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Research Article

Does Evaluation System Cause a Rise in Instructors' Informatization Teaching Abilities? Evidence from Chinese Universities*

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Abstract

With education reform and the application of informatization in Chinese universities, instructors' informatization teaching abilities represent a popular topic in social and academic circles; this knowledge is also of great significance in cultivating informatization teaching among college instructors. Based on scale development, this study uses structural equation modelling combined with survey data from 252 universities in China to study relationships among the university evaluation system, work pressure, and instructors' informatized teaching abilities. Results show that the rationality of the evaluation system positively influences college instructors' informatized teaching abilities. Work pressure plays a partial intermediary role between the evaluation system and informatized teaching abilities.

Keywords

Evaluation System • Work Pressure • Informatization Teaching Abilities

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With the advent of the information age, many new information technologies, such as big data, cloud computing, MOOC, VR teaching, and micro-courses have permeated the education field. With the continuous development of higher education, the ranks of university teachers are constantly growing; thus, adapting to changing times and improving educators' information-based teaching abilities are highly significant. In March 2018, the General Office of the Ministry of Education issued "Key Points of Education Informationization and Network Security in 2018", which proposed realizing the transformation and upgrading of education informatization and emphasize the supporting and leading roles of education modernization. A new topic around teaching reform in colleges and universities promotes improvement in teachers' informatization teaching abilities, improves teachers' employment efficiency, and realizes the goal of "double first-class" construction. The state of educators' informatization teaching abilities and whether teaching tasks and objectives are realized should be verified by the examination and evaluation system; hence, the examination and evaluation system greatly affect improvement in college instructors' informatization teaching abilities. In August 2016, the Ministry of Education issued the document "Guiding Opinions on Deepening the Reform of the Assessment System for University Teachers" to enhance reform of the evaluation system for college teachers. An appropriate college assessment system can effectively promote improvement in educators' informationized teaching abilities to engender better performance.

Research on informatization teaching abilities in China is still in the initial stage, focusing mainly on the construction of evaluation indices for college instructors' informatization teaching abilities, research on college teaching evaluations, influencing factors on college instructors' teaching abilities, and development of informatization teaching abilities. Few studies have examined improvements in college instructors' informatization teaching abilities based on the combination of an evaluation system and work pressure. From the perspective of work pressure theory, no direct linear relationship exists between the teacher evaluation system and improvement in teachers' informatization teaching abilities. The evaluation system affects the degree of work pressure, and the degree of work pressure likely shapes improvement in teachers' informatization teaching abilities.

This paper focuses on research on teachers' informatization teaching abilities, following the concept of the information age and development trends in China's college teaching reform. Taking work stress theory as the starting point, structural equation modeling (SEM) is used to analyze the influencing mechanism of the college teacher evaluation system, work pressure, and informatization teaching abilities. The intended contributions of this paper are as follows. First, taking work pressure as the intermediary, this study focuses on the influence of the evaluation system on informatization teaching abilities and expands the application boundaries of work pressure theory. Second, based on current teaching reform, this paper reveals the transmission mechanism of the evaluation system's influence on information-based teaching abilities and supplements the research literature on the teacher evaluation system and information teaching abilities. Finally, taking college teachers as the research object, this paper analyzes the relationship between the evaluation system, work pressure among college teachers, and college instructors' information-based teaching abilities in the context of China's college teaching reform to provide relevant suggestions to improve the evaluation system along with college instructors' information-based teaching abilities.

Basic Theory and Research Hypothesis

Basic Theory

Evaluation system. The evaluation system is a constraint on teachers, a rule, and a requirement that guides, stimulates, and standardizes teachers' behavior. Research on the teaching evaluation system in China appeared in the 1980s and evolved from qualitative to quantitative assessment. The content of assessment underwent substantial development from three initial levels of political performance, work performance, and business levels in four parts: academic level, teaching abilities, personal development, and organizational relations, which has been publicly recognized. The content of the assessment has been continuously refined and integrated. However, several problems remain in the evaluation system of college teachers in China, such as the opposition between 'academics' and 'teaching' in colleges and universities, insufficient salaries and treatment of college teachers, numerous teaching tasks, excessive utilitarianism of individual teachers, and a lack of sense of responsibility. In this regard, scholars have proposed using differentiated evaluation indicators between academic and teaching instructors to develop distinct incentives and punishments and establish academic committees to increase teachers' voices with an emphasis on teacher self-evaluation. Teachers', students', and students' parents' evaluation opinions are gathered through democratic evaluation to make the system transparent along with other suggestions to solve the problem of an unreasonable evaluation system. Reasonable teacher evaluation is an important component of college instructors' development.

Work pressure. Work stress is a complex process involving physiological, psychological, and behavioral responses that arise from the interaction between work environment requirements and individual characteristics under the influence of personal traits and coping behaviors. Studies of teachers' work stress first emerged in the 1970s. Kyriacou and Sutelieff (1977) proposed the concept of teachers' work stress, defined as unpleasant emotions (e.g., anxiety, loss, and anger) perceived by teachers under environmental stimuli. Later, Kyriacou and Sutelieff supplemented their notion of teachers' work pressure, describing teachers' work stress as the work stress from the environment to conceptualize the effects on environmental pressure on teachers. Pressure can manifest based on the state of the teacher's performance or reactivity. With increasingly fierce competition in China's colleges and universities, most college instructors are in a state of excessive long-term work pressure, which can generate negative and tense emotions. This paper studies the work pressure of college teachers under full implementation of college reforms in the country, perceived shifts in the degree of competition in their occupations, resulting changes in perceptions of professional crisis, and instructors' willingness to participate in future competition (Vogt & Rogalla, 2009).

Informatization teaching abilities. Establishing a sound evaluation system is conducive to the promotion of teaching abilities, and improvements in instructors' teaching abilities can drive the development of education. College instructors' teaching abilities involves their abilities to recognize, understand, master, and apply teaching academics to conduct teaching practice and research. It also involves teachers' energy and abilities to successfully complete teaching activities, which directly affect psychological characteristics of efficiency in such activities. However, domestic and foreign scholars have not devised a uniform teaching abilities

framework. When analyzing college instructors' teaching abilities, these abilities can be divided into basic teaching elements and developmental teaching elements. Examined from multiple dimensions, teaching abilities includes subject knowledge, teaching diagnosis, teaching method applications, and teaching practice. The information-based teaching abilities structure includes the application of information technology, design of information-based teaching, information technology and curriculum integration, implementation of information-based teaching, and evaluation of information-based teaching. Many factors influence teaching abilities, including the teacher's attitude, emotion, familiarity with the subject matter, educational technology practice, methods and procedures required for the teaching process, the informatization teaching resource platform and resources, and the teacher evaluation system. External factors include teacher information technology application abilities training and work pressure. This paper proposes additional factors including teachers' information-based teaching abilities in the information environment, use of information technology to conduct teaching activities, specific approaches to completing teaching tasks, and the psychological characteristics necessary to complete teaching activities successfully.

Conceptual Model and Research Hypothesis

Conceptual model. Based on the existing theoretical foundation and related literature, this paper constructs a conceptual model of the evaluation system, work stress, and informationization teaching abilities improvement and proposes corresponding research hypotheses. The model is depicted in Figure 1.

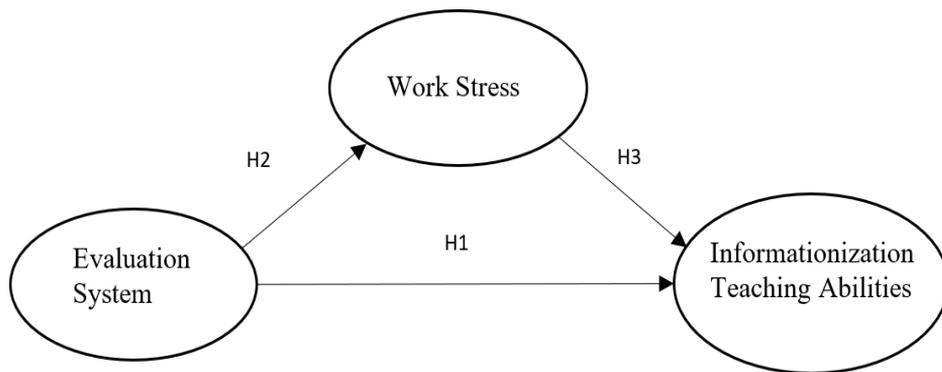


Figure 1. Conceptual model.

Model hypotheses. The teacher evaluation system functions as a 'baton' to promote healthy development of the teaching staff. It is an important basis for universities to guarantee teaching quality and involves judgement of teachers' performance or potential value. The purpose is to promote improvement in teachers' professional development and teaching effectiveness.

China is in an important stage of social transformation and deepening reform in higher education; thus, institutions related to teaching abilities and evaluation have been introduced. For instance, "Guidance Opinions

of the Ministry of Education on Deepening the Reform of the Assessment System for University Teachers" (Teacher [2016] No. 7) provides guiding suggestions for formulating an evaluation system for colleges and universities. However, due to lack of experience, indicators and models of unreasonable evaluation systems will make the reform of teaching in colleges and universities counterproductive. Heavy scientific research and light teaching promoted by the evaluation system have seriously affected teachers' roles, thus limiting the development of instructors' teaching abilities. The administrativeization of schools caused by management standardism limits the vitality and creativity of teachers' academic production. At present, teacher evaluations neglect teachers' personal planning, organization, responsibility, and moral literacy. There is also a certain degree of influence on instructors' teaching abilities. A scientific and reasonable teacher evaluation system is fundamental to the improvement of instructors' teaching abilities. Based on the practice of higher education reform and the above theoretical derivation, the following assumptions are made:

H1: The rationality of the evaluation system has a positive direct impact on college instructors' information teaching abilities; that is, the more reasonable the evaluation system of colleges and universities, the faster college instructors' information teaching abilities are improved.

Evaluation is a major source of work stress, and the greatest role of the system is to protect the legitimate rights and interests of employees and motivate employees to work. The rationality of the evaluation system affects the level of work stress. In the era of the knowledge economy, the competition facing colleges and universities is increasingly challenging. With the introduction of various assessment standards and personnel reform systems, the pressure on college teachers has grown, and mental health problems have become more prominent. Teachers in colleges and universities are subject to different levels of mental stress, and more than one-third of teachers are under excessive pressure. College teachers are high-pressure groups. The evaluation system of colleges and universities in China is based on horizontal comparison and often ignores teachers' individual differences and physical and psychological tolerance. Under an unreasonable evaluation system, college teachers' perceived pressure is also higher, and with gradual improvements to the evaluation system, the pressure felt by college teachers will decline. To reduce college teachers' work pressure, schools should follow the scientific laws of teaching and research; consider the unique nature of teachers' work; manage the relationships between administration, teaching, and scientific research; and formulate an objective and fair performance appraisal system.

Stress is a source of motivation, and a lack of power will seriously affect the quality of higher education. However, work pressure that is too high will inhibit improvement in college instructors' informatization teaching abilities. Excessive occupational stress can lead to college teacher burnout, and occupational stress has already proven detrimental to the development of college teachers' abilities. The positive effects of positive emotions and time pressure can improve the creative teaching effects among teachers and learners. Assessment is an important source of work stress, and the rationality of the assessment system affects the level of work stress, which in turn affects job performance. Many scholars have studied the impact of performance appraisal on college teachers' job satisfaction using questionnaire surveys. Work pressure has been applied as an intermediary to verify that occupational stress plays a partial intermediary role between assessment and job satisfaction. Under the high-intensity environment of the current evaluation system, university teachers are

involuntarily engaged in high-level academic production. The key to modifying university teachers' roles is to change the university teacher evaluation system. This study takes work pressure as the entry point and proposes that an unreasonable evaluation system will generate excessive work pressure, which is not conducive to stimulating instructor enthusiasm and improving their teaching abilities. Only a reasonable evaluation system will place moderate pressure on teachers, such that appropriate pressure can promote improvement in teaching abilities.

Based on the above discussion, this paper proposes the following:

H2: The rationality of the evaluation system has a positive impact on teachers' work stress reduction; that is, the more reasonable the evaluation system, the less stress teachers will be subjected to.

H3: A reduction in work stress has a positive impact on the improvement of college instructors' informatization teaching abilities; that is, greater work pressure will inhibit improvement in college instructors' informatization teaching abilities, and appropriate reduction of pressure will promote improvement in college instructors' informatization teaching abilities.

H4: Work stress plays an intermediary role in the impact of the evaluation system on the informatization teaching abilities of college teachers; that is, the evaluation system tends to be rationalized, and the work pressure of college teachers will be reduced, which will promote improvement in college instructors' informatization teaching abilities.

Research Design

Research Scale Design

To ensure reliability and validity of the questionnaire, the scales in this study were drawn from reputable domestic and international journals to identify key indicators. This survey measured three variables: the evaluation system, work pressure, and informatization teaching abilities of college instructors. In addition to collecting teachers' demographic information, assessment items were scored on a five-point Likert-type scale.

Assessment system scale. Research on the informatization teaching evaluation system at home and abroad began in 1990. Well-known educational informatization evaluation index systems in foreign countries include the enGauge evaluation framework, jointly developed by NCREL and NCRTEC in the United States; the information informatization evaluation tool Sta R, developed by the American Education Technology CEO Forum; and the ICT in Education evaluation provided by the World Bank InfoDev organization. An SRF assessment tool has been issued by the UK Educational Communications and Technology Agency. In China, many scholars believe that the unreasonable evaluation system will affect the development of instructors' teaching abilities and performance. Therefore, scholars have analyzed the rational design of an evaluation system and effective evaluation of teaching performance. Some scholars pointed out that evaluation content should include all aspects of teacher development (academic level, teaching abilities, personal development, and organizational relationships). The developments of information technology, resources, media, and

environment have played important roles in modern education and teaching activities and become increasingly important components of the information-based teaching system. Based on scholarly research, this study initially designed an informationization teaching evaluation system scale that covers 14 topics in teaching, research, management, and qualification.

Working pressure scale. In a new education era, teaching reform in the information age will place new pressure on teachers. [Kyriacou & Sutcliffe \(1977\)](#) proposed the concept of teacher work stress and designed a teacher work stress scale, scored on a five-point scale. Then, [Cockburn \(2011\)](#) further analyzed teachers' work pressure and means of stress reduction. In the information age, multimedia technology has brought convenience to teachers, but it has also generated new pressures. In addition, workload, job title review and appointment, treatment and working conditions, testing and evaluation, and self-development were other sources of stress faced by college teachers. Therefore, based on the teacher work pressure gauge developed, this study combines stressors on teachers in the information age to analyze work pressure among college information teachers. This part of the scale involves four aspects (job security, workload, work relationship, and work status) and includes 18 questions in total ([Brinkley-Etzkorn, 2018](#); [Scott et al., 2017](#)).

Information teaching abilities. The implementation of teaching reform has new requirements for college instructors' informatization teaching abilities. Research on informatization teaching abilities is expanding, but a corresponding structural framework has not yet come to a unified conclusion. By analyzing many scholars' findings, the discussion around the structure of informatization teaching abilities has been based primarily on [Dineke, Diana, Ineke, & Cees \(2004\)](#) definition of teaching abilities, which has been extended to the multi-dimensional structure of informatization teaching abilities. The three dimensions include information-based teaching design abilities, informationization implementation abilities, and information chemical industry inspection and evaluation abilities. This study is based on these three dimensions, supplemented by the 21st-century American teacher education technology standards developed by the International Association of Educational Technology-ISTENETS with reference to other literatures on informatization teaching abilities to measure and analyze college instructors' informatization teaching abilities ([Claro et al., 2018](#)). This part of the scale involves three aspects: informatization teaching design abilities, informatization teaching implementation abilities, and informatization teaching academic examination and evaluation abilities, including 15 questions in total ([Tsai et al., 2018](#)).

Data Acquisition

This study discusses the impact of the college teacher evaluation system on the college instructors' informatization teaching abilities; the sample was limited to teachers in ordinary universities. Considering the status quo and development level of China's colleges and universities, higher education institutions in each region were included in the overall sampling range. Given the difficulty of survey implementation, the universities we contacted comprised the main sampling range. To ensure a representative sample, 5 to 10 questionnaires were issued to each university, and the accuracy of the survey was considered. Respondents were limited to college teachers.

Data were collected in March 2017, and the questionnaire was distributed via paper questionnaires and electronic questionnaires (i.e., email). Sample selection included Changsha City, Hunan Province, Shapingba District, Beibei District, Chongqing City, Zhengzhou City, and Henan Province, involving 316 teachers from Central South University, Hunan University, Chongqing University, Southwest University, Zhengzhou University, and others. The questionnaire was sent to 268 participants with a return rate of 84.8%; 252 valid questionnaires were selected, with an effective rate of 79.7%. Sample profile characteristics from valid surveys are listed in Table 1.

Table 1
Sample Basic Statistical Characteristics

Category	Quantity	Proportion	Category	Quantity	Proportion
Gender			Age		
Male	158	62.7%	Under 25 years old	17	6.7%
Female	94	37.3%	26–35 years old	89	35.3%
			36–45 years old	108	42.9%
			Over 46 years old	38	15.1%
Teaching age			Education level		
5 years and below	37	14.7%	Bachelor's degree	17	6.7%
6–15 years	72	28.6%	Master's degree	91	36.1%
16–25 years	111	44%	PhD and above	144	57.1%
More than 26 years	32	12.7%			
Types of school			Subject		
Research universities	47	18.7%	Liberal arts	83	32.9%
Teaching undergraduate college	21	8.3%	Science	52	20.6%
Research teaching, teaching and research university	184	73%	Business	72	28.6%
			Others	45	17.9%

Data Analysis

Research Scale Design

Reliability is a reflection of the reliability, consistency, or stability of a measurement. In this paper, scale reliability was evaluated by testing the internal consistency coefficient and load value of the corresponding factor. First, the reliability of the scale was tested using Cronbach's alpha coefficient and indicated satisfactory reliability and internal consistency; see Table 3. The Cronbach's alpha coefficient is 0.980, which is greater than 0.8 and indicates strong reliability. The variable combination reliability was greater than or equal to 0.8138, indicating good internal consistency (Tigelaar *et al.*, 2004).

Because the informational teaching abilities facet is examined first in this paper, this study conducted an exploratory factor analysis (EFA) on each secondary facet in the questionnaire where $KMO = 0.880 > 0.7$. The p value of Bartlett's sphericity test was $0.000 < 0.001$, based on principal component analysis. Factor loadings with varimax rotation are shown in Table 2. The factor loading of each item was between 0.586 and 0.835 (greater than 0.5), indicating that the informatization teaching abilities facet could extract the three sub-facets of informational teaching design abilities, information teaching implementation abilities, and information chemical industry inspection and evaluation abilities through EFA. The factor loadings of other facet items were obtained the same way (Coates & Humphreys, 2001; Ozkan & Koseler, 2009).

Table 2
KMO and Bartlett's Sphericity Test Results

Sampling enough Kaiser-Meyer-Olkin measure		.880
Bartlett's sphericity test	Approximate χ^2	5248.089
	<i>df</i>	1081
	Sig.	.000

Validity Test

This study examined scale validity in terms of content validity, convergent validity, and differential validity. For content validity, scale items were derived from the literature. Before finalizing the scale, we invited scholars and experts in the field to conduct semi-structured interviews and revise some items; therefore, the scale has good content validity. For convergent validity, this paper used AMOS22.0 to perform confirmatory factor analysis (CFA) on the scale. As shown in Table 3, the factor loading of each item was between 0.71 and 0.90 (between 0.5 and 0.95), significant at the 0.001 level. The average variance extracted (AVE) was between 0.5931 and 0.700 ($AVE \geq 0.5$). Overall, the convergence of scale facets was quite high. Table 4 indicates that the correlation coefficient between the evaluation system, work pressure, and information-based teaching abilities was small relative to the AVE square root coefficient, substantiating strong differences between the various facets.

Research Hypothesis Test and Impact Effect Analysis

To further validate research hypotheses using SEM, this study employed AMOS22.0 software to test the fit of the model to the data (χ^2/df , CFI, IFI, TLI, and RSMEA); results are shown in Table 5. Each indicator either approached or reached the corresponding standard value within the acceptable range, indicating that the model fit the data well.

Table 3
Scale Reliability and Validity Results

Facet	Sub-facet	Item description	Exploratory factor analysis factor load	Confirmatory factor analysis factor load
Evaluation System (ES) $\alpha = 0.957$	Teaching (T) $\alpha = 0.895$	Schools set minimum hours of tuition for teachers	0.639	0.73
		School inspection and evaluation of teachers' attendance	0.736	0.82
		The basic requirements of the school for teachers to use modern teaching methods such as MOOC	0.714	0.80
		School requirements for teachers to develop extracurricular students	0.729	0.84
		School regulations on student expectations and teaching satisfaction	0.712	0.78
	Research (R) $\alpha = 0.918$	The school has to bear the relevant regulations for scientific research projects every year.	0.746	0.90
		School requirements for teachers to publish teaching reference books, monographs or self-edited lectures	0.696	0.82
		School requirements for teachers to publish papers or receive awards, etc.	0.728	0.89
		The basic requirements of the school for the transformation of teachers' scientific research achievements	0.711	0.84
	Management (M) $\alpha = 0.850$	Basic requirements for teachers' administrative duties	0.699	0.85
		Basic requirements for teachers' academic part-time job	0.748	0.87
	Qualification (Q) $\alpha = 0.831$	School requirements for minimum attendance at teachers	0.701	0.90
		The basic assessment requirements of teachers' political and ideological level and moral quality	0.648	0.80
		School minimum requirements for teacher titles and professional diplomas	0.697	0.71
	Working pressure (WP) $\alpha = 0.964$	Job security (JS) $\alpha = 0.916$	Unemployment risk that may be perceived as a steady state of work	0.707
Difficulty in job title evaluation and job promotion conditions			0.695	0.77
The level of wages and benefits compared to the work undertaken			0.719	0.82
Social expectations and requirements for college teachers			0.699	0.85
Exchange learning opportunities such as learning and training			0.687	0.81
School supply and demand for information-based teaching			0.686	0.80
Workload (W) $\alpha = 0.933$		Informatization teaching requires teachers to update their knowledge and skills.	0.762	0.89
		Student requirements and expectations for teachers	0.745	0.84
		The difficulty of actual operation of network teaching software	0.709	0.83
		Informational teaching leads to changes in teachers' workload	0.733	0.88
Working relations (WR) $\alpha = 0.813$		Informational teaching causes teacher role transformation	0.712	0.85
		Relationship with leadership	0.674	0.78
		Relationship with colleagues	0.628	0.75
Working status (WS) $\alpha = 0.866$		Communicate with students	0.586	0.78
		Work is recognized by the organization	0.680	0.79
	Interest in working for one's own work	0.721	0.82	
	Confidence in the future development of the school	0.744	0.81	
Informatization teaching abilities (ITA) $\alpha = 0.971$	Informatization teaching design abilities (D) $\alpha = 0.932$	Tightness of work and leisure schedule	0.674	0.74
		Informational teaching leads to changes in teachers'	0.812	0.87
		Informational teaching causes teacher role transformation	0.785	0.81
		Relationship with leadership	0.740	0.85
		Relationship with colleagues	0.824	0.87
	Informatization teaching implementation abilities (I) $\alpha = 0.908$	Communicate with students	0.748	0.88
		I am able to carry out teaching according to the actual teaching skill and flexible use of different teaching methods and teaching strategies.	0.825	0.88
		I can use the informational teaching environment (such as MOOC, micro-course, course app, etc.) to assist teaching.	0.728	0.76
		I can use information technology to design and build a learning environment that is conducive to learning, and to stimulate students' motivation.	0.707	0.81
		I can use all kinds of information technology to guide and inspire the difficult points in the learning and other learning (such as creating a situation) and conduct appropriate teaching.	0.757	0.83
	Informatization chemistry industry inspection and evaluation abilities (IE) $\alpha = 0.934$	I am able to respond flexibly to emergencies in the teaching process, such as timely solving technical problems in the online course (no sound, no video playback, etc.)	0.697	0.81
		I can reasonably set the latest evaluation goals and evaluation criteria.	0.835	0.89
		I can answer questions or interact with students through interviews, emails, QQ, SMS or phone calls.	0.720	0.81
		I can use information technology tools to conduct diagnostic, formative, and summative evaluations for students.	0.755	0.89
		I can objectively and reasonably analyze or interpret evaluation data and results.	0.783	0.87
I am able to reflect on and correct the problems that arise during the teaching process.	0.766	0.84		

Table 4
Descriptive Statistics and Correlation Coefficient Matrix of Main Variables (n = 252).

	Evaluation system	Working pressure	Information teaching abilities
Evaluation system	0.827		
Working pressure	0.661***	0.812	
Information teaching abilities	0.740***	0.678***	0.845
Mean	3.491	3.458	3.555
variance	0.595	0.613	0.610
Standard deviation	0.772	0.783	0.781

Note. Coefficients are all significant above the 5% level. Data below the diagonal are correlation coefficients; data on the diagonal are AVE values; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 5
Confirmatory Factor Analysis of Host Variables (n = 252).

	CFI	IFI	TLI	RSMEA	χ^2/df (Overall fit validity)
Evaluation system	0.951	0.952	0.937	0.090	1.787
Working pressure	0.888	0.890	0.868	0.117	2.329
Information teaching abilities	0.929	0.930	0.914	0.113	2.236
Reference	>0.900	>0.900	>0.900	<0.08	1-3

Correlation analysis. Table 4 shows the correlation coefficients and AVE values of the main variables. The correlation coefficient between the evaluation system and college instructors' informatization teaching abilities was 0.740, suggesting that the rationality of the evaluation system had a direct positive impact on instructors' informatization teaching abilities, thus lending initial support to H1. The correlation coefficient of the evaluation system and work pressure was 0.661, indicating that the rationality of the evaluation system and degree of work stress reduction exert a positive impact; hence, H2 was initially supported. The correlation coefficient between work stress and informatization teaching abilities was 0.678, reflecting that the degree of work stress reduction was informatized with a significant positive impact, initially supporting H3.

Research hypothesis test. SEM estimation was used to verify the three research hypotheses; the AMOS mediation effect model is shown in Figure 2.

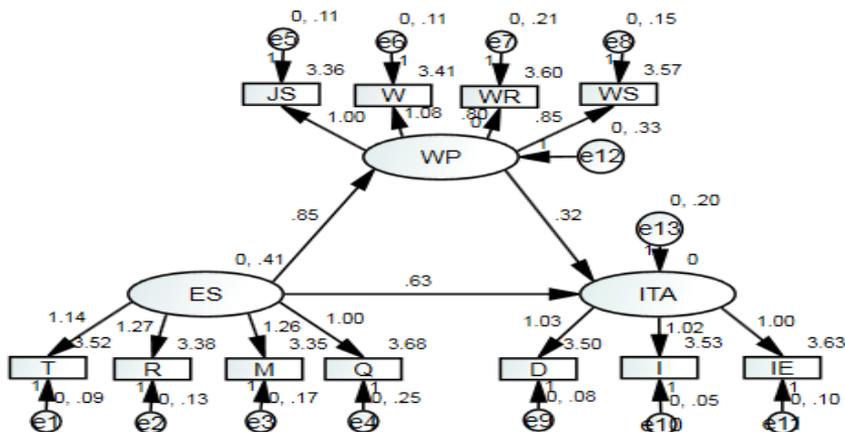


Figure 2. Intermediary model diagram of working pressure.

Table 6
Path Coefficient and Hypothesis Testing Results of Structural Equation Model

Assumed path	Standardization coefficient	S.E.	C.R.	P	Result
H1: Evaluation System → Information Teaching Abilities	0.627	0.125	5.014	***	Supported
H2: Evaluation system → work pressure	0.849	0.126	6.761	***	Supported
H3: Work stress → information teaching abilities	0.321	0.095	3.388	***	Supported

Note. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Based on Table 6 and Figure 2, the following conclusions can be drawn:

(1) The standardized path coefficient of the impact of the evaluation system on college instructors' information teaching abilities was 0.627, significant at the 1% level. Reasonable performance of the evaluation system effectively promoted instructors' informatization teaching abilities, further confirming H1.

(2) The standardized path coefficient of the impact of the evaluation system on work pressure was 0.849, significant at the 1% level. The rationality of the evaluation system could effectively reduce college instructors' work pressure, combined with work pressure and information teaching abilities. The impact was significant, and the evaluation system exerted an indirect influence on college instructors' informatization teaching abilities through the intermediary role of work pressure, partially confirming H4.

(3) The standardized path coefficient of the influence of work stress on information teaching abilities was 0.321, significant at the 1% level. Appropriately reducing college instructors' work pressure could promote improvement in information teaching abilities at colleges and universities, further confirming H3.

Re-testing the Mediating Effect of Work Stress

Based on H4, we examined the potentially direct impact of the appraisal system on college instructors' informatization teaching abilities and the potentially mediating role between the evaluation system and informatization teaching abilities. In assessing the organization's support for mediating effects, this study used SPSS 18.0 to perform hypothesis testing using hierarchical regression analysis. According to Baron and Kenny (1986), the mediating effect should satisfy four conditions: (1) the independent variable exerts a significant influence on the dependent variable; (2) the independent variable exerts a significant influence on the mediator variable; (3) the mediator variable exerts a significant influence on the dependent variable; and (4) the independent variable and the mediator variable are substituted into the regression equation at the same time. When the dependent variable is explained, the effect of the mediator variable is significant, and the effect of the independent variable either disappears (complete mediating effect) or weakens (partial mediating effect).

First, we tested the effects of independent variables on the mediation variables in Model 1: $M = aX + e_2$; then, we entered the mediation variables and independent variables into the regression equation (see results in Table 6). The evaluation system exerted a significant impact on work pressure, further verifying H2.

Second, we tested the effect of the independent variable on the dependent variable in Model 2: $Y = cX + e_1$; then, we entered the dependent variable and independent variable into the regression equation (see results in Table 7). The independent variable exerted a significant influence on the dependent variable, and the evaluation system had a significant positive impact on improvement in informatization teaching abilities, further confirming H1.

Third, we tested the role of the mediator variable on the dependent variable in Model 3: $X = bM + e_3$; then, we entered the dependent variable and mediator variable into the regression equation (see results in Table 7). The mediator variable exerted a significant impact on the dependent variable, indicating that work stress had a significant positive impact on the improvement of informatization teaching abilities and further verifying H3.

Fourth, we tested the mediating effect of the mediator variable in Model 4: $Y = c^{\wedge}X + bM + e_4$; then, we entered the dependent variable, independent variable, and adjustment variable into the regression equation (see results in Table 7). The presence of a mediating effect was indicated by the significance level and changes in R^2 . Model 4 ($R^2 = 0.612$) increased the explanatory power by 6.4% compared with Model 3 ($R^2 = 0.548$) and increased the explanatory power by 15.2% compared with Model 2 ($R^2 = 0.460$). The test coefficients c^{\wedge} and b were each significant at the 0.001 level. According to Baron and Kenny's criteria for mediation, work stress played a partial intermediary role between the evaluation system and improvement in college instructors' informatization teaching abilities, confirming H4.

Table 7
Validity of Work Stress Between Evaluation System and Informatization Teaching Abilities.

	Working pressure		Informatization teaching abilities	
	Model 1	Model 2	Model 3	Model 4
Evaluation system	0.661***	0.740***		0.525***
Working pressure			0.678***	0.336***
R^2	0.437	0.548	0.460	0.612
Adjusted R^2	0.431	0.544	0.455	0.604
F	74.486***	116.532***	81.855***	74.832***

Note. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Conclusion and Enlightenment

This paper takes college teachers as the research object, adopts SEM, empirically studies the influence mechanism of the evaluation system on college instructors' informatization teaching abilities, introduces work pressure as the transmission intermediary, and improves the transmission of the evaluation system to college instructors' informatization teaching abilities. The path has theoretical value and practical significance and provides a valuable reference for reform in the teaching system in China's colleges and universities.

Analysis Conclusion

This paper explores the relationship between the evaluation system in the teaching reform of colleges and universities, work pressure of college teachers, and college instructors' informatization teaching abilities. Findings present some worthwhile conclusions.

(1) The teacher evaluation system plays an important role in the educational reform of colleges and universities in China. Empirical evidence shows that the rationality of the evaluation system directly affects college instructors' information teaching abilities; thus, under the background of information development, the evaluation system of colleges and universities in China involves teaching and scientific research; management and other aspects set corresponding indicators and requirements, so college teachers have the direction and motivation to learn, thus improving their informatization teaching abilities.

(2) Work stress is an important intermediary of the evaluation system for teachers' informatization teaching abilities. Empirical evidence shows that college teachers' work pressure is positively affecting their informatization teaching abilities, indicating that less pressure can effectively improve informatization teaching ability. In college education reform, schools should pay attention to stress management, define workloads clearly, and establish corresponding assessment and incentive measures. Teachers must leave the ivory tower and learn stress management and self-regulation to avoid the consequences of excessive stress.

(3) The impact of the evaluation system on college instructors' informatization teaching abilities includes direct and indirect influences based on work pressure. Education reform has rendered competition among colleges and universities fiercer. The unreasonable evaluation system has placed college teachers under tremendous pressure and hindered the improvement of their informatization teaching abilities. In the reform of colleges and universities, it is necessary to relax, develop a comprehensive scientific evaluation system index, reasonably confirm index weights, provide accurate feedback on assessment results, and make corresponding assessment adjustments in a timely manner to promote improvement in instructors' informatization teaching abilities and teaching quality.

Insufficiencies and Prospects

This study has the following shortcomings and areas for improvement:

(1) The sample size of this study ($n=252$) was slightly insufficient, and 61.5% of respondents were liberal arts and business teachers, which may reduce the external effects of our conclusions. Relatively, liberal arts business teachers are more social, and the pressure of the evaluation system may be weakened; thus, it is necessary to balance the sample structure.

(2) Psychological stress is a reflection of an individual's cognitive evaluation under environmental stimulation. This study ignored the influence of individual cognition on stress, so cognitive evaluation should be addressed in future research.

(3) A high-pressure phenomenon persists among college teachers; pressure reduction will promote improvement in informatization teaching abilities. However, with the gradual advancement of reform in the university teaching system, the pressure on college teachers may change. It is not yet clear whether the influence of reform on informatization teaching abilities will be suppressed or improved.

References

- Brinkley-Etzkorn, K. E. (2018). Learning to teach online: measuring the influence of faculty development training on teaching effectiveness through a Tpack lens. *Internet & Higher Education*, 28-35. <https://doi.org/10.1016/j.iheduc.2018.04.004>
- Claro, M., Salinas, A., Cabello-Hutt, T., Martín, E. S., Preiss, D. D., Valenzuela, S., & Jara, I. (2018). Teaching in a digital environment (tide): defining and measuring teachers' capacity to develop students' digital information and communication skills. *Computers & Education*, 121, 162-174. <https://doi.org/10.1016/j.compedu.2018.03.001>
- Coates, D., & Humphreys, B. R. (2001). Evaluation of computer-assisted instruction in principles of economics. *Educational Technology & Society*, 4(2), 133-144. <https://www.jstor.org/stable/jeductechsoci.4.2.133>
- Cockburn, A. D. (2011). Primary teachers' knowledge and acquisition of stress relieving strategies. *British Journal of Educational Psychology*, 66(3), 399-410. <https://dx.doi.org/10.1111/j.2044-8279.1996.tb01205.x>
- Dineke, E. H., Diana, H. J. M., Ineke, H. A. P., & Cees, P. M. (2004). The development and validation of a framework for teaching competencies in higher education. *Higher Education*, 48(2), 253-268. <https://doi.org/10.1023/B:HIGH.0000034318.74275.e4>
- Kyriacou, C., & Sutcliffe, J. (1977). Teacher stress: A review. *Educational Review*, 29(4), 299-306. <https://doi.org/10.1080/0305569780040101>
- Ozkan, S., & Koseler, R. (2009). Multi-dimensional students' evaluation of e-learning systems in the higher education context: An empirical investigation. *Computers & Education*, 53(4), 1285-1296. <https://dx.doi.org/10.1016/j.compedu.2009.06.011>
- Scott, K. M., Baur, L., & Barrett, J. (2017). Evidence-Based Principles for Using Technology-Enhanced Learning in the Continuing Professional Development of Health Professionals. *Journal of Continuing Education in the Health Professions*, 37(1), 61-66. <https://dx.doi.org/10.1097/CEH.0000000000000146>
- Tigelaar, D. E. H., Dolmans, D. H. J. M., Wolfhagen, I. H. A. P., & Vleuten, C. P. M. V. D. (2004). The development and validation of a framework for teaching competencies in higher education. *Higher Education*, 48(2), 253-268. <https://doi.org/10.1023/B:HIGH.0000034318.74275.e4>
- Tsai, C., Chang, Y., & Lo, C. (2018). Learning under time pressure: Learners who think positively achieve superior learning outcomes from creative teaching methods using picture books. *Thinking Skills and Creativity*, 27, 55-63. <https://doi.org/10.1016/j.tsc.2017.11.003>
- Vogt, F., & Rogalla, M. (2009). Developing adaptive teaching competency through coaching. *Teaching & Teacher Education*, 25(8), 1051-1060. <https://doi.org/10.1016/j.tate.2009.04.002>