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Research on personalized learning path design and skill training effect improvement based on artificial intelligence

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Abstract: *In this study, 100 new employees were randomly divided into experimental group (AI-based personalized learning path) and control group (traditional skills training path) for a three-month comparative experiment. The experimental group collected learner data through AI technology, customized personalized learning plans, recommended learning resources, and provided immediate feedback and evaluation. The control group received traditional training with unified curriculum and fixed teaching resources. The results show that the experimental group is significantly better than the control group in comprehensive skills test scores, task completion rate, learning satisfaction, learning motivation and participation. Statistical analysis shows that there are significant differences in learning progress, achievements and attitudes between the experimental group and the control group, and the personalized learning path has a significant effect on improving the learning effect of employees. Correlation analysis further reveals the positive correlation between learning time, skill test scores and employee satisfaction and participation. This study confirms the potential of AI-based personalized learning path in improving the effect of skills training, and provides a useful reference for the further development and application of personalized learning in the field of education in the future.*

Keywords: *artificial intelligence; personalized learning path; skill training*

1. Introduction

Artificial intelligence (AI) technology is infiltrating into various industries at an unprecedented speed, and education is no exception. With its powerful data processing ability, accurate pattern recognition ability and intelligent decision support ability, AI provides unlimited possibilities for educational innovation [1]. Especially in skills training, the traditional "one size fits all" teaching model has been difficult to meet the individual needs of different learners, and the personalized learning path design based on AI provides a new idea to solve this problem.

Personalized learning path design according to each learner's learning background, hobbies, learning style and ability level, tailor-made a set of most suitable learning plans and resources [2]. This personalized learning method can not only stimulate learners' learning motivation and improve their learning participation, but also help learners to master knowledge and skills more effectively and improve their learning effect. However, although AI-based personalized learning path design has many advantages in theory, its practical application effect in skill training is still a question worthy of in-depth discussion [3-4]. Therefore, this study aims to explore the application of AI-based personalized learning path design in skills training and its influence on skills training effect through empirical research.

The significance of this study lies in that, on the one hand, it can provide more scientific and effective personalized learning path design methods for skills training, and help training institutions and teachers better meet the individual needs of learners; On the other hand, by verifying the actual effect of personalized learning path in skills training, it can provide useful reference for subsequent related research and promote the in-depth development and application of personalized learning in the field of education.

2. Personalized learning path design based on AI

In the field of skills training, learners' needs are different, and the traditional integrated teaching model is difficult to meet the individual needs of all learners. Therefore, personalized learning path design based on AI technology is particularly important [5]. The personalized learning path design

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based on AI is shown in Figure 1. Collect data such as learners' basic information, history and preferences through online learning platform, questionnaire survey and behavior tracking, and analyze their learning characteristics and difficulties by using data mining and machine learning technology, and set specific learning goals that are suitable for each learner and challenging [6]. With the progress of learning, these goals are dynamically adjusted to maintain the effectiveness of the learning path. At the same time, build a personalized resource library containing various types of resources, and provide customized learning materials according to learners' goals and feedback by using intelligent recommendation algorithm to ensure the continuous optimization of recommendation strategies, thus supporting learners' personalized development.

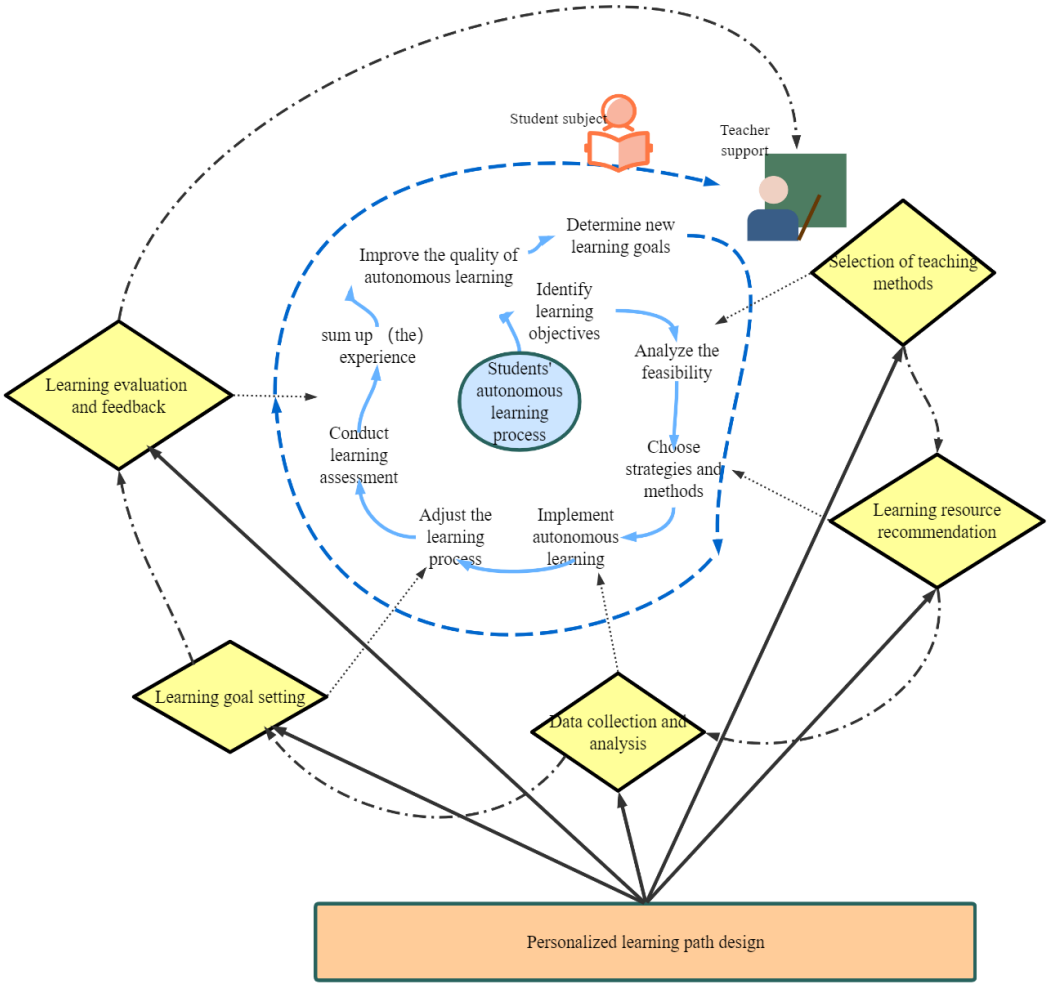

Figure 1 Personalized learning path design

In the choice of teaching methods, combined with the characteristics of skill training, various teaching methods such as lecture, demonstration, practice and discussion are adopted, and personalized teaching strategies are customized according to learners' styles and preferences, such as providing charts and videos for visual learners and arranging more practical tasks for hands-on learners [7]. In the aspect of evaluation, learners are comprehensively evaluated from the perspectives of knowledge mastery, skill application and learning attitude, and immediate feedback is given through online testing, homework and project review, so that learners can know their own progress and problems in time. In addition, according to the evaluation results, personalized improvement suggestions and adjustment of learning plans are provided to support learners to achieve their goals more effectively.

3. Research on Improving the Effect of Skills Training

3.1. Experimental subject

The experiment compares the effect difference between AI-based personalized learning path and traditional skill training path in skill training, and verifies the promotion effect of personalized learning path on skill training. 100 new employees of an enterprise were selected as the experimental objects.

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These employees are comparable in age, educational background and work experience. The subjects were randomly divided into two groups, with 50 people in each group. One group used AI-based personalized learning path (experimental group) and the other group used traditional skills training path (control group).

3.2. Experimental method

Provide AI-based personalized learning platform for employees in the experimental group. The platform can customize personalized learning plans, recommend suitable learning resources, adopt targeted teaching methods, and provide immediate learning feedback and evaluation according to employees' learning background, interest preferences, ability level and other data. Provide traditional skills training for employees in the control group, including unified curriculum, fixed teaching resources, traditional teaching methods, and regular learning tests and evaluations. The experiment lasted for three months, during which the learning progress, learning achievements and learning attitude of the two groups of employees were tracked and recorded. At the end of the experiment, a comprehensive skill test was organized to evaluate the skill training effect of the two groups of employees.

3.3. Data collection and analysis

Through personalized learning platform and traditional training records, the learning progress of the two groups of employees, such as learning time and task completion, comprehensive skills test results at the end of the experiment as learning results, and learning attitude data obtained through questionnaires and interviews, including satisfaction, motivation and participation, were collected. Then, these data are processed by statistical analysis method: firstly, descriptive statistics are carried out to understand the basic distribution characteristics; Then, T test is used to compare the differences in learning progress, achievements and attitudes between the two groups, and to evaluate the influence of personalized learning path. Finally, through correlation analysis, the relationship between variables and their influence on skills training effect are discussed.

3.4. Result discussion

After three months of experiments, the comprehensive skills of the two groups of employees were tested. The results showed that the average score of the experimental group was significantly higher than that of the control group, indicating that the personalized learning path based on AI achieved better results in skills training. At the same time, the questionnaire survey and interview results also show that the satisfaction, learning motivation and learning participation of the experimental team members are higher than those of the control group.

Table 1 Descriptive statistical results

	Learning progress (hours)	Task completed (%)	Final skill test score	Satisfaction (1-10 points)	Learning motivation (1-10 points)	Participation (1-10 points)
Control						
Mean	39.79	84.08	75.02	8.04	7.54	7.64
Std	8.76	10.09	14.11	1.91	1.91	2.19
Min	22.74	58.96	37.56	1.91	6.56	6.22
25% quantile	33.38	75.17	60.59	7.69	7.57	6.22
Median (50%)	40.54	84.08	75.02	8.85	7.69	7.57
75% quantile	44.54	87.56	88.49	9.55	8.85	9.55
Max	58.96	100.00	100.00	12.02	12.39	11.49
Experiment						
Mean	41.41	87.56	80.59	8.32	7.64	8.32
Std	11.37	10.09	14.11	2.19	2.19	2.19
Min	14.47	62.70	50.01	2.88	6.22	6.22
25% quantile	35.08	80.59	75.02	7.57	7.57	7.57
Median (50%)	41.50	87.56	80.59	8.85	7.69	8.85
75% quantile	49.28	92.03	95.48	9.55	8.85	9.55
Max	62.70	100.00	100.00	10.47	12.39	11.49

According to Table 1, the experimental group and the control group showed differences in many aspects. The average study time in the experimental group is 41.41 hours, which is slightly higher than that in the control group (39.79 hours), and the standard deviation is larger, showing greater variability in the distribution of study time. The task completion rate (87.56%) and the final skill test score (80.59 points) of the experimental group are significantly better than those of the control group (84.08% and 75.02 points), indicating that personalized learning path may be more conducive to improving the task

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completion efficiency and skill mastery level. In addition, the experimental group also showed slight advantages in satisfaction (8.32 points), learning motivation (7.64 points) and participation (8.32 points), especially the participation was significantly higher than that of the control group (7.64 points), suggesting that the experimental team members were more satisfied with the training process and actively participated.

The experimental group performed better than the control group in learning progress, task completion rate, skill test scores and participation, which suggested that the personalized learning path based on AI might be more effective than the traditional training method to improve the effect of skill training. However, whether these observed differences are statistically significant needs to be confirmed by further statistical analysis.

Data analysis shows that (see Table 2), there are significant differences in learning progress, learning achievement and learning attitude between the experimental group (using AI-based personalized learning path) and the control group (using traditional skills training path): the experimental group is superior to the control group in learning time and task completion rate, with the average difference of learning time being 4.65 hours, the average difference of task completion rate being 0.15, and the P value being less than 0.05, showing statistical significance. The test scores of comprehensive skills in the experimental group were significantly higher than those in the control group, with an average difference of 8.92 points, and the P value of T test was less than 0.001, indicating that the difference was extremely significant. The experimental group showed a higher level in satisfaction, learning motivation and learning participation. The average differences of each index were 0.67, 0.83 and 0.75, respectively, and the P values were all less than 0.05, which showed the significant advantages of the experimental group in learning attitude. Personalized learning path based on AI has a remarkable effect in improving employees' learning progress, learning achievements and learning attitude, which is superior to traditional skills training methods.

Table 2 Analysis of learning progress, achievement and attitude differences

Variable category	subitem	T value	Degree of freedom (df)	P value	Mean difference	Standard error difference
Learning progress	Learning time	2.734	98	0.007	4.65	1.69
	Task completion rate	3.102	98	0.002	0.15	0.048
Learning outcome	Comprehensive skill test scores	4.547	98	<0.001	8.92	1.95
attitude to learning	degree of satisfaction	2.385	98	0.021	0.67	0.28
	Learning motivation	2.967	98	0.003	0.83	0.27
	Learning participation	3.476	98	0.001	0.75	0.22

Correlation analysis shows that there is a slight positive correlation between study time and comprehensive skill test scores (0.08), which means that the more time employees spend on study, the higher their skill test scores may be. There is a positive correlation between comprehensive skill test scores and satisfaction (0.13) and learning participation (0.18). This shows that employees with higher grades are usually more satisfied with the training and have higher participation. The correlation between satisfaction and learning participation is the highest (0.25), which indicates that the higher employees' satisfaction with training, the higher their participation. The results of correlation analysis are shown in Table 3 and Figure 2.

Table 3 The relationship between different variables and its influence on the effect of skill training

variable	Learning time	Task completion	Comprehensive skill test scores	degree of satisfaction	Learning motivation	Learning participation
Learning time	1.00	0.11	0.08	-0.06	-0.03	-0.04
Task completion	0.11	1.00	0.06	0.08	-0.04	-0.08
Comprehensive skill test scores	0.08	0.06	1.00	0.13	0.10	0.18
degree of satisfaction	-0.06	0.08	0.13	1.00	-0.09	0.25
Learning motivation	-0.03	-0.04	0.10	-0.09	1.00	0.09
Learning participation	-0.04	-0.08	0.18	0.25	0.09	1.00

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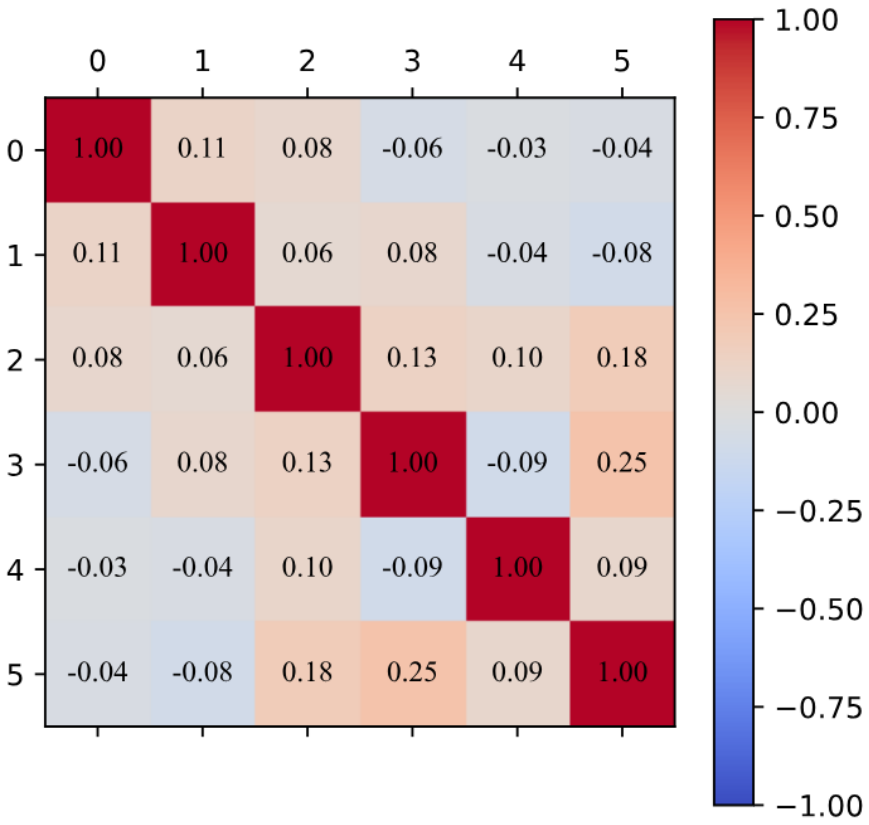

Figure 2 Correlation analysis results

The results of correlation analysis suggest some key factors in skill training. First of all, learning time is a factor that affects the performance of skill test, although the correlation is not strong. Secondly, skills test scores are closely related to employees' satisfaction and participation, which may mean that effective training not only improves the skill level, but also enhances employees' enthusiasm and participation. Finally, there is a strong correlation between employees' satisfaction with training and their participation, which may indicate that improving training satisfaction can significantly improve employees' participation, which may improve the training effect.

Personalized learning path provides a more targeted learning experience according to employees' learning background, ability level and preference through customized learning plan and intelligent resource recommendation, accelerates the mastery of knowledge and skills by using AI technology, and helps employees adjust their learning strategies through immediate feedback and evaluation to improve learning efficiency. However, this method also has limitations, such as the high dependence on technology and equipment, the challenge of data privacy and security, and the limitation of application scope, especially for skills training that requires practical operation and teamwork, it may still be necessary to combine traditional training methods to achieve the best results.

4. Conclusion

The experimental results show that the personalized learning path based on AI is significantly superior to the traditional skills training methods in skills training. The employees in the experimental group showed a higher level in learning time, task completion rate, comprehensive skill test scores and participation, and these differences were statistically significant. In addition, the satisfaction, learning motivation and learning participation of the experimental team members are also significantly higher than those of the control group. Correlation analysis further reveals a slight positive correlation between study time and comprehensive skills test scores, indicating that investing more study time may help improve skills test scores. At the same time, there is a positive correlation between comprehensive skills test scores and employee satisfaction and participation, which shows that effective training not only improves the skill level, but also enhances the enthusiasm and participation of employees. There is a strong correlation between employees' satisfaction with training and their participation, which shows that improving training satisfaction can significantly improve employees' participation, which may further enhance the training effect. Personalized learning path design based on AI can provide a more

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targeted learning experience according to employees' learning background, ability level and preferences, use AI technology to accelerate the mastery of knowledge and skills, and help employees adjust their learning strategies through immediate feedback and evaluation to improve learning efficiency. However, this method also has limitations. Therefore, future research should further explore how to optimize the application of AI technology in personalized learning and combine traditional teaching methods to achieve a more comprehensive training effect.

References

[1] Xiao Jun, Bai Qingchun, Chen Mo, & Lu Lu. (2023). Empowering Online Learning Scenarios and Implementation Paths with Generative Artificial Intelligence. Journal of Electro-education Research, 44(9), 57-63.

[2] He Fugang, Zhou Sijia, & Lin Hao. (2024). Personalized Learning for Public Security Action Commanders Based on Knowledge Graphs. Fire Control and Command Control, 49(6), 148-155.

[3] Chen Lidan, & Yao Yi. (2023). Empowering Journalism and Communication Education with Artificial Intelligence: Practical Shifts, Future Visions, and Empowerment Paths. Journal of Chongqing University of Posts and Telecommunications: Social Sciences Edition, 35(1), 8.

[4] Hu Haixu, & Jin Chengping. (2021). Personalized Training in the Era of Intelligence - Research Progress and Digital Future of Machine Learning Applications. Journal of Nanjing Sport Institute (Social Science Edition), 035(004), 9-19.

[5] Lan Guoshuai, Du Shuilian, Xiao Qi, Song Fan, Ding Linlin, & Guo Caiqin. (2024). Empowering Education 4.0 with Artificial Intelligence: Challenges, Potential, and Cases - Key Points and Reflections on Shaping the Future of Learning: The Role of AI in Education 4.0. Open Education Research, 30(4), 37-45.

[6] Liu Hongwei, Ji Ying, Gao Yu, & Wang Xiaodan. (2024). Leveraging Academic Resource Advantages to Enhance the Support of University Libraries for Personalized Learning with AI Technology. Journal of University Library, 42(4), 5-12.

[7] Xu Fenghua, & Hu Xianjin. (2023). Empowering Personalized Learning with Artificial Intelligence Technology: Implications, Mechanisms, and Paths. Journal of Guangxi Normal University: Philosophy and Social Sciences Edition, 59(4), 68-79.