

The Effect of Intrinsic Incentive on the Research Performance of College Faculty

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Abstract:

The research performance of college teachers is the effect of accomplishing the scientific research tasks under the guidance of the overall strategic objectives of the college. Establishing an effective incentive mechanism can promote the implementation of this goal and stimulate the enthusiasm of college teachers' scientific research work. Incentive is a process in which individuals are motivated by needs and behaviors to achieve certain goals. It can be seen that incentive is driven by individual needs that are not fully satisfied. It is a kind of emotional effect generated from within, and this psychological need serves as an internal incentive that eventually drives individual behavior. At present, the individual needs of college teachers have not been fully satisfied, and there is still room for institutional incentive in colleges and universities. It is the key issue to make the incentive policy effectively meet the psychological needs of college faculty and become the psychological element to motivate them. This paper focuses on the impact of intrinsic incentive on research performance, so that we can develop more targeted and effective motivational initiatives that meet the characteristics of college teachers and improve their research performance.

In this study, relevant literature research was conducted, and the questionnaire was developed by combining the existing scales and interviews in the literature. After conducting reliability and validity tests, the scale was further optimized by purifying the entries and deleting the questions. The questionnaire was then distributed to college teachers. Finally, 420 valid questionnaires were collected. Based on the Exploratory Factor Analysis, the empirically tests of the intrinsic incentive on the research performance were studied by using the path analysis method of Structural Equation Model.

The results show that intrinsic incentive includes four factors, which are innovation incentive, achievement incentive, emotion incentive and responsibility incentive. The effect of emotion incentive on research performance is not significant. Innovation incentive and responsibility incentive have positive influences on research performance, while achievement incentive has negative influence on research performance.

According to the results of the study, innovation incentives are effective in improving research performance because scientific research itself is innovative, exploratory and pioneering in nature. Teachers in higher education consider research as part of their duties. The responsibility can motivate research performance because they attach more importance to research work internally. But college teachers are vulnerable to the negative effects of uncertainty encountered in the process of research work.

Therefore, universities should develop innovative incentives in line with the inner rules of scientific research activities and clarify the scientific research responsibilities of college teachers. At the same time, they should try to create a relaxed academic atmosphere to keep teachers' enthusiasm for scientific research. The "results-only" system of research rewards should be abolished to avoid external stimuli such as apportioning research tasks and quantifying departmental targets, which would discourage faculty members' research enthusiasm.

Further research in this study could include in-depth analysis of intermediate variables, such as work attitudes, perceptions of performance, competence and quality, and even moral and educational attitudes. Whether these factors have mediating effects and play a role as intermediate variables in the process of influence of motivational factors on performance needs further analysis.

Keywords: *Intrinsic incentive, Research performance, Structural Equation Model (SEM).*

I. INTRODUCTION

Scientific research is an important task for college teachers. Improving the scientific research enthusiasm of university teachers is of great significance to promote social progress and enhance the level of science and technology. The evaluation of teachers in colleges and universities pays more attention to scientific research performance. Objective and accurate measurement of teachers' scientific research performance is a relatively difficult and complicated task. The motivation of higher education teachers' research does not come directly from the final research results. Fundamentally, scientific research is not utilitarian. In addition, the achievement of research results has a time lag. Over-emphasis on the performance of scientific research results will cause various problems in the appraisal, and even lead to academic misconduct in the process of scientific research of some teachers. At present, universities still use more economic, institutional and other external policies in terms of incentives. Such utilitarian incentives have raised some academic ethical problems in the field of scientific research.

To some extent, these problems are brought about by the short-sighted behavior of colleges and universities caused by increased competition. But are the psychological needs of college faculty met by these incentives? Are there non-utilitarian incentives that can enhance the level of research performance of college faculty? These are questions that remain to be addressed. Academics currently focus more on the effects of incentive systems on research outcome performance and less on the effects of individual faculty members' internal motivational factors, and there are few empirical studies.

The performance of college teachers is based on the decomposition and implementation of various tasks under the overall strategic goals of colleges and universities. As early as the 1980s, Darling and Hammond proposed four basic goals for teacher performance evaluation. They were personal career development, personal career goals, school development, and school status judgments. [1] And from this, they judged that an effective performance evaluation system can promote the improvement of individual teachers' abilities. The human resources department of the college can also form a corresponding staff

management system based on the evaluation results. Based on the motivation theory of college human resource management, Sun (2006) believes that motivational elements such as goal management, information management, career planning, integrity management, emotion management, and culture building are closely related to teachers' final performance. [2] Thus, it can be seen that establishing a scientific performance evaluation system can both stimulate the work enthusiasm of college teachers and promote the implementation of organizational goals. Individuals are able to generate motivation under demand orientation, which means that the motivation to complete work is an emotion effect generated from within. This psychological need as motivation drives individual behavior and eventually achieves the goal.

College teachers are a special group with strong self-awareness and self-actualization needs. Bayley (1999), based on an empirical study in Australian universities, concluded that group characteristics of college teachers have an impact on performance, among which teachers' titles and gender have a greater impact on performance. [3] Li and Xu (2013) found that there is a correlation between teachers' needs for achievement, material life, academic development, pleasure life, and security and teacher characteristics such as position, title, and age. [4] Teachers are the most important and valuable resources to ensure that the organizational goals of higher education institutions are achieved, and they are the key factor to improve the quality of research. Therefore, universities need to organize and deploy teachers in a scientific way. They cannot be externally motivated by simple goal management or performance management. The teachers' psychology and behavior should be effectively evaluated. On the one hand, the teachers are managed through the organizational system, and on the other hand, the teachers are correctly guided to self-manage in order to fully stimulate their work motivation and finally achieve the organizational goals.

Internal incentive can drive individuals to work hard with the aim of achieving the goals set in their expectations. This can stimulate a sense of achievement, career and satisfaction. Xie (2014) argues that internal incentive includes research interest, social responsibility, and research fulfillment, while external incentive includes social recognition, title promotion, appraisal, rewards, and honors. And the internal incentive of university teachers are the factors that can lead to their psychological satisfaction, and these factors can generate motivation from within the individual to improve their performance. [5] Li (2009) focused on the important role assumed by personal mental aspects in research motivation, such as the sense of achievement, innovation and satisfaction, which are motivational elements that mainly originate from teachers' own psychological needs and are intrinsically spontaneous and conscious. Therefore, they can be called intrinsic incentive or intrinsic motivation. [6]

External incentive originates from organizational systems such as pay, promotion, and appraisal, whereas college teachers originate from individual psychological satisfaction responses that can generate internal incentive and thus improve their performance. Therefore, the effect of internal motivation on job performance of college teachers is likely to be significantly different from the effect of external motivation. Wu (2010) argues that utilitarian motivation stimulates low-level needs and tends to lead to various academic unethical behaviors. [7] Liu (2010) argues that intrinsic motivation is a high level need, which is a more stable, durable and powerful dominant motivation. [8]

In general, the current academic research on performance evaluation system construction is more often carried out from the perspective of universities, mostly based on the aspects of university management such as system, resources, mechanism, and environment. In response to this status quo, this paper proposes suggestions for improving research performance evaluation from the perspective of teachers' intrinsic motivation, taking into account the characteristics of universities, and ultimately improving the effectiveness of research in universities.

II. RESEARCH HYPOTHESIS

It has been shown that external motivation can have an impact on the job performance of college teachers. However, there are certain motivational failures in Chinese universities in terms of remuneration, promotion mechanism and appraisal system, which affect the accuracy of college teachers' performance evaluation. [9] In contrast, the satisfaction and happiness of college teachers who feel innovation, achievement, emotion and responsibility in their work can be internalized into psychological demand responses, and these internal factors may be the real motives affecting performance.

From the literature, academics believe that innovation in research content, research methods and research techniques often brings teachers psychological pleasure such as exploration, discovery, and creation. The psychological pleasure is also moderately enhanced by the social attributes of the profession, such as success, trust, respect and admiration, which are in line with the social status of college teachers. The emotional factors such as teachers' identification with the organization they belong to and their enjoyment of the work atmosphere they are in create a certain degree of psychological belonging. The sense of responsibility for students, career, organization, and family, to a certain extent, drives college teachers to complete their work effectively, which in turn brings them psychological satisfaction. [10-12] Based on the above analysis, this paper summarizes and summarizes four internal motivations: innovation, achievement, emotion and responsibility, and uses them as factors for developing incentive policies to study their effects on research performance.

2.1 Effect of Innovation on Research Performance

Scientific research is a series of activities to discover, analyze and solve problems in a scientific manner by using certain research methods in order to understand the essential laws of objective things. The ultimate purpose of these activities is to explore the unknown and promote scientific and technological progress. Therefore, the basic task of scientific research is exploration and innovation. Scientific research is a basic work of college teachers, which has high requirements on teachers' exploring spirit, creative ability and innovative ideas. Only with a strong curiosity and desire for exploration can teachers in colleges and universities have the passion for scientific research. Innovation is the intrinsic motivation for college teachers to engage in scientific research. If they rely on external incentives such as monetary rewards and results incentives, they cannot give full play to their subjective initiative in scientific research activities and eventually cannot achieve good scientific research performance. [13] Facing the difficulties

in scientific research, teachers can only achieve good research results by putting in great patience and sufficient energy. Therefore, the innovation incentive of college teachers plays a certain role in promoting the scientific research performance, which is conducive to the continuous improvement of college scientific research performance. This paper assumes that the innovation factor of college teachers has an influence on the scientific research performance.

2.2 Effect of Achievement on Research Performance

Compared with teaching activities, which are also part of a college teacher's job, the results of research activities are more clearly defined and the performance is more significant. The final output of scientific research work includes academic papers, academic publications, research reports, and other forms. These outputs can be better quantified. [14] Based on this, universities are currently demanding for scientific research, and teachers in universities have a strong pursuit of scientific research results within this atmosphere. Research results are often obtained by researchers who have put in a lot of time, energy and physical strength, and they condense a lot of their efforts. The quality of research results can represent the academic level of the researcher. Therefore, college teachers with fruitful research results can often get great satisfaction and honor from them. At the same time, the external factors also force the teachers to improve their research ability and create good research performance so as to achieve their own professional goals and academic ideals. Since scientific research results are the key element of teachers' academic achievements, which are evaluated and recognized by the outside world, college teachers have a strong desire to obtain achievements. Effective achievement motivation will also promote teachers' initiative in research and academic work, and eventually promote the continuous improvement of research and academic performance. Thus, this paper hypothesizes that achievement factors have an impact on research performance.

2.3 Effect of Emotion on Research Performance

Scientific research is a job with a very high degree of uncertainty, and even if the researcher puts a lot of effort into it, he or she may not be able to get clear results. In scientific research activities, researchers need external support and respect, as well as team help and collaboration. The importance of academics and the respect for teachers can constitute an incentive mechanism to stimulate the research enthusiasm of college teachers. Faculty members whose research results are recognized and appreciated within the organization are more motivated to complete new research projects and are more likely to continue their research activities. [15] Emotional motivation can bring more psychological satisfaction to college teachers and promote them to work more proactively. The general emphasis on scientific research in universities also causes teachers to have a certain psychological preference for scientific research and tend to devote more energy to it. In addition, a harmonious team and a good working atmosphere can also enhance the efficiency of research. Based on the above analysis, this paper concludes that the emotional factors of college teachers have an impact on research performance.

2.4 Effect of Responsibility on Research Performance

Scientific research results can not only reflect the academic value of college teachers, but also promote the development of economy through the transformation of results. Scientific research results play a practical role for social progress and can realize a certain economic value. As a member of social groups, college teachers have the responsibility to drive scientific and technological innovation and promote social progress. While advancing social progress, the use of scientific research results can also bring honor to universities and reflect their research strength. Teachers also have an obligation to guide students to the latest research findings. Introducing research findings into the curriculum enables students to be exposed to the latest results and broaden their professional horizons. Research activities and teaching activities promote each other and enhance work performance. Therefore, this paper argues that the responsibility factor of college teachers has an impact on research performance.

In summary, the following path hypothesis is established in this paper (Fig 1).

H1: Innovation has an effect on research performance.

H2: Achievement has an effect on research performance.

H3: Emotion has an effect on research performance.

H4: Responsibility has an effect on research performance.

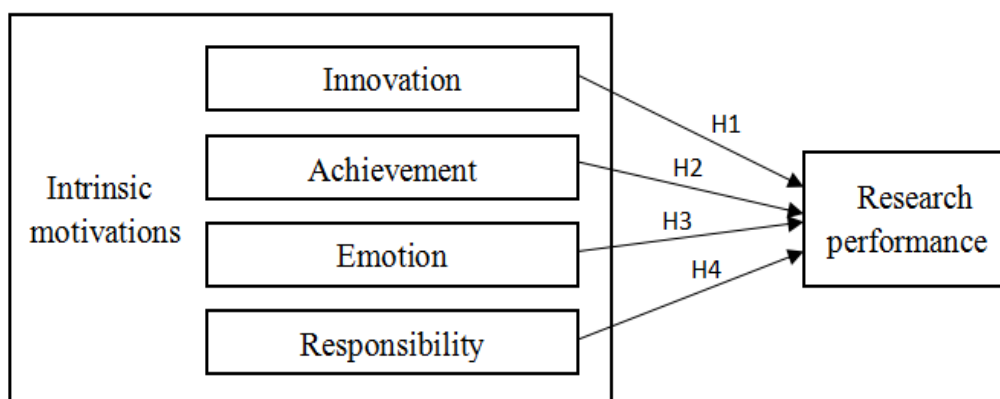


Fig 1: Path hypothesis of internal motivation on research performance

III. RESEARCH METHODS

3.1 Scale Design

To ensure the validity and reliability of the scale, this study combined the existing mature scale and conducted in-depth interviews with 7 human resource managers in colleges and universities and 15 front-line teachers, 2 experts in human resource, and 1 professor of sociology from 7 universities in China. The relevant variables were collated and mined, and a questionnaire was designed, containing 24 questions. After the initial test of the small sample, a scale consisting of 20 items was finally formed according to the results combined with the suggestions of expert discussions.

The questionnaire is based on the Likert five-point scale. It classifies the options into "not at all", "not in line", "not sure", "basically in line", and "completely in line", and 1, 2, 3, 4 and 5 points are given respectively. The scale consists of introduction, intrinsic motivation questionnaire and research performance questionnaire.

Based on well-established scales available in the literature, this study involves four intrinsic motivation variables: innovation, achievement, emotion, responsibility, and research performance variables, with a total of 20 items. The intrinsic motivation scale consists of 16 items, of which 5 are innovation (labeled as "CX"), 4 are achievement (labeled as "CJ"), 3 are emotion (labeled as "QG"), 4 are responsibility (labeled as "ZR"), and 4 teacher research performance items (labeled as "KY"). The composition of the scale is shown in Table I.

TABLE I. Measurement items of research variables

Research variable	Measurement Items	References
Innovation motivation (IM)	CX1. I am willing to be exposed to new things in my work. CX2. I like to propose new ideas, new theories or invent new technologies. CX3. I like to try new methods to solve problems. CX4. I am easily inspired by something unexpected. CX5. I like to work with my own ideas.	Super, D.E. (1970), Ruan (2011) [16]
Achievement motivation (AM)	CJ1. I enjoy the feeling of constant success in my work. CJ2. It is very satisfying to have my work recognized by others. CJ3. I am very eager to be successful in my career. CJ4. The respect and recognition of the teaching profession by the society makes me satisfied.	Super, D.E. (1970), Ruan (2011)
Emotion motivation (EM)	QG1. I agree with the educational philosophy of the college I am currently working at. QG2. I like the academic atmosphere of the college I am currently working at. QG3. I like the college where I work now.	Meyer & Allen (1993) [17]

Responsibility motivation (RM)	ZR1. My sense of responsibility as a teacher drives me to complete my current work.	
	ZR2. The pressure of life has forced me to complete the current work.	Chen (2011)
	ZR3. My current job has provided me with good opportunities for development, and I should give back to the college where I work.	[18], Zhang (2014) [19]
	ZR4. My current job requires me, and I will not leave the college even if there is a better development.	
Research performance (RP)	KY1. In order to obtain better research results, I often use my time off to continue working.	
	KY2. I am active in scientific research and have a wealth of research results.	Griffin (2007) [20],
	KY3. I try my best to apply cutting-edge academic theories, techniques and tools to my research work.	Yu (2016) [21]
	KY4. I strive to apply the results of my research to create social wealth or social impact.	

3.2 Sampling

The sample survey was targeted at college teachers in five provinces of Shandong, Jiangsu, Fujian, Yunnan and Shanxi. A total of 551 offline and online questionnaires were distributed through field research, academic conferences, online platforms and cell phone software, and 457 questionnaires were returned, with a return rate of 82.94%. After screening invalid questionnaires with missing items, severe extreme reactions or obvious contradictions, 420 valid questionnaires were finally collected, with an effective rate of 91.90%.

The characteristics of gender, marriage, age, teaching experience, education background and professional title were considered when the questionnaire was distributed. According to the sample results, the gender distribution was even (48.81% for male and 51.19% for female), the marital status distribution was reasonable (88.57% for married and 11.43% for unmarried), the age structure basically showed normal distribution (37.14% were between the ages of 36-45, while those under 30 and over 55 accounted for about 10% each), and the education and professional title structure was also reasonable (the largest proportion of master's degree and intermediate title). The results showed an even distribution of samples.

IV. DATA ANALYSIS

4.1 Reliability and Validity Test

We applied SPSS 24.0 software to test the reliability of the sample data, and the results showed that the Cronbach's α values of each factor of innovation, responsibility, emotion, and achievement were 0.866, 0.831, 0.811, and 0.787, which were all greater than 0.7. Cronbach's α coefficient of each item in the intrinsic motivation questionnaire which shows the composite reliability is 0.916 (It was higher than 0.9.). The overall reliability of the questionnaire is very good and the measurement results are reliable. The results of the reliability test are shown in Table II.

TABLE II. Result of reliability test

Variable	Factors	Cronbach's α	Composite reliability
Intrinsic motivation	Factor 1 Innovation	0.866	0.916
	Factor 2 Responsibility	0.831	
	Factor 3 Emotion	0.811	
	Factor 4 Achievement	0.787	

The KMO test of the intrinsic motivation questionnaire is 0.918, greater than 0.90. The Bartlett spherical test yielded a significance probability of 0.000, which is at a highly significant level, indicating that it is suitable for factor analysis. Exploratory factor analysis (EFA) of the variables belonging to internal motivation is shown in Table III. The factor loadings of each question item are greater than 0.50, better loading on the respective variable factors and good structural validity of the measured variables.

TABLE III. Exploratory factor analysis of intrinsic motivation scale

	Component			
	1	2	3	4
CX3	0.812	0.289	0.155	0.102
CX2	0.812	0.196	0.112	0.133
CX1	0.719	0.278	0.136	0.143
CX4	0.686	0.037	0.236	0.398
CX5	0.632	0.069	0.169	0.460
ZR2	0.176	0.749	0.196	0.123
ZR1	0.235	0.734	0.192	0.272
ZR4	0.164	0.668	0.354	0.176
ZR3	0.151	0.644	0.448	0.260
QG2	0.240	0.216	0.818	0.087
QG1	0.152	0.240	0.771	0.137
QG3	0.172	0.284	0.715	0.183
CJ2	0.201	0.215	0.228	0.764
CJ3	0.256	0.272	0.029	0.728
CJ1	0.450	0.165	0.120	0.679
CJ4	0.003	0.310	0.441	0.531

4.2 Hypothesis Testing

The research hypotheses and model were tested using path analysis in structural equations using AMOS 24.0 software. The model of the relationship between internal motivation and research performance was analyzed. It is shown in Fig 2. As the results show satisfactory levels such as $\chi^2/df = 2.826 < 5$, RMSEA = $0.066 < 0.08$, CFI = 0.938, IFI = 0.938, TLI = 0.926 (all of them are above 0.9). It shows that the model fits well. The results of the model show that the parameter estimation of the path from emotion motivation to research performance is not significant ($P=0.435 > 0.05$), and hypothesis H3 is not valid. In addition, the hypotheses H1, H2 and H4 are all true. Among them, innovation motivation and responsibility motivation have a positive effect on research performance (The direct effect is 0.65 and 0.23 respectively.), while achievement motivation has a negative effect on research performance (The path coefficient is negative.).

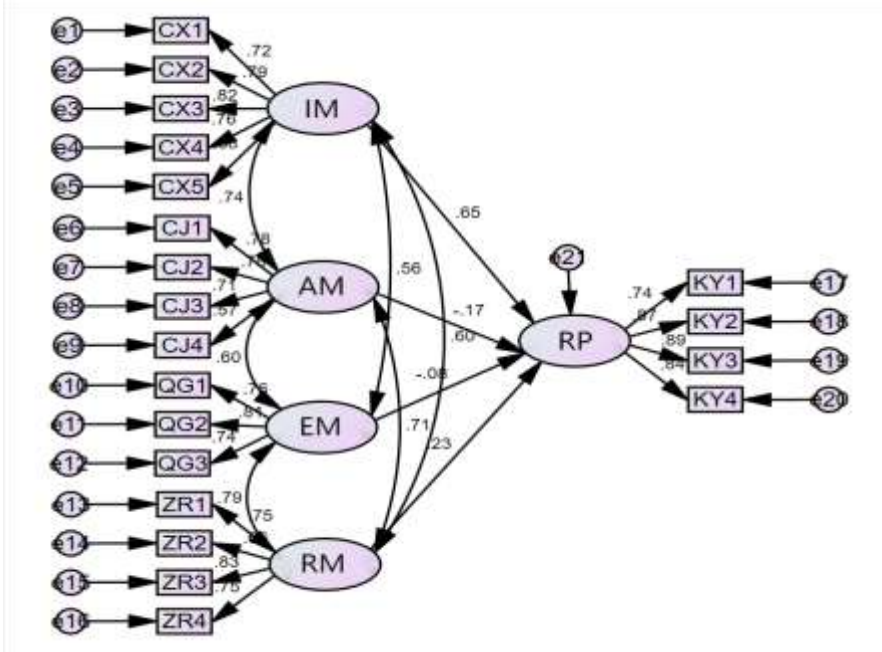


Fig 2: Path model of intrinsic motivation affecting research performance

V. CONCLUSION AND SUGGESTIONS

5.1 Conclusion

Further analysis of the results of the path model reveals the following conclusions: emotional factors do not have an impact on the research performance of college teachers, while innovation and responsibility have a direct impact on research performance and achievement has a negative impact on research performance.

Since scientific research itself has the characteristics of innovation, exploration and pioneering, the motivation of teachers to carry out scientific research mainly relies on their own curiosity, the exploration and pursuit of new things, new theories and new methods, so innovation can effectively improve scientific research performance.

At the same time, the three functions of teaching and education, scientific research and social service of colleges and universities have basically been widely recognized by the society. Teachers in colleges and universities also regard scientific research as part of their duties. In addition, the requirements of universities for scientific research are high, and even some external rewards are linked with scientific research level. In such an environment, college teachers internalize the importance of research work and agree that research is an important part of teachers' performance.

In addition, scientific research activities are full of unknowns in terms of research results, and college teachers will encounter various uncertainties in the process of scientific research work, and it is possible to invest a lot of time and energy but not get effective results. Therefore, the frustration caused by failures in scientific research and the huge and arduous physical and energy efforts of teachers in the research process lead to the fact that achievements do not have a positive impact on scientific research performance.

5.2 Suggestions

In response to the findings of the study, this paper makes the following suggestions for improving research performance evaluation.

First, to analyze the essence of scientific research work in depth, to stimulate teachers' dedication to scientific research from within and to cultivate their independent scientific character. Scientific research is the process of human exploration of new theories, new technologies and new methods, and its essence is a scientific activity. It requires scholars to spontaneously and continuously explore the truth and discover new things in their research. Teachers' desire to explore can be satisfied by research progress, which drives them to conduct more in-depth research. Therefore, innovation incentives that conform to the internal law of research activities and the sense of responsibility of college teachers to make research tasks their job duties can effectively improve research performance. The remaining internal factors that violate this rule, such as moral and emotional constraints, are not effective in advancing researchers to active research activities.

Second, we should create a relaxed academic atmosphere and abolish the "results-based" scientific research reward system. The results of scientific research are uncertain, and even if researchers invest a lot of time and energy, they are not guaranteed to produce results. On the one hand, college teachers who conduct scientific research need to be enthusiastic about their research goals and persevere in their intense research work. On the other hand, they also need to bear the frustration that the research results are not as expected and the research goals are not achieved. Under such double pressure, if universities pursue the research results too much, and even take the number and level of results as the basis for promotion and

reward, it may discourage teachers' enthusiasm of research and make them feel "afraid", so that they will be "discouraged" from research work. "This is why universities should try to create a relaxed academic environment. Therefore, universities should make efforts to create a relaxed academic atmosphere, carry out academic exchanges in a relaxed atmosphere, set up various kinds of research teams, encourage young teachers to devote themselves to scientific research, and keep their enthusiasm for scientific research.

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