improve the quality of education, cultivate more innovative talents, effectively narrow the gap between urban and rural education, and further promote the realization of educational equity. Information-based education can open up a broader horizon of knowledge, provide more abundant learning resources and more innovative learning methods for the vast number of students, constantly improve the comprehensive quality of students, and lay a solid foundation for the all-round development of students in the future. At present, the conditions for running schools in counties have been improved on the basis of policy support, and all localities are actively exploring and promoting educational reform. However, due to various factors such as the level of economic development, the distribution of educational resources, and regional cultural concepts, there is still a significant gap between education in counties and urban areas. This gap is not only reflected in the equipment of information infrastructure but also in the information literacy of teachers and students, the application level of information teaching, and the overall development environment of education information.

In the field of informatization education, many scholars have carried out in-depth and systematic exploration from multiple perspectives, laying a solid foundation for the follow-up research on the informatization education level of county high school students. Previous studies mainly focused on the level of information-based education in different regions and stages of education, the impact of information-based education on education and teaching, and the evaluation of information-based education.

According to the specific development situation of different regions, many scholars have carried out research on the level of informatized education. For example, in Tibet, a survey was conducted among 3,134 primary and secondary school teachers to explore the current situation of education informatization promoting high-quality development of basic education. The research shows that there are problems such as the disconnect between planning and practice, lagging infrastructure support, poor adaptation of teaching resources, and insufficient teachers' information-based teaching skills, and there are obvious differences between urban and rural areas and between different student groups. Based on this, the research suggests that we should adhere to high-level promotion, cooperate with multiple subjects, dispel "path dependence," and highlight application orientation, so as to promote the development of basic education informatization in Tibet^[1]. The informatization construction of county education is a key link to realizing the modernization of education. The paper *Thoughts on Promoting the informatization Construction of County Education* takes Shanxi Province as an example. The research results show that there are problems such as insufficient understanding of education informatization, lack of scientific planning, shortage of capital investment, and low level of teachers' information technology. It put forward suggestions such as changing the concept, improving the planning system, and increasing the investment of funds^[2].

The research on informatization education level in different education stages also provides an important reference for follow-up research. In terms of informatization teaching literacy of rural preschool teachers, some studies take education informatization 2.0 as the background; using the questionnaire survey and interview of 26 rural kindergarten teachers in Hebei, Henan, and Shandong provinces, the studies reveal that the informatization teaching literacy of rural preschool teachers is at a relatively high level overall, but there are some differences among individuals. Based on these research findings, development strategies such as strengthening top-level design, optimizing support service system, and improving curriculum integration ability are proposed^[3]. In the research on information-based teaching in secondary vocational schools, taking secondary vocational schools in Heilongjiang Province as an example, it is found that there are challenges such as a large gap in digital campus construction and low informatization quality of teachers, and countermeasures such as strengthening

informatization construction, improving teachers' digital literacy, and building an information-based teaching and research community are proposed ^[4].

At the same time, in-depth analysis of the impact of informatization on education is also one of the key research directions in this field. Xie and Guo took the course "Fundamentals of Computer Application" as an example to analyze the cultivation path of middle school students' innovation ability under the background of education informatization. They proposed that an application model of education informatization should be constructed and stressed that teachers should actively adopt strategies such as changing teaching methods to better adapt to the new era background of education informatization and further cultivate students' innovative thinking and innovation ability ^[5]. There are also studies focusing on the application of modern educational technology in rural revitalization, believing that it is conducive to improving the quality and level of rural education. However, in the face of the digital divide and other problems, it is necessary to further increase the investment and improvement of modern educational technology infrastructure construction ^[6]. The article *Practical Problems and Countermeasures of Informatization to Help the Development of Rural Education* took Linxia as an example to analyze the current situation and dilemma of rural education, pointing out that there are problems in rural education such as poor network conditions, weak teachers' informatization teaching ability, and lack of digital education resources, which seriously restrict the high-quality development of rural education. Based on this, it is further proposed to carry out accurate help by information technology, solve key problems, and realize method optimization and innovation ^[7].

In addition, some studies focus on the construction of the monitoring and evaluation framework for the development level of education informatization in terms of its monitoring and evaluation. By systematically combing the relevant research results at home and abroad, the development level of education informatization at the county level is divided into four stages: starting, application, integration, and innovation; and the four core dimensions of "management and service," "information teaching environment," "teachers' information teaching level," and "students' information learning level" are constructed. This research result plays an important role in the scientific evaluation of the development level of county-level education informatization ^[8].

To sum up, the research results related to information-based education are relatively abundant, but most of the research focuses on educators, that is, the information-based education level of schools and the information-based teaching literacy of teachers, and puts forward corresponding improvement measures and solutions to problems according to the specific situation. However, there are few existing studies on the educatees' information-based education level, and it is difficult for researchers to fully and deeply reveal the practical problems faced by students in the process of information-based education, as well as their actual demand and application of information-based education resources. As a result, education departments lack comprehensive understanding and scientific planning of educatees' information-based education level and often fail to formulate relevant policies and provide educational support, thus affecting students' all-round development. This study aims to make up for the shortcomings of existing studies, focusing on the specific group of county high school students, conduct an in-depth analysis of the current situation and clear the current problems faced by information education, and provide more targeted and effective suggestions for promoting the development of county education information. Therefore, in-depth research on the informatization education level of county high school students can not only accurately grasp the current situation of county informatization education, but also lay a solid foundation for promoting the improvement of the informatization education level of county high school students and inject impetus into the county education cause.

2. Research methods

2.1. Survey methods and subjects

This study mainly adopted the questionnaire survey to explore the informatization education level of county high school students, starting from January 2025. The questionnaire was designed from five dimensions: students' information literacy, students' information learning ability, perception of information education environment, evaluation of teachers' information teaching level, and overall perception. The survey subjects were high school students in Hunan and Henan counties. 82 valid questionnaires were collected, which provided the data basis for further analysis of the informatization education level of high school students in the counties.

2.2. Questionnaire survey data processing

In this paper, SPSS16.0 for Windows software was used to analyze the questionnaire data, such as descriptive statistics, difference test, and response rate.

3. Results and analysis

3.1. Gender difference

As shown in **Table 1**, a *t*-test (independent sample *t*-test) was used to study gender differences in the above five items. Different gender samples showed no significant differences in the overall perception of students' information literacy in two items ($P > 0.05$). However, there were significant differences in students' information-based learning ability, perception of information-based teaching environment, and evaluation of teachers' information-based teaching level among different gender samples. Gender showed a 0.01 significance level ($t = -3.369$, $P = 0.001$) for students' information-based learning ability, and the average value of females (3.24) was significantly lower than that of males (3.86). The perception of information teaching environment showed a 0.01 significance level ($t = -2.690$, $P = 0.009$), and the mean value of females (3.05) was significantly lower than that of males (3.41). Gender showed a 0.05 significance level for the evaluation of teachers' informatization teaching level ($t = -2.141$, $P = 0.035$), and the mean value of females (3.34) was significantly lower than that of males (3.81).

Table 1. Gender difference *t*-test

	Gender (mean \pm SD)		<i>t</i>	<i>P</i>
	Female (<i>n</i> = 58)	Male (<i>n</i> = 24)		
Student information literacy	3.49 \pm 0.74	3.52 \pm 0.59	-0.180	0.858
Students' information learning ability	3.24 \pm 0.74	3.86 \pm 0.77	-3.369	0.001**
Perception of information-based teaching environment	3.05 \pm 0.55	3.41 \pm 0.54	-2.690	0.009**
Evaluation of teachers' information-based teaching level	3.34 \pm 0.87	3.81 \pm 0.99	-2.141	0.035*
Overall perception	1.95 \pm 0.69	1.75 \pm 0.90	1.085	0.281

* $P < 0.05$, ** $P < 0.01$

3.2. Difference test of whether they have participated in additional learning activities related to information technology

As presented in **Table 2**, the *t*-test was used to study the difference between the participation in additional learning activities of information technology (such as robotics, programming extracurricular learning groups,

etc.) and the above five items. No matter whether they have participated in additional learning activities of information technology, there is no significant difference in the overall perception of two items on the evaluation of teachers' informatization teaching level ($P > 0.05$). However, the samples with or without participation in additional learning activities of information technology have significant differences in students' information literacy, students' information learning ability, and their perception of information teaching environment. For students' information literacy, the level of significance was 0.05 ($t = -2.219$, $P = 0.029$), and the mean value of no (3.44) was significantly lower than that of yes (4.00). For students' information learning ability, it showed a 0.01 significance level ($t = -2.645$, $P = 0.010$), and the mean value of no (3.35) was significantly lower than the mean value of yes (4.11). For the perception of information teaching environment, there was a 0.05 significance level ($t = -2.550$, $P = 0.013$), and the mean value of no (3.10) was significantly lower than the mean value of yes (3.62).

Table 2. Difference test of whether they have participated in additional learning activities of information technology

	Participation in any additional learning activities related to IT (e.g. robotics, programming extracurricular learning groups, etc.) (mean \pm standard deviation)		<i>t</i>	<i>P</i>
	No (<i>n</i> = 74)	Yes (<i>n</i> = 8)		
Student information literacy	3.44 \pm 0.65	4.00 \pm 0.90	-2.219	0.029*
Student's information learning ability	3.35 \pm 0.77	4.11 \pm 0.77	-2.645	0.010**
Perception of information-based teaching environment	3.10 \pm 0.55	3.63 \pm 0.53	-2.550	0.013*
Evaluation of teachers' information-based teaching level	3.42 \pm 0.89	4.03 \pm 1.12	-1.797	0.076
Overall perception	1.91 \pm 0.71	1.75 \pm 1.16	0.370	0.721

* $P < 0.05$, ** $P < 0.01$

3.3. Response rate statistics of school information resource demand

The chi-square goodness of fit test was used to analyze whether the proportion of multiple choice options was evenly distributed. In **Table 3**, the goodness of fit test does not show significance ($\chi^2 = 7.473$, $P = 0.058 > 0.05$), which means that the selection ratio of various options is relatively uniform. The current school faces problems such as old equipment, insufficient equipment, and unstable network.

Table 3. Response rate of the main reasons for the unsatisfactory information equipment provided by the school

Item	Response		Penetration rate (<i>n</i> = 32)
	<i>n</i>	Response rate	
Old equipment	17	30.91%	53.13%
Insufficient equipment	16	29.09%	50.00%
Unstable network	17	30.91%	53.13%
Other	5	9.09%	15.63%
Summary	55	100%	171.88%

Note: $\chi^2 = 7.473$, $P = 0.058$ for goodness of fit test

The chi-square goodness of fit test was used to analyze whether the selection ratio distribution of multiple choice options was uniform. In **Table 4**, the goodness of fit test showed significance ($\chi^2 = 57.822$, $P = 0.000 < 0.05$), which means that the selection ratio of each item was significantly different, and the difference could be compared by response rate or popularity rate. Specifically, the response rate and penetration rate of adding information technology courses, carrying out information technology training, and providing more online learning resources are significantly higher.

Table 4. Response rate of suggestions and expectations for information-based teaching in schools

Item	Response		Penetration rate ($n = 82$)
	n	Response rate	
Adding information technology courses	64	29.91%	78.05%
Offering information technology training	53	24.77%	64.63%
Updating information technology	45	21.03%	54.88%
Providing more online learning resources	52	24.30%	63.41%
Other	0	0.00%	0.00%
Summary	214	100%	260.98%

Note: $\chi^2 = 57.822$, $P = 0.000$ for goodness of fit test

4. Discussion

4.1. The differentiation of information-based education level caused by gender factors

Based on the questionnaire survey data, the average value of male students is significantly higher than that of female students in three dimensions: students' information-based learning ability, perception of information-based teaching environment, and evaluation of teachers' information-based teaching level. According to the analysis of previous literature, the usage behavior of male students in computer network technology and information communication is significantly higher than that of female students. Male students have a higher sense of self-efficacy than female students in using information technology. They have higher self-confidence and believe that they can better master this technology. They are also more inclined to apply the technology skills they have learned in real life ^[9].

Specifically, male students master new information technology skills in a shorter time and apply them to their learning practices. In perceiving the information-based teaching environment, male students are more sensitive to its impact and make full use of these resources to improve their learning results. Girls, on the other hand, have little contact with resources in the information-based teaching environment, which affects their positive perception of the teaching environment. In the teaching process, teachers usually adopt unified teaching methods and content. Boys may be more interested in programming content with strong logical thinking, while girls may be better at understanding and using images and words, resulting in the differentiation of girls' and boys' information-based education levels.

These differences indicate that in the current county informatization education, the design of teaching content and teaching methods may not fully consider the gender characteristics and learning needs of male and female students. This puts female students in a relatively inferior position in some aspects of informatization education to a certain extent and thus has an impact on the overall improvement of their information literacy

and comprehensive ability.

4.2. The influence of additional information technology learning activities on students' information literacy

The degree of participation in additional learning activities of information technology plays a key role in the improvement of students' information literacy. However, the results of the questionnaire survey show that only about one-tenth of the students have participated in additional IT learning. Specifically, students with additional IT learning experience are more accurate in information acquisition, screening, and use, and are more proficient in using a variety of IT tools to carry out independent learning. At the same time, they can better adapt to and make use of various resources and facilities in the information-based teaching environment. However, students who have not participated in additional information technology learning activities are often in a relatively backward position in information literacy, information learning ability, and perception of information teaching environment.

At present, there are some problems in the high school information technology curriculum, such as the lack of pertinence in teaching design and the disconnection between students' knowledge forgetting and learning. The pertinence of teaching should be improved, and the sustainability of information technology application should be ensured ^[10]. Additional information technology learning activities, such as programming competitions and information technology clubs, provide more practical opportunities for students, stimulate students' interest in information technology, promote students to apply what they have learned to practical situations, and cultivate students' problem-solving ability and innovative thinking.

It can be seen that it is difficult to fully meet the needs of students to improve information literacy only by relying on conventional information education and teaching in the county, and students' lack of awareness to actively participate in additional information technology learning activities greatly limits the development space of some students in the field of information education.

4.3. Students' demand for information-based education resources and teaching methods

Diversified and interactive teaching methods can stimulate high school students' interests and enhance class participation. Through the questionnaire survey, it is found that county high school students have a high demand for increasing information technology courses, carrying out information technology training, and providing more online learning resources. At the same time, students also have high expectations for innovative and interactive teaching methods, which will help students deepen their understanding of knowledge in exchanges and cooperation.

This reflects the current county high school information education in the provision of resources and equipment and teaching mode. However, there are certain deficiencies that cannot fully meet the learning needs of students. Currently, there are hardware problems, including old equipment and insufficient equipment in county high schools, as well as scarce online learning resources. In addition, there are still some problems in the training of teachers' informatization level, such as lack of pertinence and some teachers' reluctance to update their teaching skills. As a result, teachers are not skilled enough in the use of informatization teaching tools and cannot use online teaching software smoothly, which affects the online teacher-student interaction, teaching effect, and student experience ^[11].

5. Countermeasures and suggestions

5.1. Gender-specific design of information education

Information-based education is an indispensable part of the current new teaching methods. According to the data, the use behavior and self-efficacy of boys in information-based education are significantly higher than that of girls. It is true that gender differences exist in information-based education, which will affect the quality of information-based teaching ^[12]. Therefore, it is extremely important to carry out gender-specific education, and education departments should encourage schools and teachers to design different teaching contents and methods according to students' gender characteristics and learning needs. For boys, programming content with strong logical thinking can be added to meet their interest and needs in information technology. For girls, more content related to images and word processing can be introduced to give full play to their advantages in understanding and using images and words. A hierarchical and diversified teaching model can also be built to help teachers better teach students according to their aptitude, break the gender barrier, give lessons according to different levels of students, and rationally allocate resources, so as to enhance the actual effect of information-based education ^[13].

In addition, since girls are in a relatively inferior position in some aspects of information education, enhancing girls' sense of information technology self-efficacy is also a critical part. Teachers can encourage, praise, and provide specific learning guidance to help girls enhance their confidence in learning information technology. At the school level, IT-related competitions and activities can be organized to encourage girls' active participation in order to enhance their interest in and mastery of IT. Gender equality of information education resources should be ensured to avoid the influence of gender bias and stereotypes. At the same time, male and female students should be encouraged to participate in information technology learning and practice activities to promote their mutual understanding and cooperation.

5.2. Emphasizing the consistency in the construction and use of information-based education

Compared with conventional information education and teaching, additional information technology learning has a more far-reaching impact on the development of students' information ability. Information-based education should not only be a good information-based classroom, but the integration of subsequent educational resources and educational content is the key ^[13]. The government and education departments should increase the investment in the information-based education of county high schools and improve the hardware conditions of schools. The number of equipment should be updated and increased to ensure that students have full access to and use of information-based education resources. Schools should also change their ideas, build an information-based education system, utilize hardware facilities, and increase the frequency of use. Schools should optimize the teaching design of information technology courses to ensure that the teaching content is in line with students' actual needs and interests. The link between IT courses and practical activities should be strengthened to ensure that students can apply what they have learned in practice and improve their information literacy and practical ability. Through lively and interesting classroom teaching and practical activities, teachers can stimulate students' interest and enthusiasm in information technology, encourage students to actively participate in information technology learning and practical activities, and cultivate their independent learning ability and innovative thinking. It is necessary to integrate information education in the classroom as well as the campus education system.

5.3. Improving the quality of teaching through innovative and interactive teaching models

It is obvious that county high school students have a demand for information-based education. However, due to the lack of information education hardware and online learning resources, the lack of teachers' information level training, and some teachers' resistance to updating teaching skills, etc., the effect of information education and students' experience are affected, leading to challenges in meeting academic needs^[14]. In this regard, schools should actively create opportunities for students to have access to information-based education resources and provide more opportunities for additional learning activities such as information technology competitions and associations, so as to meet students' interest in and demand for information technology and mobilize students' enthusiasm for information-based learning. Training should be conducted for teachers to enrich online learning resources and enhance teaching quality. We should actively develop and introduce high-quality online learning resources to meet the learning needs of students. Teachers are encouraged to adopt innovative and interactive teaching methods, such as flipped classrooms and project-based learning^[15]. Through group cooperation, discussion, and communication, students' interests and participation in learning can be stimulated, improving their learning effect and teamwork ability. Multiple measures should be taken to strengthen the allocation of information education resources and teacher training, so as to stimulate students' interest and comprehensively enhance the quality of information education and students' learning effect in county high schools.

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Xiao L, Zheng Z, Song N, 2023, Review of the Current Situation of Promoting High-Quality Development of Basic Education in Tibet through Education Informatization: Based on the Survey and Analysis of 3134 Teachers' Influencing Factors of Intelligent Education Literacy. *Journal of Tibet University (Social Sciences Edition)*, 38(01): 237–245.
- [2] Gao Y, 2014, Thoughts on Promoting the Construction of County Education Informatization. *Education Theory and Practice*, 34(26): 20–22.
- [3] Li C, Ma J, 2022, Investigation and Research on the Information Technology Teaching Literacy of Rural Preschool Teachers in the Era of Education Informatization 2.0. *Journal of Hebei Normal University (Education Science Edition)*, 24(05): 108–113.
- [4] Meng Y, 2024, Challenges and Countermeasures of Informationized Teaching in Secondary Vocational Schools in Heilongjiang Province. *Adult Education*, 44(08): 80–84.
- [5] Xie X, Guo X, 2024, Pathways for Cultivating Middle School Students' Innovation Ability in the Context of Educational Informatization—Review of “Fundamentals of Computer Application.” *Applied Chemical Industry*, 53(03): 762.
- [6] Bian W, 2023, Application of Modern Educational Technology in Rural Revitalization. *China Fruits*, (12): 141.
- [7] Li H, 2022, Practical Problems and Countermeasures of Informationization in Promoting Rural Education Development. *Educational Research and Experiment*, (06): 92–96.
- [8] Li H, 2017, Research on the Construction of Monitoring and Evaluation Framework for County-level Educational Informatization Development. *China Educational Technology*, (07): 107–114.

- [9] Xue W, 2015, Research on Gender Differences in Educational Technology Use Behavior from the Perspective of Self-Efficacy. *Education Research*, 36(04): 124–128.
- [10] Wei T, 2024, The Impact of High School Information Technology Courses on Students' Information Literacy. *College Entrance Examination*, (31): 54–56.
- [11] Yu J, Yuan S, Zhou X, 2020, Investigation and Research on the Current Situation of Informationization Construction in Regional Primary and Secondary Schools—Taking X City in Hubei Province as an Example. *China Education Informatization*, (09): 82–85.
- [12] Wang J, 2019, The Impact of Gender Differences on College Students' Adaptation to Informationized Teaching—Taking Hubei Normal University as an Example. *Journal of Hubei Normal University (Natural Science Edition)*, 39(02): 90–99.
- [13] Li J, 2024, Promoting County-Level Educational Informatization Construction to Achieve Co-Construction and Sharing of High-Quality Educational Resources. *Shanxi Education (Management)*, (12): 6–7.
- [14] Zhang Y, 2024, Exploration of Innovative Paths for County-Level Educational Informatization Construction under the Background of Rural Revitalization. *Jilin Education*, (33): 5–7.
- [15] Rao A, Wan K, Ren Y, 2019, Strategies for the Development of County-Level Basic Education Informatization from the Perspective of High-Quality and Balanced Development. *China Educational Technology*, (08): 37–43.

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