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Research on Knowledge Hiding Behavior of Physical Education Teachers in Primary and Secondary Schools of Hunan Province

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Abstract: The knowledge concealment behavior of members of the Physical education Teacher Workshop online training seriously hinders the improvement of teachers' professional development level. Uncovering the influencing factors and behavioral logic behind knowledge concealment behavior is an urgent task to improve the quality of online training. The study focused on the knowledge concealment behaviors of members of online training workshops for physical education teachers in primary and secondary schools in Hunan Province. A total of 309 physical education teachers from 5 workshops were randomly sampled as the subjects of the survey. Social science research methods such as literature review, scale measurement, and mathematical statistics were used to study the influencing factors of knowledge hiding behavior in online training of physical education teachers' workshops in primary and secondary schools in Hunan Province. The anacedent variables of the influencing factors were summarized as self-efficacy, knowledge characteristics and context atmosphere, and participation was used as the moderating variable to explore the influence of knowledge hiding behavior in Hunan Province physical education teacher workshops, provide effective support for reasonable prevention of knowledge hiding behavior, and offer reasonable suggestions for promoting the development of Hunan Province primary and secondary school physical education teacher workshops.

1. Introduction

Primary and secondary school teacher workshop is a new online training model for enhancing teachers' professional skills. Through the teacher workshop online training platform, a hybrid training of online and offline is carried out. Relying on subject experts and key teachers, all teachers in a certain subject (field) within a certain area are led to develop the habit of online learning and establish the awareness of shared and cooperative learning. It is of great significance for the overall improvement of teaching and educational abilities. Although workshops originated as a form of

learning and discussion in physical Settings, the open sharing of knowledge has not shown a positive trend. Instead, the phenomenon of knowledge concealment is widespread. in 2012, Connelly[1] et al. introduced the concept of Knowledge hiding behavior in their paper "Knowledge hiding in organizations". Cerne [2] analyzed the role of a good environment and creativity in knowledge hiding behavior. Tang et al. [3] examined the interrelationship between ethical leadership and knowledge sharing as well as knowledge hiding by using psychological engagement as a mediating variable. Many scholars' research on the influencing factors of knowledge hiding behavior is gradually enriching and can explore the causes of knowledge hiding behavior from a more complete and systematic dimension, and knowledge hiding behavior in virtual communities is more complex than that in physical organizations. Therefore, it is particularly urgent to explore the factors that influence knowledge hiding behavior and to seek countermeasures.

2 Study hypotheses

2.1 Research on self-efficacy and knowledge Hiding Behavior

Self-efficacy is the confidence or belief that an individual needs to have in order to reach a predetermined goal or achieve success. It is essentially the result of an individual's subjective judgment, and this judgment can greatly influence an individual's behavior. In social cognitive theory, Bandura also points out that individuals are willing to do what they can do within their capacity, and seldom act on what they are unable to do. The study by Anand and Jain[4] highlights that in physical organizations, an individual's personality traits significantly influence their behavior of knowledge sharing. In the context of virtual communities, cognitive traits mainly refer to the specific language habits and communication styles of individuals in social networks, which involve self-efficacy, risk awareness, cost perception, and knowledge and psychological belonging. Among the cognitive characteristics of knowledge-hiding behavior, self-efficacy is dominant, followed by psychological belonging. Lin and Huang [5] pointed out that users are more willing to share knowledge if they are confident that they can answer others' questions. The research by Gan et al. [6] reveals that when users in virtual communities lack confidence in providing high-quality information, they tend to avoid the knowledge demands of other users.

Based on the research theories of experts and scholars at home and abroad, the study found that there is a certain correlation between self-efficacy and knowledge hiding behavior. The higher the degree of self-efficacy among the trainees, the higher their participation and the lower their knowledge hiding behavior. Therefore, this paper puts forward the following hypothesis:

H1: Self-efficacy (SE) directly affects knowledge hiding (KH) behavior and is modulated by engagement (DP).

2.2 Research on Knowledge Characteristics and Knowledge Hiding Behavior

The value of knowledge is usually more easily manifested in physical environments, but in online communities, due to the diversity of participants and the wide range of problems, its value may vary from person to person. Connelly et al. [1] suggested that when acquiring knowledge requires a great deal of time and effort, that is, when knowledge complexity is high, people may choose to hide knowledge for fear of affecting the main task. HUO et al. [7] found that the value of knowledge is indeed related to the behavior of knowledge concealment. Sun et al. [8] pointed out that the competitive environment may cause knowledge providers to weaken their competitive advantage by sharing professional skills. It can be concluded that in the online training of physical education teacher workshops, the higher the intrinsic value of the knowledge, the more likely the trainees are to engage in knowledge concealment. Ning Jingjing [9] proposed that the types of knowledge, namely

explicit knowledge and tacit knowledge, affect user knowledge sharing. Compared with explicit knowledge, tacit knowledge is more difficult to convey directly during the sharing process. According to Zhang Ru's [10] view, the essential feature of tacit knowledge is that it is difficult to express precisely in words. It usually needs to be transformed into understandable explicit knowledge in virtual communities through means such as metaphor, analogy and transfer, so that learners can absorb and apply it.

The study, based on the research theories of experts and scholars at home and abroad, found that the more complex the characteristics of knowledge are, the more likely knowledge hiding behavior is to occur, but to some extent, it can increase the participation of the trainees. Therefore, this paper puts forward the following hypotheses:

H2: Knowledge features (KC) directly influence knowledge hiding (KH) behavior and are modulated by engagement (DP).

2.3 Research on Contextual Atmospheres and knowledge hiding behavior

Contextual atmosphere represents an atmosphere or situation that is gradually formed through interaction among users within a virtual community and can be perceived by users and influence their behavior, which is quite different from knowledge hiding in offline enterprise organizations or knowledge teams. Reciprocity refers to the expected benefit that an individual will gain from the need for feedback on future gains after sharing their knowledge. Li Jinyang [11] found that when users discover that the knowledge in a virtual community can meet their own knowledge needs, they will contribute their knowledge more actively, presenting a reciprocal state, which can sometimes be material or psychological rewards. Gu Kai [12] proposed reciprocity based on the social exchange theory, indicating that good interpersonal relationships among individuals need to be formed through continuous reciprocal exchanges among individuals. Trust is when users trust the knowledge shared in a virtual community, believing that the community has a spirit of solidarity and mutual assistance. Yen [13] et al. pointed out that trust is an external environmental factor. Yen et al. view trust as a subjective emotion of users towards the community. YANG [14] suggested that if there is a lack of mutual trust in an online community, users will be reluctant to devote their time and energy to the community. Conversely, when members trust each other, they will be more active. Justice means that individuals feel they are treated equally with others and receive corresponding rewards or resources. HUO et al. [7] suggested that a higher sense of organizational justice can enhance the positive atmosphere among organizations. Conversely, when individuals do not feel a sense of justice within an organization, they will reduce their desire to share knowledge.

Based on the research theories of experts and scholars at home and abroad, the study found that a good and fair situational atmosphere can increase the participation of trainees and prevent the occurrence of knowledge concealment behavior. Therefore, this paper puts forward the following hypotheses:

H3: Contextual atmosphere (SA) directly influences knowledge hiding (KH) behavior and is modulated by engagement (DP). (Figure 1)

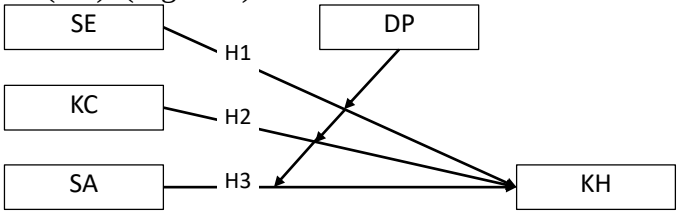

Figure 1 Research the theoretical model

3. Research methods

3.1 Scale Development

Part 1 is basic information. The content includes questions such as gender, age, educational attainment, etc. Part 2: Evaluation and measurement were conducted using a 7-point Likert scale based on literature collation and review. Self-efficacy scale from Gu Kai [12], Knowledge Characteristics scale from Zuo Minghui (2009), Contextual Atmosphere scale from Tang Xinyue (2021), Engagement scale from Li Jiawen et al. (2022), Knowledge Concealment scale from Tang Xinyue (2021), combined with the contextual characteristics of online training and the professional characteristics of middle school physical education teachers The item description was contextualized and revised, and after the pre-research, the scale had good reliability and validity, providing a reliable measurement tool for the study.

3.2 Data Collection

The research subjects were the online training input of the participants of the Hunan Province Middle School Physical Education Teacher Workshop (referred to as: Teacher Workshop), and the research subjects were the participants of the Hunan Institute of Science and Technology who undertook the Hunan Province "National Training Program" Middle School Physical Education Teacher Workshop in the past three years. The samples were from middle school physical education teachers in 13 prefecture-level cities and 1 autonomous prefecture in Hunan Province, including Changsha and Yueyang. A questionnaire survey was conducted between January 5 and 15, 2025. A total of 330 questionnaires were distributed through the online platform. After excluding 21 invalid questionnaires, 309 valid questionnaires were obtained, with an effective recovery rate of 93.6%. Among them, 168 were female teachers (54.37%) and 141 were male teachers (45.63%); Teachers aged 26-30 99 (32.04%), 31-40 136 (44.01%), and over 41 74 (23.95%).

3.2.1 Scale test

The content validity (CVI≥0.78), structural validity (CFI≥0.90), and reliability (Cronbach'sα≥0.80) of the questionnaire were tested. The overall reliability Alpha coefficient of the scale was 0.907, and all subscales were above 0.85; The standardized path coefficients of each item on the factor to which it belongs are all above 0.6. In addition, the CR of each variable is above 0.5, the AVE is above 0.75, and the converging validity is relatively reliable. The study model had a good fit for indicators such as CMIN/DF (3.532), RMSEA (0.091), IFI (0.897), TLI (0.877), CFI (0.896), and NFI (0.862).

4. Research Results

4.1 Analysis of Differences

Table 1 Analysis of Gender Differences

	1. Your gender (mean ± standard deviation)		*t-value*	*p-value*
	Male (*n*=141)	Female (*n*=168)		
SE	4.96±1.10	4.61±0.75	10.606	.001 * *
KC	4.93±0.92	4.77±1.05	1.853	.174
SA	5.04±1.01	4.70±0.91	9.864	.002 * *
DP	5.11±1.14	4.77±1.02	7.693	.006 * *
KH	3.88±1.68	4.56±0.94	20.292	.000 * *

* $p<0.05$ ** $p<0.01$

Table 1 shows significant differences in self-efficacy (SE), contextual atmosphere (SA), engagement (DP), and knowledge hiding (KH) between men and women ($p<0.05$).

Table 2 Analysis of Age Differences

	2. Your Age (mean ± standard deviation)			*F-statistic*	*p-value*
	26-30 years old (*n*=99)	31-40 (*n*=136)	Over 41 (*n*=74)		
SE	5.33±1.06	4.47±0.78	4.56±0.67	31.286	.000 * *
KC	5.20±0.78	4.59±1.08	4.84±0.97	11.553	.000 * *
SA	5.35±0.96	4.58±0.92	4.71±0.80	21.891	.000 * *
DP	5.32±1.26	4.67±0.98	4.87±0.90	10.997	.000 * *
KH	3.54±1.82	4.55±0.94	4.64±0.89	22.428	.000 * *

* $p<0.05$ ** $p<0.01$

Table 2 shows significant age differences ($p<0.05$) in self-efficacy (SE), knowledge characteristics (KC), contextual atmosphere (SA), engagement (DP), and knowledge concealment (KH), and that participants aged 26-30 showed higher expectations.

4.2 Path Analysis

To study how self-efficacy (SE), knowledge characteristics (KC), situational atmosphere (SA), and engagement (DP) directly affect knowledge hiding (KH) behavior after excluding the influence of control variables such as gender and age, multiple regression models were established using SPSS27.0.

Table 3 Multiple Regression Models

Model			Unstandardized coefficients		Standardized coefficient	t	Significance	VIF
			B	Standard error	Beta			
		(Constant)	2.5	.338		7.39	.000	
Independent variable		SE	-.228	.074	-.164	-3.103	.002	2.043
		KC	.318	.062	.259	5.127	.000	1.852
		SA	.378	.069	.289	5.456	.000	2.045
Control variables	Age	26-30	-.913	.139	-.328	-6.559	.000	1.826
		31-40	-.054	.116	-.022	-.469	.640	1.587
		40 above	0					
	Gender	male	-.083	.108	-.033	-.769	.442	1.353
		female	0					
R^2					.316			
R					20.910			
P					<0.001			
Dependent variable: KH								

Table 3 shows that R2>0.3, indicating that the model has a good fit and a significant influence. And after excluding the confounding interference of gender and age, self-efficacy significantly negatively affects knowledge hiding, while knowledge characteristics and contextual atmosphere significantly positively affect knowledge hiding; Secondly, the VIF values of the multicollinearity diagnosis were all less than 5, indicating that there was no multicollinearity among the variables. Based on the above analysis, the regression equation between the independent variable and the dependent variable is: KH=2.5+-0.228*SE+0.318*KC+0.378*SA

4.3 Moderating effects

The study adopts a data-centric approach and employs analytic hierarchy regression to analyze the data. That is, a regression analysis of self-efficacy, knowledge characteristics, contextual atmosphere (independent variable) against knowledge hiding (dependent variable) and engagement (moderating variable) is conducted first, followed by a regression analysis of knowledge hiding (dependent variable) against self-efficacy, knowledge characteristics, contextual atmosphere (independent variable), engagement (moderating variable) and the product of both (independent variable * moderating variable). By comparing the changes in the measurement coefficient R2 obtained from the two regression analyses, if it is significant, there is a moderating effect; otherwise, there is no moderating effect.

Table 4 Hierarchical Regression Analysis

Variable Names		KH				Significance	VIF
		Model 1	Model 2	Model 3	Model 4		
Control variables	Gender	.155	.151	.152	.056	.078	1.338
	Age	.255	.230	.226	.084	.010	1.420
Independent variables	SE		-.349	-.355	-.282	.000	2.539
	KC		.301	.299	.250	.000	1.919
	SA		.166	.151	.180	.000	3.654
Adjusting variables	DP			.028	-.158	.002	3.391
Interaction items	SExDP				-.501	.000	2.353
	KCxDP				.086	.022	1.839
	SAxDP				-.114	.022	3.051
R^2		.151	.269	.269	.504		
Adjusted R		.146	.261	.260	.495		
F		30.527	35.870	31.379	62.605		

Table 4 shows R2>0.3, indicating a good fit of the model, and the value of R2 gradually increases, indicating a significant moderating effect. Excluding the confounding interference of gender and age, participation as moderating variables, self-efficacy and contextual atmosphere significantly negatively affect knowledge hiding, and knowledge characteristics significantly positively affect knowledge hiding. When the VIF value is less than 5, there is no multicollinearity among the variables. The regression equation between the independent and dependent variables is: KH=-0.501* (SE*DP) +0.086* (KC*DP) +-0.114* (SA*DP).

5. Research Conclusions

There are significant group differences in knowledge hiding behavior among the members of the online workshop for physical education teachers in primary and secondary schools in Hunan Province, and the differences are mainly focused on gender and age. In terms of gender, the knowledge hiding behavior of male participants (3.88±1.68) was significantly lower than that of female participants (4.56±0.94) (t=20.292, p=0.000), and there was no gender difference only in knowledge feature perception (t=1.853, p=0.174). It is speculated that the higher level of knowledge hiding behavior in women is associated with fragmented training time and insufficient engagement in interaction due to family care stress; In terms of age, teachers aged 26-30 had the lowest knowledge hiding behavior (3.54±1.82), those over 41 had the highest (4.64±0.89), and those aged 31-40 (4.55±0.94) had a very significant difference in all dimensions (F=22.428, p<0.001). It reflects the characteristic that young teachers are more inclined to share knowledge due to the novelty of the profession, while older teachers' enthusiasm decreases with the increase of teaching years.

The direct effects of self-efficacy, knowledge characteristics, and situational atmosphere on

knowledge hiding behavior were significant, with the overall explanatory power of the model reaching 31.6% (R^2=0.316, F=20.910, p<0.001), and there was no multicollinearity among the variables (VIF <5). Among them, self-efficacy significantly negatively predicted knowledge hiding behavior (Estimate=-0.164, t=-3.103, p=0.002), that is, the stronger the participants' belief in their ability to answer questions and contribute knowledge, the more likely they are to avoid knowledge hiding. This is in line with the view in social cognitive theory that "individuals with high self-efficacy are more likely to take positive actions." Knowledge characteristics significantly positively predict knowledge concealment behavior (Estimate=0.259, t=5.127, p<0.001), indicating that the more complex and implicit the knowledge in training is (such as tactical design experience and personalized coaching skills in physical education teaching), Members are more likely to hide knowledge out of fear of "high sharing costs" or "loss of competitive advantage"; Contextual atmosphere significantly positively predicted knowledge hiding behavior (Estimate=0.289, t=5.456, p<0.001), reflecting the lack of reciprocity, trust, and sense of fairness in current workshops, which led to atmosphere perception failing to translate into sharing motivation and instead intensifying the hiding tendency due to "inefficient interaction".

The moderating effect of participation on the influence mechanism of knowledge hiding behavior is significant, significantly enhancing the model's explanatory power to 49.5% (adjusted R^2=0.495, F=62.605, p<0.001), and the moderating path is clear. Engagement significantly negatively moderates the relationship between self-efficacy and knowledge hiding (Estimate=-0.501, p<0.001), that is, the higher the engagement, the stronger the inhibitory effect of self-efficacy on knowledge hiding. Members with high engagement verify the value of their knowledge through frequent interaction, further reinforcing the "ability-belief-sharing behavior" cycle; Engagement significantly positively moderates the relationship between knowledge features and knowledge hiding (Estimate=0.086, p<0.05), which actually weakens the positive effect of knowledge features - high engagement members, due to their in-depth understanding of the application scenarios of knowledge, reduce the perception that "knowledge is complex and needs to be hidden"; Engagement also significantly negatively modelled the relationship between contextual atmosphere and knowledge hiding (Estimate=-0.114, p<0.05), where high-engagement members fully perceived reciprocity and trust in the context and transformed "atmosphere perception" into sharing motivation, while low-engagement members were unable to form an interactive closed loop, resulting in atmosphere perception being unable to reduce hiding behavior.

6. Research implications

The study, in combination with the core issue of knowledge hiding behavior among members of the online workshop for physical education teachers in primary and secondary schools in Hunan Province, revealed the direct effects of self-efficacy, knowledge characteristics, contextual atmosphere on knowledge hiding and the moderating effect of participation (adjusted R^2=0.495), providing a theoretical framework for the analysis of variable relationships in teacher training of the same subject. In practice, precise measures should be tailored to group differences: To enhance the quality of online training for physical education teacher workshops, implement the following measures: Provide flexible training modules and family support channels for female teachers, and establish an Experience Transformation Incentive Platform for educators over 41 years old to mitigate gender- and age-related knowledge-hiding tendencies. Anchor self-efficacy as a core driver by reinforcing the "ability-belief-knowledge-sharing" cycle through hierarchical task assignments (e.g., assigning complex physical education challenges to high self-efficacy teachers) paired with real-time feedback. Optimize training content by converting complex sports knowledge into case studies + video demonstrations, while fostering engagement through reciprocal points systems and

public recognition of high-quality contributions. Boost participation via a dual mechanism: basic interactive tasks (e.g., weekly discussions) and incentive-based commitments (e.g., earning credits for achieving engagement milestones), ultimately creating a closed-loop framework of external support → internal motivation → behavioral refinement.

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