



## Application Effect of Four-Subjects and Four-Dimensions Evaluation System in the Classroom Teaching of Geriatric Nursing

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**Abstract:** Geriatric nursing is the main course for cultivating elderly nursing talents. The teaching quality of geriatric nursing is the key element of training elderly nursing talents. Therefore, it is of great significance to improve the classroom teaching quality of geriatric nursing. The purpose of this study is to construct a four-subject and four-dimension evaluation system and explore its application effect in geriatric nursing teaching. From February 2022 to July 2022, an experimental study was conducted on 185 sophomore nursing students from Zaozhuang Vocational College. The experimental group adopted the four-subject and four-dimension evaluation system, while the control group adopted the summative evaluation method. The study found that the scores of the experimental group were higher than those of the control group ( $P < 0.05$ ). In addition, the academic evaluation of the experimental group was significantly improved ( $P < 0.05$ ). The results show that the application of four subjects and four dimensions evaluation system in geriatric nursing teaching is conducive to improving students' learning effect and comprehensive ability.

**Keywords:** Four-subject and Four-dimension Evaluation System, Geriatric nursing; Classroom Teaching

### Introduction

In China, "the Overall Plan for Deepening the Reform of Educational Evaluation in the New Era" [1] points out that we should start from the systematic provisions and structural elements of the reform of educational evaluation, and promote the establishment of a scientific educational evaluation mechanism in line with the requirements of The Times. However, restricted by its own development stage and the demand for high-quality social talents, the teaching evaluation system of higher vocational colleges still has some problems, such as paying too much attention to the quality of results, weakening the evaluation process, and less evaluation subject and dimension. Therefore, from the perspective of the long-term goal of talent training and the practical needs of teaching evaluation, an evaluation system that attaches importance to the process, evaluation subject and evaluation dimension diversification and conforms to the post needs should be constructed and applied to teaching practice, so as to stimulate students' interest in learning, optimize learning motivation, promote students to adhere to independent learning, strengthen the development of team cooperation, innovative thinking and other comprehensive abilities.

Geriatric Nursing is the core course of nursing major in vocational colleges, which is mainly a subject of nursing for the aged group. However, traditional geriatric nursing teaching ignores the principal position of students and restricts the development of their autonomous learning ability [2]. Teacher-led classroom teaching, on the other hand, pays more attention to knowledge indoctrination. Although it maximizes the output of knowledge, it ignores the reception of students and the cultivation of practical ability [3, 4]. The new teaching model pays more attention to students' learning process and harvest in the process. In combination with this feature, the method combining multiple evaluation subjects, multiple evaluation methods and multi-dimensional evaluation index system is adopted to evaluate students' studies, which is of great significance to improve the teaching effect under this model and the incentive effect of evaluation [5]. The four-subject and four-dimension evaluation system is based on the theories of constructivism, postmodernism and multiple intelligentism, combined with the learning situation analysis and the law of professional cognition. It adopts the "four" evaluation subjects of teachers, students, geriatric-nursing experts and teaching platform, emphasizing the integration of subjective evaluation and objective evaluation. The teaching is guided by the four dimensions of theoretical achievement assessment, practical assessment, comprehensive application evaluation and qualification certificate assessment to form a more effective teaching process. Therefore, this study constructed a four-subject and four-dimension evaluation system and applied it to the geriatric nursing teaching practice, in order to stimulate students' interest in learning, optimize learning motivation, promote students to adhere to independent learning, strengthen teamwork, innovative thinking and practice and other comprehensive abilities.

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## Literature Review

### (1) Development status of foreign vocational education teaching evaluation system

From the perspective of the world, many countries have accumulated rich experience in the process of vocational education development, and formulated corresponding vocational education evaluation system according to the actual situation of each country. German vocational education adopts dual system, which is a model of school-enterprise cooperation. German vocational education evaluation adopts a pluralistic system. The subjects involved in the evaluation include the federal government and state government education departments, third-party intermediary certification agencies, trade associations, schools, enterprises, etc. All parties express their demands according to their own rights and interests to ensure the fairness of the evaluation. Various forms of evaluation, including school self-evaluation, education department evaluation, third-party evaluation, etc., ensure the fairness of evaluation<sup>[6]</sup>. American vocational education evaluation system is designed based on the characteristics of the socialization and marketization of vocational education. In accordance with the American legal system and educational certification system, the vocational education evaluation is mainly dominated by non-profit certification committees and civil organizations, reflecting the social participation, fairness and objectivity of vocational education evaluation<sup>[7]</sup>. Finland is also a strong country in vocational education. Its assessment pays more attention to the assessment of vocational skills and learning results, and emphasizes the orientation of national core curriculum, vocational skills demonstration and vocational qualification requirements. We will establish a dialogue mechanism between the fields of education and work, emphasizing the combination of vocational education and work. The form of assessment is mainly to collect the information of vocational skills display, pay attention to the difference of occupational types and the ability to master vocational skills. Quality assessment is mainly based on vocational qualification ability examination, and combines "competence-oriented vocational qualification system" with traditional "academic qualification system", emphasizing the evaluation of students' vocational skills and vocational qualification ability<sup>[8]</sup>. As mentioned above, German, American, and Finnish vocational education evaluation is based on school-enterprise cooperation, adhere to the diversified direction, and pay attention to the learning process and the evaluation of students' vocational ability. These experiences provide important references for the reform of our higher vocational education evaluation system.

### (2) Development status of China's vocational education teaching evaluation system

The start of our higher vocational education is later than the developed countries, and the development is not perfect, there are some problems. For example, the evaluation content is mainly aimed at the school-running ability, the condition of teachers and the quality of teaching, etc., and there is a lack of evaluation means for students' vocational ability<sup>[7]</sup>. The evaluation method is simple, lack of diversification and hierarchical evaluation, basically evaluates all types of vocational colleges on the same scale, can not reflect the type characteristics of vocational colleges. In recent years, many Chinese scholars have explored the outstanding problems in the reform of vocational education evaluation. Gong Yun<sup>[9]</sup> believes that the evaluation system of "multi-party collaborative platform + mechanism" should be built based on the quality evaluation of the tripartite collaboration among industries, enterprises and universities. Adopt "teachers and students evaluation, employers evaluation, social peer evaluation". Gong Fanghong et al.<sup>[10]</sup> emphasized the value-added of vocational ability, realizing the value-added significance of evaluation from the aspects of vertical development, vocational interest and vocational ability cultivation. Zhou Jiansong<sup>[11]</sup> believes that the urgent task is to establish a scientific evaluation view highlighting the type attributes of higher vocational education, innovate the evaluation system, carry out diversified and multi-level classification evaluation, and gradually build an evaluation system based on the characteristics of vocational education, so as to improve the education quality of higher vocational colleges and realize the sustainable development of high-level vocational colleges. Generally speaking, Chinese vocational colleges have entered the stage of exploring personalized evaluation system according to specialty characteristics and curriculum needs.

### (3) Reform of geriatric nursing teaching evaluation system

A search on CNKI found six articles containing the words "geriatric nursing" and "evaluation system". Among them, two studies by Deng Ying (2017) and Yang Xiaoli (2017) both focused on the application of formative evaluation system in geriatric nursing, with fewer evaluation subjects and dimensions. The third paper focuses on the construction of multiple assessment and evaluation system, which only focuses on the diversity of evaluation dimensions and evaluation in the classroom teaching process, ignoring the diversity of evaluation subjects. The other three studies are all about the reform of teaching model and teaching process. At present, no scholars have carried out the comprehensive reform of the geriatric nursing teaching evaluation system from the comprehensive level of multi-evaluation subject, multi-evaluation dimension and the combination of evaluation system throughout the learning process.

## Description of the Study Area and Research Subjects

This study was conducted in Zaozhuang, Shandong Province. The subjects of study were the sophomore nursing major students in higher vocational college.

In this study, a total of 185 students from 4 classes of nursing major of Grade 2021 in the Medical Department of Zaozhuang Vocational College were selected by convenient sampling method, among which 30 were male and 155 were female. Age 18-20 years old. Then 2 classes were randomly selected from the 4 classes as the experimental group,

with a total of 93 people, including 13 males and 80 females; The other two classes served as the control group, with a total of 92 students, including 17 males and 75 females. There was no statistically significant difference between the experimental group and the control group in the baseline aspects of educational background, gender, age, race, and other aspects ( $P>0.05$ ). The geriatric nursing course is carried out in the fourth semester, including 36 periods of teaching (24 periods of theoretical teaching and 8 periods of practical teaching) and 1 week of comprehensive practice. The selected textbooks are Geriatrics Nursing, 4th edition (People's Medical Publishing Press). The final examination adopts the separation of teaching and examination, and the examination questions are extracted from the item pool by the educational administration department.

### Selection methods

Both groups of students organized teaching according to PDCA cycle teaching quality management model. The experimental group adopted a four-subject and four-dimension evaluation system to evaluate students' learning, which mainly included learning platform evaluation, inter-student evaluation, student self-evaluation, teacher evaluation and geriatric nursing expert evaluation. 30% of the total grade in geriatric nursing is derived from the pre-class stage, including videos, animation resources (10%), online tests (10%), and online topic discussions (10%). 30% of the total grade in geriatric nursing is derived from the mid-class stage, including group collaboration (10%), class discussion (10%), and presentation of results (10%). 40% of the total grade in geriatric nursing is derived from the post-class stage, including knowledge mastery (5%), knowledge expansion (5%), final examination score (10%), "1+X" elderly care certificate exercise test (5%), comprehensive practical skills display (10%), "1+X" elderly care certificate acquisition rate (5%). In the control group, the students' learning was evaluated by the final evaluation method, which was completed by the teachers. The total score of geriatric nursing included the usual test (20%), chapter test (40%) and final exam (20%). Both groups of students were required to conduct academic self-evaluation.

### The research methods were implemented as follows:

#### (1) The construction of four - subject and four - dimension evaluation system

The four-subject and four-dimension evaluation system uses teachers, students, geriatric nursing experts and teaching platform "four evaluation subjects", emphasizing the integration of subjective evaluation and objective evaluation. The teaching process adopts four evaluation dimensions: theoretical achievement assessment, practical assessment, comprehensive application assessment and qualification certificate assessment.

**Dimension 1:** Theoretical achievement evaluation, including online test in the pre-class stage and final examination in the post-class stage.

**Dimension 2:** Practical assessment, including presentation of results in the mid-class stage and comprehensive practical skills display in the post-class stage.

**Dimension 3:** Comprehensive application evaluation, including video and animation resources in the pre-class stage; Group collaboration and class discussion in the mid-class stage; Knowledge mastery (knowledge mind map) and knowledge expansion (health education poster) in the post-class stage.

**Dimension 4:** Qualification certificate evaluation, including the "1+X" elderly care certificate exercise test and the "1+X" elderly care certificate acquisition rate in the post-class stage.

The main objective of this evaluation system is not only to evaluate students' proficiency in mastering and applying theoretical knowledge, but more importantly, to evaluate students' self-learning effect, ability to analyze and solve problems, enthusiasm and effectiveness of communication and cooperation in classroom teaching [12]. Based on the above situation, combined with the analysis of learning situation, the law of professional cognition and the teaching demand of nursing major, a four-subject and four-dimension evaluation system of geriatric nursing is constructed (FIG. 1). This system attaches more importance to the improvement of students' teamwork, practical skills and innovative ability.

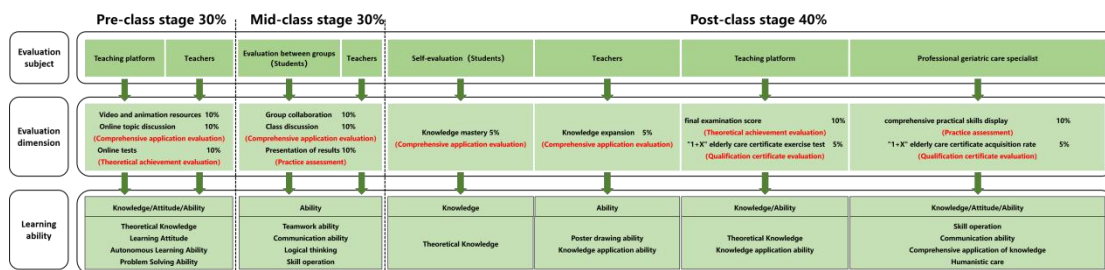


Figure 1: The four-subject and four-dimension evaluation system of geriatric nursing

#### (2) In geriatric nursing teaching, the implementation step of four subjects and four dimensions evaluation system

**Pre-class Plan (P):** According to the learning situation and post standards, accurately locate the teaching objectives of

each class, and release teaching resources and self-study tasks before class. According to their own situation and understanding level, students take the initiative to learn videos, animations and other resources, and independently complete independent learning, pre-class tests and online topic discussion. Teachers can evaluate students' learning attitude and knowledge mastery according to the data recorded by the learning platform. In this stage, the evaluation subjects are teaching platform and teachers; The evaluation dimensions are comprehensive application evaluation and theoretical achievement evaluation.

**Do in class (D):** According to pre-class data analysis, formulate classroom teaching tasks. Clinical cases, Skill demonstration videos and other teaching resources will be uploaded to the learning platform. Students will be divided into groups of 6-8 to carry out group collaborative learning, class discussion and presentation. In class discussion, students exchange cases and problems. In this stage, the evaluation subjects are students and teachers; The evaluation dimension is comprehensive application evaluation.

**Check in class (C):** The group members demonstrate the group's achievements. The evaluation can be divided into two types: ①Report and display: teachers give grades according to the enthusiasm of group discussion, the answers to questions and the accuracy of results; Students impartially evaluated the other groups according to the Case Report inter-group Evaluation Table (Table 1). ②Skill display: the teacher will give grades according to the group operation and humanistic care. Finally, teachers give timely comments on students' classroom performance, emphasize key knowledge points, affirm positive aspects and point out existing the shortcomings. In this stage, the evaluation subjects are students and teachers; The evaluation dimension is practical assessment.

Report topic					
Reporting group:		Evaluation group:		Date of evaluation:	
Evaluation content			Highest Score	Score	
Report content	Distinct theme		10		
	Clear thinking		10		
	No mistakes in reporting content (If there are mistakes, each mistake will be deducted 2 points until the deduction is complete)		10		
Solidarity and collaboration	Team members have clear responsibilities		10		
	Cooperation degree of team members		10		
	Each member is responsible for part of the report (If one team member fails to report, 2.5 points will be deducted until the deduction is complete)		10		
Reporter performance	The debriefer speaks clearly and skillfully		10		
	When giving a presentation, the presenter behaves appropriately		10		
	The reporting time was well controlled and no timeout occurred (If the reporter goes over time during the presentation, two points will be deducted for each minute of overtime until the deduction is complete.)		10		
Innovative performance	In addition to oral presentation, PPT presentation, other innovative forms of presentation (e.g. posters, videos, animations, etc.)		10		
Total score:					

Table 1: Case Report inter-group Evaluation Table in Geriatric nursing

**Post-class Actions (A):** the evaluation at the post-class stage mainly includes four parts: ①The online learning platform automatically records the test results of the "1+X" elderly care certificate exercise; ②According to the geriatric nursing course self-evaluation table (Table 2), students evaluate their knowledge acquisition in the whole learning process, summarize all aspects of the learning process, and conduct self-reflection, self-restraint and self-encouragement. Encourage students to evaluate truthfully, timely improve the shortcomings, reduce the psychological burden of students, and then stimulate students' learning motivation. ③Combining the data automatically recorded by the learning platform and the feedback information of students, teachers comprehensively evaluate their learning attitude, knowledge expansion, emotional expression, ability cultivation and other aspects, and appropriately adjust the teaching program; ④In the comprehensive practice week, students enter the nursing skills training room as a group for skills training, select clinical cases from the case analysis database, evaluate and correct errors according to the skill assessment criteria, and finally record the operation video of geriatric nursing skills, and submit it to the geriatric nursing experts for evaluation. ⑤In the final evaluation, the final examination results of the course are separated from the teaching and examination, and the closed-book examination method is adopted. The questions include multiple choice questions and case analysis questions, aiming to test the students' analytical judgment ability and clinical comprehensive ability. The examination time is 90 minutes. ⑥According to the qualification certificate evaluation time arranged by the state, students are organized to carry out the "1+X" elderly care certificate examination, the certificate passing as a part of the geriatric nursing teaching evaluation. In this stage, the evaluation subjects are

students, teachers, teaching platform and professional geriatric care specialist; The evaluation dimensions are Comprehensive application evaluation, theoretical achievement evaluation, qualification certificate evaluation and practice assessment.

Name:		Student ID:		Date:	
Geriatric nursing teaching content:					
Evaluation item	Score			Score obtained	
	General level (10 score)	Good level (15 score)	Excellent level (20 score)		
Improvement of learning initiative					
Theoretical knowledge mastery					
Improved independent learning ability					
Improvement of operational skills					
Improved critical thinking ability					
Total score:					

Table 2: Geriatric nursing course self-evaluation table

### Valuation index

The results of final exam, overall evaluation and academic evaluation were compared between the two groups.

### Student academic evaluation

The students' academic evaluation questionnaire compiled by Xu Juling [13], including 11 items, was issued after the course and filled out by students independently.

### Statistical method

Excel 20.0 was used to establish the database, SPSS 22.0 software was used for statistical analysis, Quantitative data were expressed by ( $\bar{x} \pm s$ ), inter-group comparison by t test, qualitative data were expressed by frequency and percentage (%), inter-group comparison by  $\chi^2$  test, differences were considered statistically significant when  $P < 0.05$ .

### Result

#### (1) General information

The general situation is shown in Table 3. We compared gender, age, race, and educational background between the experimental and control groups. There was no significant difference in gender ( $\chi^2=0.689$ ), age ( $95\%CI = -0.037 - 0.257$ ), race ( $\chi^2=0.217$ ) or educational background ( $\chi^2=0.260$ ) between the two groups ( $P < 0.05$ ). (Table 3)

Variables	Experimental group (n=93)	Control group (n=92)	P
Gender (male/female)	13/80	17/75	0.406
Age ( $\bar{x} \pm s$ , year)	19.91 $\pm$ 0.48	20.02 $\pm$ 0.53	0.143
Race (Han/The others)	91/2	89/3	0.641
Educational Background (Spring / Summer entrance examination)	39/54	42/50	0.610

Table 3: General information



## (2) Comparison of evaluation results between the two groups of students

The scores of the experimental group were (84.8±8.2) points in the pre-class stage, (83.6±7.9) points in the mid-class stage and (84.6±8.1) points in the post-class stage. The average score of the control group was (76.2±7.7), and the score of the mid-term exam was (72.1±8.2). The comparison results of final examination scores and overall course scores of the two groups of students are shown in Table 4. The final scores and total course scores of the experimental group were better than those of the control group.

Variables	Control group (n=92)	Experimental group (n=93)	<i>t</i>	95% Confidence Interval	<i>P</i>
Final examination scores	73.2±7.9	85.4±7.6	10.705	(9.95, 14.45)	<0.001
Results of overall evaluation	72.6±8.0	84.3±7.2	10458	(9.49, 13.91)	<0.001

Table 4: Comparison of geriatric nursing final examination scores and results of overall evaluation between two groups

## (3) Student academic evaluation

The comparison of the two groups of students' academic evaluation is shown in Table 5. The academic performance of the experimental group was better than that of the control group.

Evaluation content	Experimental group (n=93)		Control group (n=92)		$\chi^2$	<i>P</i>
	Yes	No	Yes	No		
Increase interest in learning	82 (88.2%)	11 (11.8%)	39 (42.4%)	53 (57.6%)	42.839	<0.001
Improve independent learning ability	86 (92.5%)	7 (7.5%)	30 (32.6%)	62 (67.4%)	70.872	<0.001
Improve critical thinking ability	84 (90.3%)	9 (9.7%)	40 (43.5%)	52 (56.5%)	45.920	<0.001
Improve communication skills	84 (90.3%)	9 (9.7%)	34 (37%)	58 (63%)	57.019	<0.001
Improve teamwork ability	81 (87.1%)	12 (12.9%)	38 (41.3%)	54 (58.7%)	42.261	<0.001
Improve practical and innovative abilities	83 (89.2%)	10 (10.8%)	50 (54.3%)	42 (45.7%)	27.876	<0.001
Promote the mastery and application of knowledge	88 (94.6%)	5 (5.4%)	44 (48.9%)	46 (51.1%)	47.591	<0.001
Truly reflect the mastery of knowledge	86 (92.5%)	7 (7.5%)	38 (41.3%)	54 (58.7%)	54.790	<0.001
Students expect themselves, peers and teachers to participate in the evaluation	85 (91.4%)	8 (8.6%)	72 (78.3%)	20 (21.7%)	6.214	0.013
Get feedback of evaluation results in time	62 (66.7%)	31 (33.3%)	28 (30.4%)	64 (69.6%)	24.303	<0.001
The students wish to continue with the current method of evaluation	86 (92.5%)	7 (7.5%)	25 (27.2%)	67 (72.8%)	82.168	<0.001

Table 5: Comparison of academic evaluation between two groups

## Discuss

### (1) The four-subject and four-dimension evaluation system is helpful to improve students' comprehensive quality

The results of this study showed that the final examination scores of students in the experimental group were significantly better than those of the control group. Most students in the experimental group held a positive attitude towards the four-subject and four-dimension evaluation, believing that it could improve the comprehensive qualities of learning interest, independent learning ability and teamwork. The 11 items in the academic evaluation between the two groups were statistically significant ( $P < 0.05$ ). The four-subject and four-dimension evaluation system tracks and records students' learning at different stages of the course, which can play a positive role in guiding and urging students to overcome their easy to produce inertia in learning and improve their learning attitude. In addition, the students' learning situation can be evaluated continuously through diversified evaluation subjects and dimensions, which increases the interaction between teachers and students and between students, fully arouses the enthusiasm of students to participate in the geriatric nursing course learning, and significantly improves the learning effect. Therefore, the four-subject and four-dimension evaluation system is more helpful for students to understand and master knowledge and improve their comprehensive ability.

### (2) The four-subject and four-dimension evaluation system can timely feedback students' learning situation and

### **adjust the progress of teaching and learning**

The results of this study showed that 66.7% of the students in the experimental group believed that the four-subject and four-dimension evaluation method could enable them to get feedback on the evaluation results in time, understand the shortcomings in the learning process, and timely check and fill in the gaps, and the difference was statistically significant compared with the control group ( $P < 0.05$ ). It shows that the four - subject and four - dimensional evaluation pays more attention to the result feedback than the final evaluation. At the same time, this study also showed that nearly one-third of the students in the experimental group still thought that they did not get feedback information in time. The four-subject and four-dimension evaluation is not a simple data collection and time record, but pays attention to the effective communication between teachers and students in order to reflect on, adjust and improve teaching and learning<sup>[14]</sup>. Adjusting the progress of teaching and learning according to the feedback is an indispensable link of the four-subject and four-dimension evaluation, which is also the embodiment of its educational and developmental characteristics. Feedback information is helpful for students to clarify the gap between existing knowledge, ability and learning objectives, and to clarify the direction of efforts<sup>[15]</sup>. At the same time, the four-subject and four-dimension evaluation is the evaluation in the teaching process, which can increase the diagnostic information of students' learning strengths and weaknesses for teachers. Such timely feedback can also increase the opportunities for teachers to find problems in the teaching process, so as to improve the teaching process and constantly promote the improvement of teachers' teaching ability<sup>[16]</sup>. In the process of implementing the four-subject and four-dimension evaluation, a more scientific and reasonable feedback mechanism should be established to find the most suitable implementation way for students.

### **Conclusions and suggestions**

Geriatric nursing is a discipline with strong application and practice, which attaches great importance to the cultivation of humanistic care, practical ability and innovative thinking. The application of PDCA cycle teaching quality management model makes students become the main body of learning, but the traditional evaluation system has some problems, such as less evaluation subjects, less evaluation dimensions, single evaluation process, and poor evaluation continuity, so it is easy to ignore the evaluation of students' learning process and comprehensive ability. The evaluation system of four subjects and four dimensions broadens the evaluation subjects and dimensions, pays attention to the evaluation of the whole learning process, and has the characteristics of evaluation continuity and timeliness.

To sum up, the four-subject and four-dimension evaluation system emphasizes the cultivation of students' comprehensive ability in the learning process, guides students to improve learning methods and strategies, and helps to enhance students' learning interest and improve their learning effect. However, since the four-subject and four-dimension evaluation runs through every link of the learning process and records the learning situation of students, it needs the support of information technology, so there may be some difficulties for the schools with lagging information construction. In addition, the four-subjects and four-dimensions evaluation system does not include the situation of students' voluntary service in pension institutions. Our follow-up research will include the situation of students' voluntary service in pension institutions into the evaluation system to further explore and improve the evaluation system.

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