Research on the Effect of Hybrid Training in Enterprises in the Digital Era

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Abstract. The arrival of the digital age forces enterprises to train high-skilled and innovative talents. It is a common training for all kinds of enterprises to adopt information-based blended learning In order to study the effect of enterprise hybrid training in the digital age, the evaluation model of enterprise hybrid training effect in the digital age is constructed from two dimensions of key performance information literacy and digital ability, and the hierarchy is carried out by using YAAHP software The results show that organizational effectiveness, digital technology application ability and integration ability, and digital literacy are the main factors to evaluate the effect of mixed training in enterprises.

Keywords: Hybrid training; questionnaire survey; Analytic Hierarchy Process; YAAHP software

1 Introduction

With the development of Big data, cloud computing, the Internet of Things, blockchain, artificial intelligence, 5G communication and other emerging technologies, the digital era is coming, and the integration of digital technology and the real economy is accelerating. Digital transformation has become the next Grand strategy task of enterprises, especially resource intensive, labor intensive and technology intensive industries. Digital transformation and enterprise hybrid training are mutually reinforcing. In the process of Digital transformation, enterprises need to cultivate and supplement digital talents; Similarly, in the enterprise hybrid training, with the idea of Digital transformation giving birth to new development momentum, it combines digital and enterprise hybrid training, infiltrates digital into enterprise training, and cultivates digital genes from the perspective of people [1]. In the context of the continuous acceleration of enterprise Digital transformation iteration and upgrading, and the increasing improvement of employee capability requirements, enterprise hybrid training has been deepening. Hybrid training not only focuses on effect and experience, but also takes into account the information literacy and digital capabilities acquired by employees under digital training.

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2 Research status

A large number of scholars have conducted research on the theme of blended training in the digital era. Regarding the definition and model of blended training, the research group of Wuhan Training College, Agricultural Bank of China University (2016) has made a dialectical explanation of the definition of blended training. Blended training is not simply a combination of online learning and classroom learning, but an organic, complementary, and promoting combination, emphasizing the guidance of training content for practical work. And propose two training modes: project process mode and center radiation mode [2]. Regarding the role of blended training, Hou Mandan (2018) conducted a questionnaire survey on mathematical modeling competition team members, studied the effectiveness of blended teaching mode, and proposed that this mode can effectively stimulate students' learning interest [3]. With regard to the training links under the hybrid training mode, Ren Xiaoyuan, Wang Zhijun and Wang Shijia (2016) proposed a hybrid training mode based on MOOCs platform, which includes five links, namely, early training, recommendation of MOOCs courses, autonomous learning, centralized face-to-face teaching, assessment and certification, and paid more attention to the link of recommendation of MOOCs courses, so as to ensure the quality of online learning courses [4]. Regarding the application of blended learning, Wei Houqing, Zhang Hao et al. (2021) used the management information course as a case study, analyzed the characteristics of the course, proposed the application of blended learning in management information system courses, built a platform, and conducted online self-learning; Using online interaction to understand students' learning abilities; By avoiding the curriculum, the key and difficult points are targeted; Offline feedback, communication and interaction [5]. Looking at blended training in the digital era, Xu Haijing, Jia Ming, and Qiu Meixin (2022) proposed that the use of digital tools can enhance the personalized learning experience of each employee, optimize learning methods, and ultimately improve school effectiveness when studying the design of blended training for enterprises in the digital era[6]. Luo Haidong and Gao Ruochen (2022) took teachers in ethnic border areas as an example to study the precision training of teachers in the context of Digital transformation, and proposed that the training path should have a perfect digital infrastructure to consolidate the foundation for precision training of digital teachers [7]. Gao Hong, Li Dongchao and Zhang Yuanque (2023) studied the Digital transformation of training and proposed that Digital transformation of training is to use digital technology and digital strategy, reconstruct the organizational business and operation process of training, and improve the performance of training operation, which mainly depends on new technologies and appropriate operation methods to achieve [8].

The above literature explains the definition, mode, advantages and application scenarios of hybrid training, and briefly explains the transformation of enterprise hybrid training in the digital era. However, the research on the evaluation of learning effects of enterprise hybrid training in the digital context is still limited to key performance, and the measurement of information literacy and digital capabilities is relatively lacking. Based on this, this paper takes enterprise trainees as the research object, uses the questionnaire survey method and the analytic hierarchy process, and uses the YAAHP

software to study the learning effect of mixed training employees under the Digital transformation.

3 Model construction and empirical analysis

Based on the current background of digital updates in enterprises, the goal of conducting hybrid training can be summarized in two main aspects: firstly, improving employee performance through information-based and systematic training; The second is to improve the information literacy and digital ability of employees and ensure the sustainable innovative development of enterprises. On this basis, adopting the principle of holism, considering the universality of enterprise training and learning, the dominant position of students in the training process, and referring to the research on blended learning evaluation indicators by Xiong Sujuan (2019) [9] and Liu Yan (2017) [10], the following evaluation indicator system is constructed, as shown in Table 1.

Table 1. Evaluation System for the Learning Effectiveness of Enterprise Blended Training in the Digital Era

Evaluation system for learning effectiveness of blended training in enterprises A		
Primary indicators	Secondary indicators	Explanation of indicators
Learning Completion B	Learning completion B1	Online training content and offline classroom completion rate
	Learning Effect B2	Online training and offline project learning test scores
	Learning Process B3	Participants' initiative in sharing training results and participating in discussions
Training Process C	Learning Interaction C1	The frequency of participants participating in online interactions and answering questions; Offline learning attendance rate
	Exam Pass Rate C2	Completion Exam Pass Rate
	Adverse Event Occurrence Rate C3	The incidence of adverse events (such as withdrawal without reason, disruption of discipline, etc.) during the training process
Technical CapabilitiesD	Technology Integration Capability D1	Integrating information and data using information technology
	Digital Literacy D2	The Use and Understanding of Information in the Digital Age
	Technical Application Ability D3	Use of network collaboration tools and general software
Organizational Effectiveness E	Professional Identity E1	Students establish new career goals and plans in their work, and enhance their sense of identity
	Personal Performance Improvement E2	The proportion of employee performance improvement after training
	Job Satisfaction E3	The job department is satisfied with the work of the trainees participating in the training

After constructing the evaluation indicators, the AHP method is applied to determine the weights of the evaluation indicators. On the basis of establishing an orderly and hierarchical indicator system, the weight coefficients of the indicators are comprehensively calculated by comparing the relative importance of each indicator at the same level. To ensure the scientificity of the weight coefficient, a combined online and online questionnaire distribution was used to collect the indicator questionnaire. A total of 30 questionnaires were distributed, including 18 enterprise employees, accounting for 60%, and 12 university experts. Using the mean of importance assignment to construct a judgment matrix, compare indicators at the same level in pairs and select an appropriate scale, and then form a judgment matrix. In judgment matrix A, aij is the value of the importance pairwise comparison between the i-row indicators and the j-column indicators. The importance scale standards are shown in Table 2.

Table 2. Importance Scale of Analytic Hierarchy Process

Scale aij	Factor i is more than factor j
1	Equally important
3	Slightly important
5	Strongly important
7	Strongly important
9	Extremely important
2、4、6、8	Intermediate value of two adjacent judgments
count backwards	If the importance ratio of element i to element j is aij, then the importance ratio of element j to element i is aji=1/aij

Secondly, the AHP weight calculation process mainly includes:① calculating the product Mi of each row's numerical value in the judgment matrix; ② Calculate the N-th root of Mi; ③ Normalize Wi, where Wi is the weight of the i-th indicator.

When calculating the weight of the judgment matrix, consistency testing is required to determine the logical correctness: ① Calculate the consistency index *CI*,$\mathrm{CI}=\frac{\lambda\max-\mathrm{n}}{\mathrm{n}-1}$ (where λmax is the maximum feature root and n is the number of indicators. When

n≤2, the judgment matrix is completely consistent. When n>2, the ratio of the consistency indicator of the judgment matrix to the average random consistency indicator RI is called the random consistency ratio, which is *CR*).; ②Calculate the random consistency ratio *CR*,$CR=\frac{CI}{RI}$, and when *CR*<0.1, it is considered to have good consistency. The *RI* values are shown in the Table 3 below.

Table 3. Consistency Comparison Table of Judgment Matrix

n	1	2	3	4	5	6	7	8	9
RI	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45

Based on the scores collected from the questionnaire, the following judgment matrices and the weights of each element are calculated, as shown in Tables 4-8. The consistency ratio of all judgment matrices is less than 0.1, which meets the standard.

Table 4. First level indicator judgment matrix

A	B	C	D	E	Wi
B	1	1.5333	0.9667	0.85	0.2021
C	1.4667	1	1.2667	0.9333	0.2163
D	1.8667	1.5667	1	0.5167	0.2151
E	2.8667	2.0667	2.4	1	0.3664

Table 5. Judgment matrix for learning completion

B	B1	B2	B3	Wi
B1	1	2.05	0.4667	0.2758
B2	1.2	1	0.8667	0.2652
B3	2.2	2.4667	1	0.4589

Table 6. Judgment matrix for the training process

C	C1	C2	C3	Wi
C1	1	1.7667	1	0.3076
C2	1.2333	1	1.4	0.3057
C3	1.6667	2.1333	1	0.3867

Table 7. Judgment Matrix of Technical Capability

D	D1	D2	D3	Wi
D1	1	2.9	1.8	0.4491
D2	0.6333	1	0.6833	0.196
D3	1.0333	2.5	1	0.3549

Table 8. Evaluation matrix for organizational effectiveness

E	E1	E2	E3	Wi
E1	1	1.8	1.4667	0.3481
E2	1.0333	1	1.4167	0.289
E3	1.5333	1.95	1	0.3629

Finally, the comprehensive weights and rankings of the evaluation indicators for the learning effectiveness of blended training in enterprises in the digital era are summarized, as shown in Table 9. Among the first level indicators of training effectiveness, ability improvement is the most effective way for enterprises to test training effectiveness, with the highest weight of 0.3661. Among the second level indicators, job satisfaction has the highest weight of 1.33, followed by professional identity and personal performance improvement. This is also the final stage of testing effectiveness and the direct purpose of enterprises conducting training. However, the testing of these three indicators is subjective and long-term, Long observation after training is required to obtain quantitative feedback results. Secondly, there is the improvement of technical ability. After training, the technical integration ability of each employee is the most important evaluation indicator, with a weight of 0.0966, ranking fourth among the secondary indicators. In addition to the above indicators, the learning pro-

cess (0.0928) and incidence of adverse events (0.0836), technical application ability (0.0763), and learning interaction frequency (0.666) are also the main detection indicators, ranking high in weight. Based on the above data analysis, it can be seen that in the digital era, when enterprises carry out blended training and learning, organizational effectiveness and technical ability are the most important factors for verifying the effectiveness.

Table 9. Evaluation system weight and ranking

Primary indicators	Weight	Secondary indicators	Weight	ranking
Learning Completion B	0.2021	Learning completionB1	0.0558	10
		Learning Effect B2	0.0536	11
		Learning Process B3	0.0928	5
Training Process C	0.2163	Learning Interaction C1	0.0666	8
		Exam Pass Rate C2	0.0661	9
		Adverse Event Occurrence Rate C3	0.0836	6
Technical Capabilities D	0.2152	Technology Integration Capability D1	0.0966	4
		Digital Literacy D2	0.0422	12
		Technical Application Ability D3	0.0763	7
Organizational Effectiveness E	0.3664	Professional Identity E1	0.1275	2
		Personal Performance Improvement E2	0.1059	3
		Job Satisfaction E3	0.133	1

4 Conclusion

This paper mainly discusses the training effect of enterprise hybrid training from two dimensions of key performance, information literacy and digital ability in the digital era, using questionnaires and analytic hierarchy process, and YAAHP software. The research results show that in the digital era, the evaluation of enterprise hybrid training still focuses on organizational effectiveness, namely, job satisfaction, professional identity and personal performance improvement, while the importance of digital technology application ability and integration ability is in the middle position, while digital literacy is still in the primary stage due to Digital transformation, ranking lower in importance.

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