Research on Personal Knowledge Management Model for Fragmented Learning Efficiency of College Students

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Abstract: The fragmented learning method makes college students obtain resources quickly and at the same time leads to poor learning efficiency, which requires college students to improve theire personal knowledge management ability to improve fragmented learningefficiency.Based on the existing theories and researches, the paper builds a personal knowledge management model for college students' fragmented learning, and conducts empirical tests and makes revisions to the model through questionnaires. The results show that learning motivation does not significantly affect the efficiency of fragmented learning, andpersonal knowledge needs & process of fragmented knowledge management have an impact on the efficiency of fragmented learning. In particular, knowledge management tools play a significant role in improving the efficiency of fragmented learning.

Keywords: College Students; Fragmented Learning; Personal Knowledge Management Model

1. Literature review

Neo-constructivism was proposed by Wang Zhuliin 2011, against the background of two problems of information overload and knowledge fragmentation that human learning is currently facing, emphasizing the construction of meaning including knowledge innovation on the classical constructivist idea. This learning theory focuses on exploring the learning process, learning motivation, and proposes relevant methods and strategies based on the analysis of the fragmentation characteristics in the era of online learning.

2. Proposed hypothesis and conceptual model

(1) Personal knowledge needs

Bandura argues that self-efficacy contributes to both cognitive processes and performance of individuals in different scenarios, believes that self-efficacy can directly influence learning motivation , and verifies the role of personal knowledge needs on learning motivation. The role of the personal knowledge needs dimension in the processes of knowledge acquisition, sharing and integration in the knowledge management process was verified in the model proposed by Liu Shuai. In summary, this paper argues that personal knowledge needs based on personal knowledge structure and self-efficacy measures have a positive effect on learning motivation, fragmented knowledge management process, and fragmented learning efficiency, and therefore proposes the following hypotheses.

H1a: Personal knowledge needs positively influence learning motivation.

H1b: Personal knowledge needs positively influence the fragmented knowledge management process.

H1c: Personal knowledge needs positively influence the efficiency of fragmented learning.

 (2) Construction of PKM model to improving the efficiency of fragmented learning

Based on the above theories and related researches, this paper constructs a personal knowledge management model of fragmented learning for college students, as shown in Figure 1.
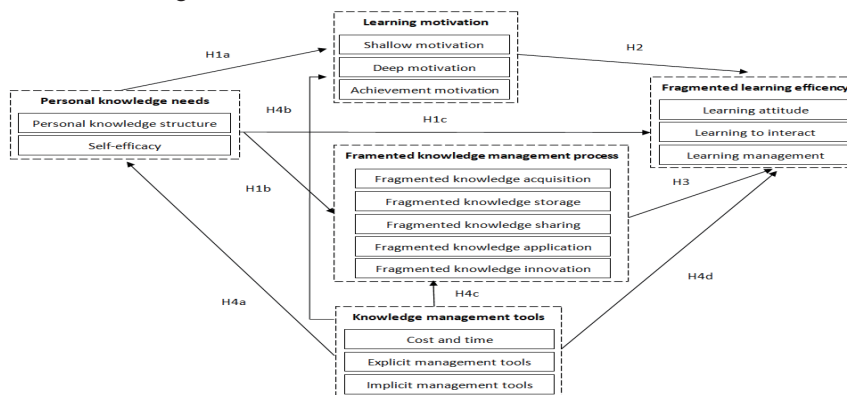

Figure 1. PKM model of fragmented learning for college students

3. Analysis model based on empirical data

1. Model measurement method

In this paper, the measurement scale for each element of the model is summarized as shown in Table 1. Based on this scale, a questionnaire is formed, including 3 entries of basic information and 35 core entries, and the main part of the questionnaire uses a Likert 5-level scale. The questionnaire items in this paper are divided into 5 dimensions, which are personal knowledge needs (A) with measurement items A1-A6, learning motivation (B) with measurement items B7-B9, fragmented knowledge management process (C) with

measurement items C10-C22, knowledge management tools (D) with measurement items D23-D25, and fragmented learning efficiency (E) with measurement items named E26-E35. There are 35 measurement items in total.

Table 1. List of structure and observed variables in the model

Structure Variables	Observed Varaibles	Measurement Items	Reference Sources
Personal knowledge needs (A)	Personal knowledge structure	Deeper professional knowledge(A1)	(Zhan Yue,2010)
		Broader non-specialized knowledge(A2)	
	Self-efficacy	Individual sense of competence(A3,A4)	(Xie Youru,2011)
		Individual sense of control(A5,A6)	
Learning motivation (B)	Shallow motivation	Learning task driven(B7)	(Long Chengzhi,2017)
	Deep motivation	Interest,personal competitiveness enhancement(B8)	
	Achievement motivation	Gaining a sense of accomplishment and satisfaction(B9)	
Framented knowledge management process (C)	Fragmented knowledge acquisition	Ability to locate fragmented knowledge sources(C10)	(Wei Yaoyang,2017)
		Ability to use search methods(C11)	
		Selective analysis capabilty(C12)	
	Fragmented knowledge storage	Classification and organizing ability(C13)	
		Storage capacity(C14)	
	Fragmented knowledge sharing	Application of information technology skills(C15)	
		Interpersonal communication(C16)	
		Dssemination capacity(C17)	
	Fragmented knowledge application	Knowldge translation,transferability (C18)	
		Knowledge generalization ability(C19)	
	Fragmented knowledge innovation	Ability to identify and discern problems(C20)	
		Imagenative adaptability(C21)	
		Knowledge construction ability(C22)	
Knowledge management tools(D)	Cost and time	Smaller expense and shorter time(D23)	(Liu Shuai,2019)
	Explicit management tools	Systematizing knowledge in an orderly fashion(D24)	
	Implicit management tools	Facilitate communication(D25)	
Fragmented learning efficency (E)	Learning attitude	Cognitive enhancement(E26)	(Zhang Dandan,2016)
		Increased recognition(E27)	
		Learning ethics improvement(E28)	
	Learning to interact	Improved ability to interact with interface(E29)	
		Improved ability to interact with learning content(E30)	
		Increased ability to interact with other learners(E31)	
	Learning management	Learning time managemnet skills improvement(E32)	
		Learning program managemnet skills improvement(E33)	
		Learning to reflect on the improvement of management skills(E34)	
		Learning resource management capacity enhancement(E35)	

2. Data collection

In order to ensure that the theoretical model constructed in this paper can be effectively verified, the research team conducted a pre-survey before the formal survey. The research team distributed questionnaires to 47 undergraduate students enrolled in local University, and the online questionnaire was distributed with the help of WJX.CN platform. Among the 47 obtained data, 2 invalid questionnaires were excluded, and finally 45 valid sample data were obtained.

3. Reliability and validity analysis

Aggregate validity means that indicator variables measuring the same latent trait will be located on the same factor level, and is assessed by a combination of factor loadings, combined reliability (CR), and average extracted variance (AVE). Factor loadings reflect the loadings of the observed variables on the dimension in which they are located, and it is generally considered that factor loadings should exceed the critical value of 0.5. The factor loadings of all question items in this project exceeded the critical value of 0.5. Combined reliability (CR) indicates the intrinsic correlation between the measured indicators, and the data shows that the CR values of the five dimensions range from $0.840 \sim 0.924$, which exceeds the recommended value of 0.7, indicating that the five structural variables of the internal observed variables are strongly correlated with each other. The average extracted variance (AVE), which indicates the degree of convergence of each structural variable, shows that the AVE of each structural variable ranges from $0.530 \sim 0.724$, which exceeds the recommended value of 0.5, indicating that each structural variable in the scale has good convergence. Taken together, these five dimensions showed good convergent validity with their corresponding measures.

4. Structural equation modeling analysis

The structural equation model was constructed using IBM SPSS Amos, containing 5 latent variables and 33 measured variables, and the obtained fit indices are shown in Table 2. The initial model of this paper was poorly fitted, with TLI (0.848<0.9) and CFI (0.860<0.9) not meeting the fit criteria, so the model was revised. The correction index (MI) is a common reference index, and in this paper, based on the results of MI, we found that the residual terms corresponding to several question items A5, C10, C11, E26, and E27 were independently

correlated, and there were correlations between e5 and e29, e10 and e11, and e26 and e27. After deleting A5, C10, C11, E26, and E27, the model was reevaluated, and the re-corrected the model fit indicators all meet the fit criteria and have good fit with the sample data.

Table 2 Fit indices of the model

Indicator name	Fitting criteria	Initial calibration results	Corrected calibration results
CMIN/DF	Between 2.0 and 5.0	2.484	2.047
TLI	>0.9	0.848	0.902
CFI	>0.9	0.860	0.912
RMSEA	<0.08(good fit)	0.075	0.063

After the revision of the model, the paper analyzes the path significance of the structural model by testing the coefficients in the figure denote the path coefficients and the asterisk (*) denotes significance, and the results are shown in Figure 2.
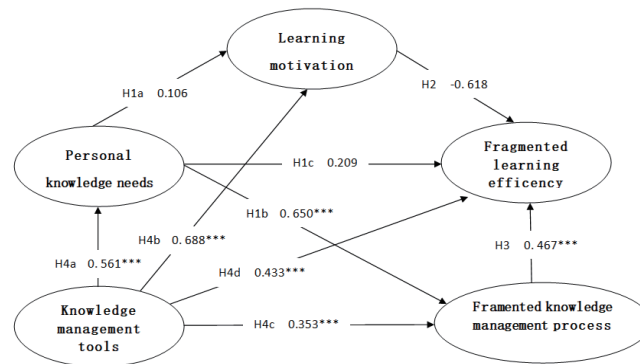

Figure 2 Analysis of model path coefficients

*** denotes P<0.001, ** denotes P<0.01, and * denotes P<0.05.

Based on the significance analysis of the model path coefficients, H1a,H1c,H2 does not hold, while the rest of the hypotheses hold, as shown in Table 3.

Table 3 Research hypothesis testing results

Assumptions	Test results
H1a: Personal knowledge needs positively influence learning motivation	Rejection
H1b: Personal knowledge needs positively influence the fragmented knowledge management process	Established
H1c: Personal knowledge needs positively influence the efficiency of fragmented learning	Rejection
H2: Learning motivation positively influences the efficiency of fragmented learning	Rejection
H3: Fragmented knowledge management process positively influences fragmented learning efficiency	Established
H4a: Knowledge management tools positively influence individual knowledge needs	Established
H4b: Knowledge management tools positively influence learning motivation	Established
H4c: Knowledge management tools positively influence the fragmented knowledge management process	Established
H4d: Knowledge management tools positively affect the efficiency of fragmented learning motivation	Established

4. Suggestions for Countermeasures

To improve the personal knowledge structure of college students, they should make full use of the fragmented time to learn more non-specialized basic knowledge, such as computer operation ability, English ability, etc., and effectively combine fragmented knowledge with systematic knowledge. It is also necessary to improve college students' self-efficacy, build self-confidence, and accomplish specified goals to gain a sense of accomplishment. College students should focus on their learning tasks in fragmented learning without external interference to improve the efficiency of fragmented learning.

5. Conclusion

In this paper, only the reliability and validity of the structural equation model as well as the path are tested and analyzed in the empirical analysis. In the future, the characteristics of the research groups can be expanded and refined by using the control variables method to conduct research on the refined groups separately and put forward more refined strategies and suggestions.

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