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UNIVERSITY STUDENTS' BELIEFS ABOUT LEARNING AND KNOWLEDGE

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ABSTRACT

Results of the empirical research of students' beliefs about the nature of learning and knowledge are presented. The research is based on conceptions on the multidimensional nature of these beliefs and on findings indicating that these beliefs influence learning behavior. Students from the University of Belgrade (N=560) answered Epistemological Questionnaire. Structure, developmental level, and relations of these beliefs to students' age, year of studies and indicators of academic success (grades and the number of passed exams) were investigated. Factor analysis confirmed the existence of four dimensions of these beliefs: 1) avoiding integration, avoiding ambiguity, and dependence on authority; 2) belief that learning cannot be learned and that success in learning does not depend on the effort invested; 3) belief that ability to learn is inborn and that learning is quick and 4) believing in absolutely certain and unquestionable nature of knowledge. Low positive correlations were obtained between dimensions. Developmental level of these beliefs is not related to students' age, but during studies at the University beliefs become more sophisticated. At beginning years of studying students' express beliefs that concentrated effort is a waste of time, that learning ability is inborn and that learning is quick. Students who express sophisticated beliefs about learning had higher grades and passed more exams. Results indicate that development of students' beliefs about learning and knowledge should be longitudinally investigated. Development of these beliefs from naive to sophisticated can be influenced. Developing consciousness regarding one's own beliefs helps competences for living and working in contemporary society to develop. Encouraging a conceptual change – reorganization of knowledge structures – is the base for development of beliefs about learning and knowledge. Students should be included in different experiences during learning process.

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Improvement of learning process should be aimed to students' beliefs, not only to behavior.

KEYWORDS: beliefs about learning and knowledge, University students, factor analysis, academic success.

JEL CLASSIFICATION: I23

INTRODUCTION

Life in a knowledge-based society, characterized by rapid change, implies an openness to learning and development, adaptability and a readiness to assume an active role in the construction and application of knowledge. Appropriate beliefs concerning the nature of learning and knowledge are a prerequisite for active and responsible learning throughout one's life. Non-expert beliefs concerning the nature of learning and knowledge reflect personal, non-scientific theories of knowledge (Hofer, 2005; Mirkov, 2013; Schommer, 1990; Schraw, 2013). After the first investigations of epistemological beliefs as a broad one-dimensional construct (Brooks, 1998; Perry, 1985; 1999), from the 1990s onwards the multi-dimensional nature of epistemological beliefs has become the focus of research (Schommer, 1998; Schommer, Crouse, & Rhodes, 1992; Schommer, Calvert, Gariglietti, & Bajaj, 1997; Schommer-Aikins, 2004; Schommer-Aikins, Duell & Hutter, 2005; Schommer-Aikins & Easter, 2006). Different approaches in research have been developed and the application of methodologies is dependent on initial theoretical assumptions (Pavlović 2008, 2009; Plazinić, 2013). In the research that assumes the existence of a unified epistemological position a qualitative methodology is applied, while in the investigation of multidimensional beliefs about the nature of knowledge and learning the psychometric approach is utilized. It has been confirmed that maturing and education influence the formation of beliefs on learning and knowledge (Schommer et al., 1997; Pavlović, 2009), and that these beliefs influence personal attitudes and learning behaviors, specifically: information interpretation, written text understanding, understanding monitoring, making an effort to carry out tasks; and attitude towards school (Braten & Stromso, 2006; Hofer, 2001, 2005; Law, Chan, & Sachs, 2008; Mirkov, 2013; Muis, 2004; Phan, 2008, 2009; Schommer-Aikins & Easter, 2006; Stoeger, 2006).

In this paper we present the findings from an investigation of the beliefs of university students about learning and knowledge. We proceed from the conception of the multi-dimensional nature of these beliefs, specifically three basic dimensions: the nature, the certainty and the origin of knowledge. These dimensions have been conceptualized as continuous, ranging from two opposing poles – from “naïve” to “sophisticated” beliefs. Presented from the naive perspective, these beliefs represent a system of relatively independent dimensions: belief in the absolute certainty of knowledge; that knowledge is organized into isolated segments; that knowledge is imparted by an authority (rather than developed by the learner); belief in a fixed and unchangeable ability to learn, and that learning is quick or not happen at all. Formulated in this manner, the beliefs reflect the initial stadium of the development of a personal epistemology. The Epistemological Questionnaire – EQ (Schommer, 1990, 1998) examines these beliefs based on four epistemological criteria: the changeability of the ability to learn, the structure of knowledge, the speed of learning and the stability of knowledge. Our aim was to establish in what way certain student beliefs on knowledge and learning are organized, what their relations are, whether they change during studies and how they relate to academic achievement. The following research questions were posed: What is the structure of the beliefs of students concerning knowledge and learning? What are the relationships between certain beliefs? Is there a difference in the distribution of these beliefs relative to the age of the students or their year of study? Are they connected to indicators of academic success?

METHOD

Our research involved students (N=560; 81.4% females¹) in the first to fifth year of study at the Faculty of Philosophy (46.40%), Faculty of Philology (31.40%) and Teacher Training Faculty (22.10%) at the University of Belgrade, with an average age of 21.84 years (SD=2.20, ranging from 19 to 42 years). First-year students account for 34.8% of the sample, second-year students for 25%, third-year students for 18.1%, fourth-year students for 21.3% and fifth-year students for 0.9%. Data on the average

¹ Female students accounted for 76% of the total number of students in the first year of studies, 85% of the total number in the second year, 79% in the third year, 85.7% in the fourth and 100% in the fifth year of studies.

grade achieved in exams (range from 5.40 – 10.00; M=8.45; SD=0.75) and the number of exams passed (range 0 – 50; M=21.05; SD=0.75) were obtained from the students via the questionnaire. The questionnaire employed was the Epistemological Questionnaire – EQ, which presents a five-point Likert-type scale (Schommer, 1990; Simić, Savanović, & Jokić, 2012; Plazinić, 2014) and contains 63 items² divided into 12 subscales (Table 2). During their regular classes, students answered the questionnaire by noting their level of agreement with the statement given. In order to establish the structure of their beliefs about knowledge and learning, the method of principal component factor analysis in 63 items was utilized. The methods of descriptive statistics were applied to determine the level of development of certain dimensions. Also performed were correlational analyses (Pierson coefficient) so as to establish the relation between the factors and how the beliefs related to the age of the student, the year of study and their academic success.

RESULTS AND DISCUSION

Using factor analysis, we explored the latent structure of the students' beliefs about learning and knowledge. From the space of the beliefs³ four latent second-order dimensions were extrapolated (Table 1), which explained 53% variance. The majority of earlier research conducted on college students (Schraw, 2013) obtained factor solutions which could explain the lower percentage of variance (20% - 35%).

Table 1. Principal Component Analysis on 12 EQ subscales scores

<i>Components</i>	<i>Initial solution</i>	
	<i>Eigen values</i>	<i>% of variance explained</i>
1. Avoidance of integration, avoidance of ambiguity and dependence on authority	2.44	20.34
2. The belief that one cannot learn how to learn and that success in learning is unrelated to hard work	1.82	15.19
3. The belief that learning ability is innate and that learning is quick	1.09	9.14
4. The belief in absolutely certain and unquestionable nature of knowledge	1.05	8.82

Source: Own research

² Examples of the statements given in each subscale are presented in Appendix 1

³ Previously, average scores for each of the 12 subscales EQ were obtained.

In earlier research, the analysis of 12 subscales frequently obtained a four-factor structure, which includes factors such as: Simple Knowledge, Certain Knowledge, Quick Learning and Fixed Ability (Schommer, 1990; Schommer, Crouse, & Rhodes, 1992). The structure we obtained in our research (Table 2), also a four-factor structure, is similar to those obtained in earlier research, however, it contains certain peculiarities which distinguish it from other research conducted on University and high-school students in Serbia (Simić, Savanović, & Jokić, 2012; Plazinić, 2014) and other countries (Schommer, 1990; Schraw, 2013; Schommer-Aikins, Duell, & Hutter, 2005). For example, from a sample of students of Psychology and Mathematics (Plazinić, 2013) two factors were obtained – Naive beliefs on the nature of learning and Naive beliefs on the nature of knowledge – which explain the 51.2% variances.

Table 2 Structure of beliefs about learning and knowledge (Rotated component matrix)

<i>Subscales</i>	<i>Factors</i>			
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
Avoid integration	.705			
Avoid ambiguity	.691			
Depend on authority	.651			
Seek single answers	.570			
Can't learn how to learn		.766		
Success is unrelated to hard work		.701		
Learn the first time		.520	.294	
Concentrated effort is a waste of time			.756	
Ability to learn is innate			.612	
Learning is quick		.356	.556	.308
Knowledge is certain				.838
Don't criticise authority				.562

Source: Own research

The indicators given in Table 3 suggest that there are low statistically significant positive correlations between dimensions, except in two cases: the first and second dimension, and also the second and fourth dimensions are not correlated.

Table 3 Correlations between factors

	FA2	FA3	FA4
FA1: Avoidance of integration, avoidance of ambiguity and dependence on authority	-.03	,20**	,29**
FA2: The belief that one cannot learn how to learn and that success in learning is unrelated to hard work		,28**	-.02
FA3: The belief that learning ability is innate and that learning is quick			,19**
FA4: The belief in absolutely certain and unquestionable nature of knowledge			

Source: Own research

On the basis of the results obtained from the second-order factor analysis, average scores were obtained for each factor, which point to the level of development of the four types of beliefs about learning and knowledge.⁴ It was confirmed that all four dimensions were moderately present amongst the students (Table 4), meaning that students' beliefs about learning and knowledge can be described as moderately sophisticated.

Table 4 Descriptive statistics

	<i>N</i>	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>
FA1	559	1.86	4.04	2.87	.33
FA2	559	1.25	3.92	2.21	.41
FA3	559	1.55	3.91	2.53	.41
FA4	559	1.00	8.67	2.38	.52

Source: Own research

In order to examine the relationships between the four factors of students' beliefs about learning and knowledge and the students' age, year of study and indicators of academic success, we performed correlation analyses (Pearson coefficient). The data obtained is presented in Table 5.

⁴A higher score indicates more sophisticated beliefs.

Table 5 Correlations between dimensions of beliefs about learning and knowledge and age, year of studies, and indicators of academic success

<i>Beliefs about learning and knowledge</i>	<i>Age</i>	<i>Year of studies</i>	<i>Grade average</i>	<i>Number of passed exams</i>
Avoidance of integration, avoidance of ambiguity and dependence on authority	,05	-,04	-,21**	,03
The belief that one cannot learn how to learn and that success in learning is unrelated to hard work	,03	-,10*	,14**	-,08
The belief that learning ability is innate and that learning is quick	,10*	-,21**	,06	-,17**
The belief in absolutely certain and unquestionable nature of knowledge	,09*	-,13**	-,09*	-,11**

Source: Own research

Statistically significant correlations between the four dimensions of beliefs on learning and knowledge and the age of the students were not present (Table 5). Low negative correlations between the year of studies and certain dimensions of beliefs were found: belief in the innate ability to learn and that learning is quick; belief in the absolutely certain and unquestionable nature of knowledge and the belief that learning cannot be learned and that success in learning does not depend on effort invested (Table 5). Students at the beginning of their studies show greater belief that concentrated effort is a waste of time, and also that learning ability is innate and that learning is quick, as opposed to students who are in the final years of their studies. This indicates that students in their final years of study tend to have more sophisticated beliefs compared to students at the beginning of their studies. Reliable conclusions could be drawn from a longitudinal study. The findings of other research (Cvijan, 2008) indicate that there might be qualitative, and not only quantitative differences in epistemological beliefs relating to the students' age and year of studies. In any case, with the application of qualitative methods, more complete data might be obtained.

The results obtained (Table 5) indicate that there is a negative correlation between the dimension Avoidance of integration, avoidance of ambiguity and dependence on authority and the average grade in exams, as well as a low positive correlation between the dimension Belief that learning cannot be learned and that success in learning does not depend on effort and the grade average. The dimensions

Belief that the ability to learn is innate and the learning is quick and the Belief in the absolute certain and unquestionable nature of knowledge are negatively correlated with the number of exams passed. Although certain beliefs about learning and knowledge are connected to different indicators of academic success, in principle, students who express more sophisticated beliefs have higher grades and pass more exams, compared to students who express naive beliefs about learning and knowledge. The avoidance of integration, avoidance of ambiguity, dependence on authority and the search for one answer can be related to the quality of knowledge. Weak tendencies relating to the connection between the beliefs that learning cannot be learned, that success does not depend on effort invested, that learning happens at first, and the students' grade average did not give the expected result. Although weak intensity correlations were obtained, it might be assumed that their experiences during studies at university, but also in elementary and high school, influence the formation of beliefs that success depends on luck and not on effort. Although further research is necessary, these results indicate that the development of sophisticated beliefs could be encouraged through changes made to the teaching and evaluation systems. Results of other research do not suggest that there are connections between the sophistication of epistemological beliefs of high-school students and their school success (Simić, Savanović, & Jokić, 2012), however, significant correlations were found between the epistemological beliefs of students of Psychology and Mathematics and academic success (Plazinić, 2014): naive beliefs about the nature of knowledge were related to lower achievement, while beliefs on the nature of learning do not significantly contribute to academic success. Our findings, however, indicate that beliefs that the ability to learn is innate, that learning is quick, and that knowledge is certain might be connected to a lower number of exams passed (Table 5). On the basis of the results shown, the connection between the beliefs of students with certain indicators of academic success should stimulate further research into the possibility of encouraging the transformation of naive beliefs into sophisticated beliefs, in accordance with the implications of earlier studies (Kienhues, Bromme & Stahl, 2008), while the results which indicate variations in the levels of sophistication of certain beliefs about learning and knowledge at different years of studies point to the need for longitudinal research.

CONCLUSIONS AND IMPLICATONS

According to our findings, the dimensions of the beliefs about learning and knowledge amongst the students are moderately sophisticated. Certain dimensions of beliefs about learning and knowledge are weakly connected. The results match the theoretical conceptions of the multi-dimensional nature of epistemological beliefs. It was confirmed that the level of development of the students' beliefs about learning and knowledge do not differ relative to their age but there are indications that changes to beliefs occur during studies. This opens up the possibility of influencing the development of these beliefs. According to the findings of earlier studies (Hofer, 2001) sophisticated epistemological beliefs positively influence the use of learning strategies and also the learning outcomes. Interventions in teaching process should be directed towards the encouragement of the understanding of fundamental epistemological assumptions which are at the basis of critical thinking: that there is not only one right answer; that the development of science and the understanding of truth is subject to change; and that attitudes which might seem in opposition to one another can be synthesized within a new framework. The basis of the development and transformation of beliefs about learning and knowledge is encouraging conceptual changes, that is, the reorganizing existing knowledge structures with focus on the overcoming of naive or erroneous assumptions about certain scientific concepts. The starting point for conceptual change is a dissatisfaction with existing concepts based on a discrepancy between existing beliefs and new experiences.

Certain dimensions of the students' beliefs about knowledge and learning are moderately connected to different indicators of academic success. The found correlations are low and match the findings obtained in other studies (Schommer-Aikins, 2004). However, although the direct influence of the students' beliefs about learning and knowledge might be weak, the indirect influence could prove to be much more significant. The relationship between the students' beliefs and their academic achievement could be mediated by other variables, such as their learning intentions and behaviors, as indicated by earlier research (Braten & Stromso, 2006; Neber, & Schommer-Aikins, 2002; Simić, Savanović, & Jokić, 2012). For this reason, it is necessary to investigate the relationship between the students' beliefs about learning and knowledge and goal orientations they adopt and their use of different learning strategies. Previous research (Braten & Stromso, 2006) confirmed that

epistemological beliefs influence the adoption of goals. Students who believe that knowledge is certain and that it is acquired passively do not adopt mastering goals and are not ready to make a greater effort to complete their tasks. The belief that learning is quick can negatively influence the development of adaptive forms of regulation and for this reason it is recommended that teaching at the university level address the issue of overcoming the belief that learning is quick or not happen at all.

In further research it is necessary to apply different methodological approaches and to include a wider complex of variables, especially taking into account their mutual relationships. Longitudinal studies would contribute to a deeper understanding of the ways in which teaching approaches and other environmental variables influence students' beliefs about learning and knowledge. It is more and more apparent that there is a need for systemic models into which epistemological beliefs would be incorporated, thus creating a complex system which would include groups of different variables (Schommer-Aikins, 2004), from variables relative to cultural beliefs (collectivism – individualism) to concrete teaching methods (debates, cooperative groups, asking questions) and variables connected to self-regulated learning (learning strategies, understanding, metacognition, critical thinking and problem solution).

REFERENCES

- Braten, I. & H. Stromso (2006) Predicting achievement goals in two different academic contexts: a longitudinal study, *Scandinavian Journal of Educational Research*, Vol. 50, No. 2, 127-148.
- Brooks, P. (1998) Perry: fact, fiction, and outcomes assessment, Paper presented at *Annual Meeting of the Mid-Western Educational Research Association*, October 1998, Chicago. Retrieved June 20, 2008 from World Wide Web http://www.eric.ed.gov/ERICDocs/data/ericdoc-s2sql/content_storage_01/0000019b/80/17/66/48.pdf
- Cvijan, N. (2008) *Povezanost epistemoloških verovanja i motivacione orijentacije kod učenika i nastavnika gimnazija* (neobjavljen diplomski rad), Filozofski fakultet Univerziteta u Beogradu.
- Hofer, B. (2001) Personal epistemology research: implications for learning and instruction, *Journal of Educational Psychology Review*, 13(4), 353-383.
- Hofer, K. B. (2005) The legacy and the challenges: Paul Pintrich's contributions to personal epistemology research, *Educational Psychologist*, 40 (2), 95-105.
- Hofer, B. (2001) Personal epistemology research: implications for learning and instruction, *Journal of Educational Psychology Review*, 13(4), 353-383.
- Kienhues, D., R. Bromme & Stahl, E. (2008) Changing epistemological beliefs: the unexpected impact of a short-term intervention, *British Journal of Educational Psychology*, 78(4), 545-565.
- Law, Y., Chan, C. & Sachs, J. (2008) Beliefs about learning, self-regulated strategies and text comprehension among Chinese children, *British Journal of Educational Psychology*, Vol. 78, No. 1, 51-73.
- Muis, K. (2004) Personal epistemology and mathematics: a critical review and synthesis of research, *Review of Educational Research*, 74(3), 317-377.
- Mirkov, S. (2013) *Učenje – zašto i kako: Pristupi u poručavanju činilaca koji deluju na učenje*, Institut za pedagoška istraživanja, Beograd.
- Neber, H. & Schommer-Aikins, M. (2002) Self-regulated science learning with highly gifted students: the role of cognitive, motivational, epistemological, and environmental variables, *High Ability Studies*, Vol. 13, No. 1, 59-74.
- Pavlović, J. (2008) *Pozicije subjekata i diskursi o znanju* (neobjavljen magistarski rad), Filozofski fakultet Univerziteta u Beogradu.
- Pavlović, J. (2009) Prikaz istraživanja ličnih epistemologija: analiza istraživačkih metafora, *Zbornik Instituta za pedagoška istraživanja*, 41 (1), 61-75.
- Perry, W.G. (1985) Different worlds in the same classroom: students' evolution in their vision of knowledge and their expectation of teachers, Reprinted from *On Teaching and Learning*, Vol. 1. Retrieved June 20, 2008 from World Wide Web <http://isites.harvard.edu/fs/html/icb.topic58474/perry.html>
- Perry, W.G. (1999) *Forms of intellectual and ethical development*, Jossey-Bass, San Francisco. Retrieved May 5, 2008 from World Wide Web <http://gsi.berkeley.edu/resources/learning/perry.html>
- Phan, H. (2008) Predicting change in epistemological beliefs, reflective thinking and learning styles: a longitudinal study, *British Journal of Educational Psychology*, 78(1), 75-93.
- Phan, H. (2009) Amalgamation of future time orientation, epistemological beliefs, achievement goals and study strategies: empirical evidence established, *British Journal of Educational Psychology*, 79(1), 155-173.
- Plazinić, Lj. (2013) *Epistemološka uverenja i strategije učenja kao prediktori akademskog postignuća studenata* (neobjavljen master rad), Filozofski fakultet Univerziteta u Beogradu.
- Plazinić, Lj. (2014) Epistemološka uverenja i strategije učenja kao prediktori akademskog postignuća studenata, *XX naučni skup Empirijska istraživanja u psihologiji, knjiga rezimea*, (205-206), Beograd, 28 – 30 mart, 2014, Institut za psihologiju i Laboratorija za eksperimentalnu psihologiju, Filozofski fakultet, Univerzitet u Beogradu, Filozofski fakultet, Beograd.
- Schommer, M. (1990) Effects of beliefs about the nature of knowledge on comprehension. *Journal of Educational Psychology*, 82(3), 498-504.
- Schommer, M. (1998) The influence of age and education on epistemological beliefs. *The British Journal of Educational Psychology*, 68, 551-562.
- Schommer, M., Crouse, A., & Rhodes, N. (1992) Epistemological beliefs and mathematical text comprehension: Believing it is simple does not make it so, *Journal of Educational Psychology*, 84, 435-443.

- Schommer, M., C. Calvert, Gariglietti, G., & Bajaj, A. (1997) The development of epistemological beliefs among secondary students: a longitudinal study, *Journal of Educational Psychology*, 89(1), 37-40.
- Schommer-Aikins, M. (2004) Explaining the epistemological belief system: introducing the embedded systemic model and coordinated research approach, *Educational Psychologist*, 39(1), 19-29.
- Schommer-Aikins, M, Duell, O. K. & Hutter, R. (2005) Epistemological beliefs, mathematical problem-solving beliefs, and academic performance of middle school students, *The Elementary School Journal*, 105(3), 289-304.
- Schommer-Aikins, M. & Easter, M. (2006) Ways of knowing and epistemological beliefs: Combined effect on academic performance, *Educational Psychology*, 26(3), 411-423.
- Schraw, G. (2013) Conceptual integration and measurement of epistemological and ontological beliefs in educational research, Hindawi Publishing Corporation, *ISRN Education*, Vol. 2013, Article ID, 327680, Retrieved September, 10, 2014 from World Wide Web <http://dx.doi.org/10.1155/2013/327680>
- Simić, N., Savanović, Lj. & Jokić, T. (2012) Relationship between epistemological beliefs and motivational orientation among high school students, *Psihologija*, 45(4), 451-465.
- Stoeger, H. (2006) First steps towards an epistemic learner model, *High Ability Studies*, 17, 17-41.

APPENDIX 1 – EQ SUBSCALES AND STATEMENTS EXAMPLES

<i>Subscales</i>	<i>Statements examples</i>
Seek single answers	Most words have one clear meaning. (+) A tidy mind is an empty mind. (-)
Avoid integration	You will just get confused if you try to integrate new ideas in a textbook with knowledge you already have about a topic. (+) I try my best to combine information across chapters or even across classes. (-)
Avoid ambiguity	It's a waste of time to work on problems which have no possibility of coming out with a clear-cut and unambiguous answer. (+) I find it refreshing to think about issues that authorities can't agree on. (-)
Depend on authority	Sometimes you just have to accept answers from a teacher even though you don't understand them. (+) When you first encounter a difficult concept in a textbook, it's best to work it out on your own. (-)
Knowledge is certain	If scientists try hard enough, they can find the truth to almost anything. (+) Nothing is certain, but death and taxes. (-)
Don't criticise authority	People who challenge authority are over-confident. (+) Often, even advice from experts should be questioned. (-)
Ability to learn is innate	The ability to learn is innate. (+) Some people are born good learners, others are just stuck with limited ability. (+)
Learning is quick	Successful students understand things quickly. (+)

	If a person can't understand something within a short amount of time, they should keep on trying. (-)
Concentrated effort is a waste of time	If a person tries too hard to understand a problem, he will most likely just end up being confused. (+) Usually you can figure out difficult concepts if you eliminate all outside distractions and really concentrate. (-)
Can't learn how to learn	Self-help books are not much help. (+) Everyone needs to learn how to learn. (-)
Success is unrelated to hard work	The really smart students don't have to work hard to do well in school. (+) Genius is 10% ability and 90% hard work. (-)
Learn the first time	Almost all the information you can learn from a textbook you will get during the first reading. (+) If I find the time to re-read a textbook chapter, I get a lot more out of it the second time. (-)

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