



# Research on Optimization Strategies of Intelligent Education Literacy of Higher Vocational Teachers under the Perspective of Big Data

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**Abstract.** Nowadays, with the rapid growth of Big Data (BD) and Artificial intelligence (AI) technology, promoting Higher Vocational Education (HVEd) informatization work has already become an essential aspect of education reform, and the acceleration of the informatization process in various industries has resulted in a higher demand for Intelligent Education Literacy (IEdL) of practitioners. Higher Vocational Teachers (HVT) is an important part of the education reform in China. Higher Vocational Teachers (HVT) is the main force of talent training in Higher Vocational School (HVS) and is the core force to guarantee the high-quality development of HVS. Thus, this study explores the current level of IEdL of HVTs as well as the potential problems. Optimization improvement of the IEdL training system to enhance the IEdL of HVTs from different dimensions is finally proposed.

**Keywords:** Higher Vocational Teachers, Intelligent Education Literacy, Big Data

## 1 Introduction

The 21st century is the era of artificial intelligence. Big data, 5G, etc. have become the buzzwords of the moment <sup>[6]</sup>, AI has permeated every aspect of our lives, and digitization and intelligence drive the transformation of higher education to higher quality <sup>[4]</sup>. In the digital era, school education needs to better adapt to the requirements of the digitalization strategy of education and develop students' intellectual literacy <sup>[10]</sup>, and improving teachers' IEdL has become an important direction for future teacher development. Shih P. K. et al. found that significantly associated with students' AIL was their ethical awareness. At the same time, STEM-related courses offered in schools helped some students whose AIL was not high enough to draw their attention to AI ethics. To improve students' AI ethics, teachers themselves need to continuously improve their understanding of the connotations and concepts of AI ethics <sup>[3]</sup>.

Teachers play a leading role in the teacher-student relationship, so the level of teachers' own IEdL plays a key role in students' IEdL [7], students are undeveloped individuals, unique individuals, the development and cultivation of students' abilities need to be flexibly grasped by teachers. Thus, the cultivation of teachers' IEL is crucial to students' IEdL.

This research highlights the optimization path of IEdL for HVTs, aiming to strengthen the HVEd system to meet the country's urgent demand for highly skilled technical personnel. By analyzing the current status and challenges of IEdL for HVTs, this study aims to propose a series of forward-looking strategies aimed at improving the IT integration ability of HVTs, the innovation potential of HVTs, and their overall AIL, an effort that is not only related to the professional development of HVTs, but also has far-reaching significance in fostering a highly AIL student body and promoting educational equity and quality leapfrog. This endeavor is not only about the professional development of individual HVTs, but also has far-reaching implications for fostering a highly AIL student body, promoting educational equity and quality improvement, and is a key step in leading the wave of educational modernization.

## 2 Literature Review

Current research on IEdL has evolved from district-based conceptualization to post-application status surveys. Research on IEdL in China first began in 2019. It has been studied the connotation, content and promotion path of IEdL, which provided a reference for the construction of teacher literacy system. Guo et al. studied the role position of teachers in the intelligence era and IEdL framework.

Previous studies have emphasized that the first thing for teachers is to be familiar with and master the Intelligent Education Knowledge (IEK) and Intelligent Education Capabilities (IEC), to enhance Intelligent Education Awareness (IEA) to assist teaching and management. Secondly, teachers should pay attention to the needs of students in the age of intelligence. Finally, social and emotional learning should be added to the training of teachers to build a clear ethic of intelligence.

These dimensions have been widely publicized in more recent years, in a study by Falloon (2020)<sup>[1]</sup>, it was noted that the current narrow focus of teachers on subject-related IEdL does not adequately equip students with the broad range of knowledge and competencies needed in today's classes and beyond. In a study of elementary and middle school teachers, brought up the importance of Intelligent Education Awareness (IEA) and external support.

It had been argued that teachers' Ethics of Intelligent Education (EIEd) refers to teachers' formation of correct ethical cognition and positive ethical attitudes in intelligent teaching activities, and their ability to become digital citizens ethically involved in teaching and learning activities is a focus that demands greater attention.

The 21st century is the age of intelligence, and the importance of IEdL for teachers is self-evident, but there is a lack of research on this topic for HVT. Therefore, this study is committed to identifying a more popularly accepted model of IEdL through practical investigations, and accordingly conducting empirical investigations and

proposing enhancement strategies for the actual problems of frontline higher vocational teachers.

### 3 Methodology

The content of the scale in this study was selected from the questionnaire "Teacher Intelligent Education Literacy Questionnaire" [8]. The questionnaire mainly explores the internal connection between the dimensions of IEdL, mainly from the four dimensions of Intelligent Education Knowledge (IEK), Intelligent Education Capabilities (IEC), Intelligent Education Awareness (IEA), and Ethics of Intelligent Education (EIEd). The questionnaire took teachers from higher vocational schools in Wenzhou as the research objects, and a total of 320 questionnaires were distributed. After removing invalid questionnaires, 306 valid questionnaires were obtained. SPSS27.0 was used to analyze the data, and Likert 5-point scale was used for scoring.

In this research sample, male teachers accounted for 31.6%, while female teachers accounted for 68.4%. Among them, the number of teachers in the age group of 20-30 years old is the largest, accounting for 38.7%. HVTs from Normal University accounted for 67.2%, while HVTs from Non-Normal University accounted for 32.8%. This data reflects the distribution of students with different educational backgrounds in the teaching team. In terms of teaching subjects, English accounted for the highest proportion of 34.8%. Mathematics followed closely. In terms of teaching grade, the number of HVTs in the first and third grades is relatively large, accounting for 34.8% and 34.3% respectively. The specific content is shown in Table 1.

**Table 1.** Analysis of valid samples.

Variable	Options	Frequency	Percent
Your gender.	Male	129	31.6
	Female	279	68.4
Your age.	20-30 years old	158	38.7
	30-35 years old	109	26.7
	35-40 years old	93	22.8
	45-55 years old	48	11.8
Type of institution you graduated from.	Normal University	274	67.2
	Non-Normal University	134	32.8
Your teaching subject.	Chinese	57	14
	Math	130	31.9
	English	142	34.8
	Music, P.E, Art	37	9.1
	Information Technology	29	7.1
	Others	13	3.2

The grade you teach.	Year 1	142	34.8
	Year 2	126	30.9
	Year 3	140	34.3

When exploring the correlation between multiple dimensions of IEdL, the Pearson correlation coefficient was used for quantitative analysis, and a heat map was used to show the linear correlation strength between different dimensions. (Figure 1) The IEK and IEC was 0.266, which may mean that in some situations, the increase of IEK may increase the correlation with IEC; the IEK and IEA was 0.496, indicating that the increase of IEK has a efficient effect on the improvement of IEA; the IEK and EIED was 0.663, indicating that there is a significant correlation between IEK and EIED, the IEC and IEA was 0.333, that is, the enhancement of IEA It helps to improve IEC; the IEC and EIED is 0.413, that is, the improvement of IEA and the enhancement of EIED are complementary to each other; the IEA and EIED is 0.530, that is, the improvement of IEC is consistent with the enhancement of EIED; the IEA and IEDL is 0.736, which means that the improvement of IEC plays an important role in improving DV-IEdL; the EIED and IEDL is 0.771, emphasizing the key role of EIED in improving DV-IEdL.

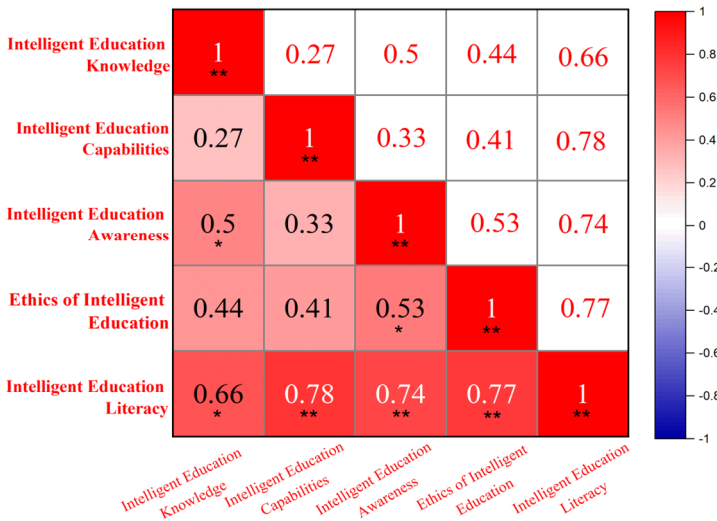


Fig. 1. Pearson correlation coefficient analysis.

Statistical analysis explored the effects of IEK, IEC, IEA, and EIED (Table 2). The model results showed that the overall fit was excellent ( $R^2=0.7922$ ), and there was no multicollinearity problem between the independent variables, thus ensuring the reliability and accuracy of the model results. The model results showed that the overall fit was relatively significant, and there was no serious multicollinearity problem between

the independent variables, thus ensuring the reliability and accuracy of the model results. IEK had a significant positive effect on IEDL ( $\beta=0.459$ ,  $P<0.001$ ), which showed that this variable played an important role in improving IEDL, but the degree of influence was moderate; IEC also had a very significant effect on IEDL, and was positively correlated ( $\beta=0.793$ ,  $P<0.001$ ), and its degree of influence was relatively large, indicating that this variable played a key role in improving IEDL.

IEA also has a significant and positive impact on IEDL ( $\beta=0.882$ ,  $P<0.001$ ), with the largest impact, indicating that this variable has the most important impact on the improvement of IEDL; EIEd also has a significant positive impact on IEDL ( $\beta=0.778$ ,  $P<0.001$ ), and its impact is second only to IEC and IEA, but it is still not negligible. Based on the above analysis, we can derive the following regression equation:

$$DV-IEdL = 4.171 + 0.781IEK + 0.834IEC + 0.928IEA + 0.733EIEd \quad (1)$$

**Table 2.** Analysis of influencing factors of scale data.

Model	Unstandardized Coefficients		Standardized Coefficients	Sig.	Collinearity Statistics
	B	Std. Error	Beta		VIF
(Constant)	4.171	0.357	0	0	
IEK	0.781	0.018	0.459	<.001	1.41
IEC	0.834	0.041	0.793	<.001	1.237
IEA	0.928	0.047	0.882	<.001	1.602
EIEd	0.733	0.032	0.778	<.001	1.596
R Square				0.792	
F				7.622	
P				<.001	

## 4 Discussion

AI brings not only opportunities but also challenges, this study explored the current status of the four core dimensions of Intelligent Educational Literacy in HVT in Wenzhou, analyzed the correlations between them, and established a regression model.

Education is a knowledge field<sup>[2]</sup>, although the impact of IEK is relatively minor, teachers in the era of AI cannot be ignored to improve knowledge literacy, reshape the professional authority of teachers; and change the concept of professional learning and training. The government's document based on intelligent literacy points out that "It is essential to strengthen the idea of educating talent with competence as the priority and concentrate on the evolving requirements of talent training in the new era.", this indicates that teachers should focus on capability training, supplemented by knowledge learning as the basis. Technological innovation in the teaching method of the ever-changing, efficient use to achieve the purpose of education.

HVTs' attitudes and willingness to be aware of IEdL are important factors affecting IEdL<sup>[5]</sup>, and positive attitudes and strong willingness to be aware of IEdL teachers need HVTs to be clear about what is the significance of carrying out the teaching and learning application of AI and to stimulate a positive connection between IEdL and the other dimensions.

The significant positive impact of teachers' IEA calls for attention to its assessment, as HVT needs to focus not only on the knowledge and competencies within ethical literacy to maintain equity and moral dignity in education, but also on intellectual property protection, whose efficient results point to a reduction in teachers' technological stress and job transfer intentions, as well as an increase in the performance of technology-supported teacher jobs.

In conclusion, according to the results of the analysis of the current status quo of the intelligent literacy of higher vocational teachers in Wenzhou, together with previous studies, it is revealed that the overall improvement of the intelligent educational literacy of higher vocational teachers can be effectively promoted by enhancing the intelligent educational knowledge, capabilities, awareness, and ethical dimensions.

## 5 Conclusion

In order to enhance the quality of China's future higher vocational education teaching force as well as to cope with the needs of the future development of informationized teaching integration and innovation, scientific assessment of higher vocational teachers' IEdL and promotion has become an inevitable trend in the present era. This study is of great significance and contributes to promoting the improvement of the IEdL of higher vocational teachers and the modernization of education and teaching. The results of the study are of great significance in guiding actual educational policies and teaching practices. Based on this foundation, future research directions will include combining qualitative research methods, expanding the sample size, and adopting longitudinal research methods. These methods will contribute to the further in-depth understanding of the development trends and influencing factors of intelligent educational literacy among higher education teachers, to better respond to the challenges and opportunities in the field of education.

## References

1. Falloon, G. (2020). From digital literacy to digital competence: the teacher digital competency (TDC) framework. *Educational technology research and development*, 68(5), 2449-2472.
2. Hao & He. (2022). The Game and integration of AI and human intelligence in knowledge production and its enlightenment to education. *Journal of East China Normal University (Education Science Edition)*, 40(9), 78.
3. Laupichler, M. C., Aster, A., Schirch, J., & Raupach, T. (2022). Artificial intelligence literacy in higher and adult education: A scoping literature review. *Computers and Education: Artificial Intelligence*, 3, 100101.

4. Li & Fang. (2019). Investigation on the current application situation of artificial intelligence teaching in university teachers. *China's education informatization*,20.
5. Ng, D. T. K., Su, J., Leung, J. K. L., & Chu, S. K. W. (2023). Artificial intelligence (AI) literacy education in secondary schools: a review. *Interactive Learning Environments*, 1-21.
6. Perchik, J. D., Smith, A. D., Elkassem, A. A., Park, J. M., Rothenberg, S. A., Tanwar, M., ... & Sotoudeh, H. (2023). Artificial intelligence literacy: developing a multi-institutional infrastructure for AI education. *Academic radiology*, 30(7), 1472-1480.
7. Shen, P. (2023). An investigation into the status of primary school teachers' intelligent education literacy and strategies for improvement. (master's thesis, Central China Normal University). Retrieved from <https://link.cnki.net/doi/10.27159/d.cnki.ghzsu.2023.001873>
8. Stolpe, K., & Hallström, J. (2024). Artificial intelligence literacy for technology education. *Computers and Education Open*, 6, 100159.

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