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Research on the Learning Effectiveness of International Students from the Belt and Road Countries in Chongqing's colleges and universities: An Empirical Study

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Abstract: In September 2018, the Ministry of Education issued the "Quality Standards for Higher Education for International Students in China (Trial)", marking that international education has entered a critical historical period of quality improvement. Improving quality and efficiency has gradually become a general consensus in the field of international education. Based on the Learner-Centered Approach theory and the Input-Environment-Outcome model, this study takes international students from four universities in Chongqing under the Belt and Road Initiative as the research objects. The current status of their learning investment and support at school. As well as the impact of learning investment and learning support on learning effectiveness, empirical research has been carried out to form improvement suggestions for improving the learning effectiveness of colleges and universities studying in China under the "Belt and Road Initiative", which is of great significance for comprehensively improving the quality of education for college students studying in China.

Keywords: Studying in China; Colleges and Universities; Learning Investment; Learning Gains; Impact Research.

1. Research Background

The report of the 20th National Congress of the Communist Party of China proposed to promote high-level opening up and steadily expand institutional opening up in terms of rules, regulations, management, standards, etc. In 2024, the National Education Conference explained the scientific connotation and basic path of an education power, among which enhancing international influence is one of the six characteristics. Developing high-level international student education is an important part of increasing the opening up of education to the outside world. Especially at a time when globalization is accelerating and the internationalization of education is deepening, international student education has become an important indicator of national and regional education levels and international influence.

Chongqing, as one of China's four municipalities, has given full play to its advantages connecting the Belt and Road Initiative and the Yangtze River Economic Belt and its production and manufacturing advantages in the entire industrial chain in recent years under the guidance of the Belt and Road Initiative. It has transformed from an inland hinterland to a frontier of opening up, and boasts a solid practical foundation for developing Belt and Road-related international education in China and building an inland highland of educational openness.

Driven by the development of international education in Chongqing, the optimized quality and structure of international students have raised new requirements for education and management in local universities. Moving from quantity to quality, improving learning effectiveness, and advancing connotative development are critical issues for Chongqing's higher education sector.

2. Study Design

2.1. Theoretical Framework

At present, the exploration of education quality has deepened from macro issues such as system scale, structure and benefits to more specific, micro and implicit factors, which are concentrated in the development and changes of educational objects and fall on the role of education in human development. The internationally accepted learner-centered theory and the input-process-output model provide the necessary theoretical basis for understanding the connotation of education quality [1]. Pigozzi (2006) proposed the conceptual framework of education quality based on the "learner-centered model", emphasizing that learners are placed at the center of the model and closely related to five types of elements related to learners, namely discovering learners, learner characteristics, learning process, learning content and environment. The learning experience of learners should be highly valued [2] Astin (Alexandra W. Asitin's "Input-Environment-Outcome" model believes that the three important factors for measuring education quality are education input, education environment and education effectiveness. Input refers to the personal qualities that students bring into the education plan when they first enter school, which can be understood as the learner's personal learning background; environment refers to the actual experience of students in the education plan, that is, it refers to various educational factors in the implementation process of college goals; effectiveness refers to the student talents that are attempted to be developed in the education plan. [3] [4]

Based on the Learner-Centered Approach and Alexandra W. Asitin's "Input-Environment-Outcome" model, the effectiveness of education for international students in China is closely related to their own learning background and investment. On the other hand, it is also closely related to the

learning support provided by schools. Based on literature research and theoretical analysis, this study combines the characteristics of international students in Chongqing universities, the current training status, and the training requirements for international students in China to construct an analysis model of factors affecting the learning effectiveness of international students from the Belt and Road Countries in Chongqing's colleges and universities. The overall framework of the influencing factor analysis model includes four modules: demographic factors (student background), learner learning investment, university learning support and learning effectiveness. The specific content of each module needs to be constructed according to the learning characteristics of international students in China.

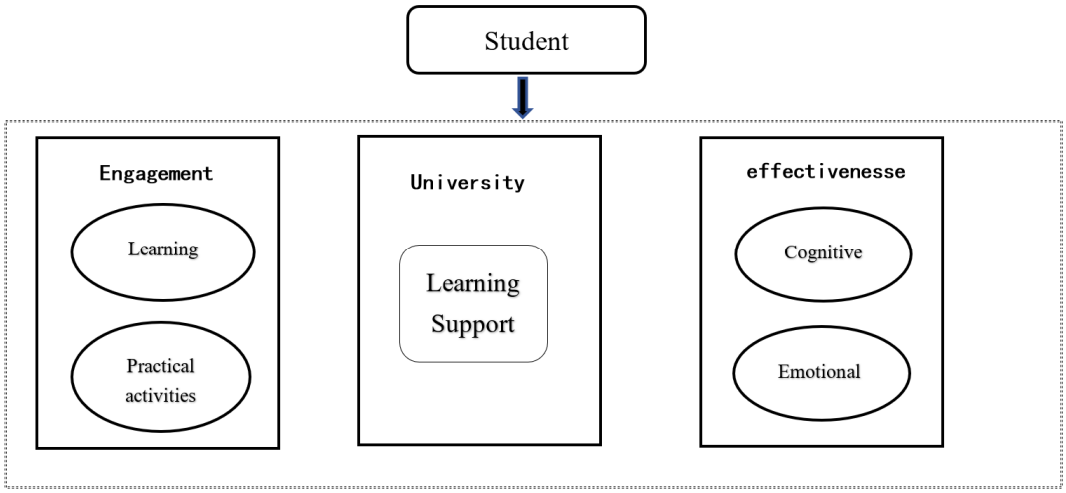

Figure 1. Analytical Model of Factors Affecting the Learning Outcomes of International Students from Colleges and Universities along the Belt and Road

2.2. Research Object

Table 1. Statistical Results of Demographic Background Factors in the Survey on Learning Outcomes of International Students from Colleges and Universities Along the Belt and Road

Name	Options	Frequency	Percentage (%)
Nationality	Countries along the Belt and Road in Asia (Laos, Myanmar, Singapore, Bangladesh, etc.)	147	80
	African "Belt and Road" countries (Ethiopia, Togo Republic, Tanzania, Congo, etc.)	26	14
	"Belt and Road" countries in Europe and America (Russia, Cuba)	10	5
Age	17 years and under 17	11	6.01
	18 to 20 years old	56	30.6
	21 to 23 years old	44	24.04
	24 years and over 24	72	39.34
Gender	Male	82	44.81
	Female	101	55.19
Chinese Proficiency	Below HSK3	46	25.14
	HSK3	46	25.14
	HSK4	66	36.07
	HSK5	21	11.48
	HSK6 and above	4	2.19
Learning duration	Under 6 months	30	16.39
	6 months-1 year	88	48.09
	1-1 and a half years	18	9.84
	1 and a half years to 2 years	7	3.83
	More than 2 years	40	21.86
Discipline and Major	Arts	12	6.56
	Science	16	8.74
	Engineering	71	38.8
	Business	18	9.84
	Medical Department	33	18.03
	Others	33	18.03
Reasons for studying abroad	Learn Chinese	133	72.68
	Learn about China	103	56.28
	Low cost	24	13.11
	High quality of education	95	51.91
	Good for getting a good job	63	34.43
Total		183	100

This study takes international students from 4 higher education institutions (2 undergraduate colleges and 2 higher vocational colleges) in Chongqing as the research subjects. From July to August 2024, 200 questionnaires were distributed online, and 183 valid questionnaires were collected, with a response rate of 92%. Among them, 100%

are international students from countries along the "Belt and Road". The proportion of international students from Asian countries along the "Belt and Road" (the largest number of Southeast Asian countries such as Laos and Myanmar) is the highest. A total of 147 people, reaching 80%; The age is mainly concentrated between 18 and 25 years old, accounting for 80% of the total; In terms of gender distribution, male international students account for 46% and female international students account for 54%, showing a relatively balanced gender ratio; Most international students (75%) have a Chinese proficiency of intermediate or above (HSK3 and above); The learning time is mostly 6-12 months and more than 2 years, which are medium- and long-term learners; Disciplines and majors cover liberal arts, science, engineering, business and other fields; The main motivations for international students to study in Chongqing include learning Chinese (73%), understanding China (56%), high education quality (52%) and being conducive to finding a good job (34%). Among them, the low cost of studying abroad (13%) makes fewer choices, indicating that international students who come to Chongqing to study are more likely to pursue high-quality studies in China.

2.3. Research Tools

This study constructed a survey scale for international students in colleges and universities along the "Belt and Road" based on the analysis model of factors affecting effectiveness. The core dependent variable is the learning effectiveness of international students in China, including cognitive effectiveness (improvement of Chinese proficiency, professional knowledge and ability, etc.) and emotional effectiveness (enhancement of emotional attitude towards knowing and being friendly to China). Independent variable 1 is the study investment of international students in China. Including participation in learning activities (classroom learning, after-school discussions, listening to reports, etc.) and practical activities (internship practice, participation in school clubs, participation in competitions, etc.). Independent variable 2 is the learning support provided by colleges and universities to international students in China, including organizing collective activities, setting up science courses, cultural adaptation, economic support, employment support, etc.

Table 2. Variables of Learning Outcome for International Students in Higher Education Institutions Along the Belt and Road

Latent variable (dimension)		Observed Variables (Question)
Learning outcomes	Cognitive effectiveness	Through learning here, my Chinese skills have been improved Through learning here, professional field knowledge has been improved Through learning here, professional skills have been improved Through learning here, the ability to use information technology has been improved
	Emotional effectiveness	Through studying here, you will have a certain understanding of Chinese culture Through studying here, you will have an interest in further exploring Chinese culture By studying here, you are willing to communicate and learn from the Chinese By studying here, you may find a job in China or work for Chinese companies in your home country in the future.
Learning investment	Learning activities	Actively participate in class discussions Discussion and cooperation with classmates after class Listen to school reports and lectures
	Practical activities	Internship, social practice Organize or participate in school clubs Participate in the competition
Learning support		The school organizes group activities to help you better integrate The school has set up a scientific and reasonable curriculum to support academic studies Schools help deal with interpersonal relationships or cross-cultural communication Schools help cope with economic problems School Guidance Employment Issues

2.4. Research Results

Using SPSS 26.0 software, a combination of independent sample T-test method, Pearson correlation analysis, regression analysis and other research methods were used to analyze 183 questionnaires collected from college students in Chongqing. According to the reliability and validity analysis of the questionnaire, the Cronbach coefficient value is 0.902, indicating that the data collected in this questionnaire survey are highly reliable. The KMO test value of the questionnaire survey data is 0.860, and the degree of freedom of the sample in Barthes' sphericity test is 0.741, indicating that the questionnaire survey data has good validity and there is a certain correlation between the variables.

2.4.1. Frequency Analysis of Demographic Variables

First, a frequency analysis was conducted on demographic variables, including their nationality, gender, age, length of study, Chinese proficiency, etc. The pie chart of the nationality distribution of international students is shown in the figure below.

As can be seen from the figure, among the international students participating in this questionnaire survey from 32 countries, they are mainly from Southeast Asian countries, of which those from Laos account for the largest proportion, reaching 31.7%. International students from Myanmar and Singapore ranked second, accounting for 16.9% and 7.1% respectively. The gender ratio of the respondents was

approximately 1:1, with more women accounting for 55.2%. In terms of age, international students over 24 years old account for the highest proportion, reaching 39.3%, while those aged 17 and below have the lowest number, only 11. In terms of language proficiency, the largest number of international students have a Chinese level of HSK4, and half of them are currently at HSK3 or below, indicating that the overall Chinese level of international students in Chongqing is at the junior and intermediate levels. In terms of study duration, nearly half of international students study for 6 months to 1 year.

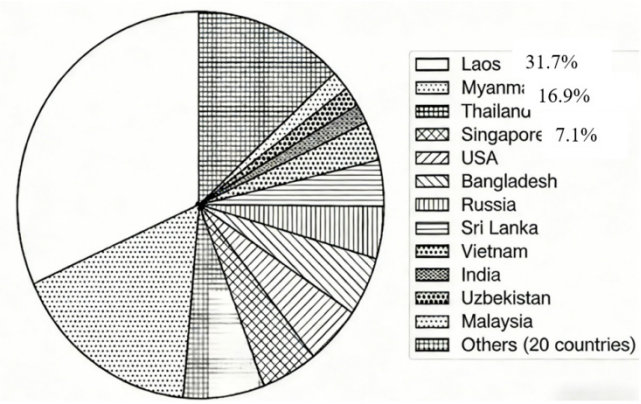

Figure 2. Pie Chart of Nationality Distribution of International Students

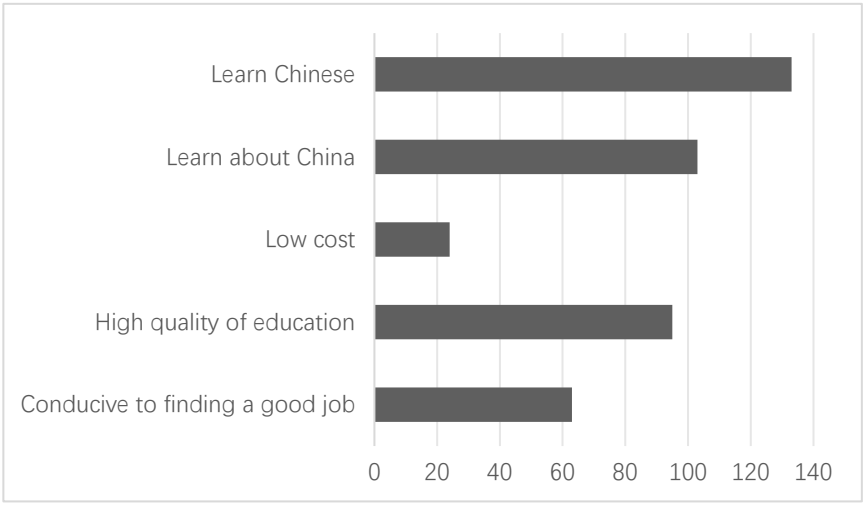

Figure 3. Bar chart of reasons for studying in China

A survey and analysis of the reasons why international students choose to study in China shows that learning Chinese, understanding China, and high-quality education are the main reasons for international students to choose to study in China, accounting for more than 50%, among which the largest proportion is choosing to learn Chinese, reaching 72.7%. And because of the low cost of studying in China, very few international students choose to study in China, accounting for only 13.1% of the total number.

2.4.2. Descriptive Analysis of Continuous Variables

The independent variables of participation in learning activities (referred to as learning activities), participation in practical activities (referred to as practical activities), learning support, and the core dependent variables of cognitive effectiveness and emotional effectiveness are continuous variables. Descriptive statistics are performed on them, and the results are shown in the following table.

Table 3. Descriptive Statistics of Continuous Variables

Variable	Total	Minimum value	Maximum value	Mean value	Standard Deviation
Learning activities	183	3.0	5.0	3.94	0.52
Practical activities	183	1.0	5.0	4.05	0.75
Learning support	183	1.0	5.0	3.78	0.80
Cognitive effectiveness	183	2.0	5.0	3.96	0.63
Emotional effectiveness	183	2.0	5.0	4.22	0.57

It can be seen from the table that international students' participation in both learning and practical activities is relatively good, with an average value of about 4.0. However, the minimum value of practical activities is significantly smaller than the minimum value of learning activities, which shows that the participation in practical activities varies greatly among different overseas students. The average value of learning support provided by colleges and universities to international students in China is 3.78, but the range is 4, indicating that although international students receive good learning support as a whole, there are large differences in the amount of learning support received by different international students.

For the dependent variable, the average cognitive effectiveness of international students is 3.96, while the average emotional effectiveness is 4.22. This shows that compared with the improvement in Chinese proficiency, professional knowledge and ability, the effect of enhancing the emotional attitude of international students to know and befriend China after studying in China is more obvious. Studying abroad has a significant effect on improving foreign students' understanding and love of China.

2.4.3. Analysis of Differences Between Demographic Variables and Dependent Variables

Analyze the factors that affect cognitive and emotional

outcomes. Among them, independent sample t-tests were conducted on bivariate variables such as gender and various reasons for studying abroad, while one-way ANOVA was conducted on multivariate variables such as age, current Chinese proficiency, length of study, subject major, and making friends in China.

After analysis, there was no significant difference in the effects of gender, age, and learning time on cognitive and emotional outcomes. There are significant differences in the 2 items of subject majors and making Chinese friends, as follows:

Through one-way ANOVA, it can be seen that there is no significant difference in cognitive effectiveness among different disciplines and majors, but there is a significant impact on emotional effectiveness. Through the post hoc multiple comparison test (LSD), it can be seen that the emotional performance of international students majoring in medicine is significantly lower than that of science, engineering, business and other majors.

Table 4. Difference test of different disciplines and majors

	Discipline and Major	Number of cases	Average	Standard Deviation	F	p	Multiple comparisons
Cognitive effectiveness	Arts	12	3.78	0.763	2.201	0.056	/
	Science	16	3.77	0.730			
	Engineering	71	3.94	0.623			
	Business	18	4.31	0.611			
	Medical Department	33	3.84	0.539			
	Others	33	4.10	0.594			
Emotional effectiveness	Arts	12	4.10	0.897	3.395	0.006	Science > Medicine, Engineering > Medicine, Business > Medicine, Others > Medicine
	Science	16	4.29	0.602			
	Engineering	71	4.25	0.554			
	Business	18	4.49	0.514			
	Medical Department	33	3.90	0.464			
	Others	33	4.32	0.474			

Through one-way ANOVA, it can be seen that there is no significant difference in cognitive effectiveness in the number of Chinese friends made, but there is a significant difference in emotional effectiveness. Post-test analysis found that international students with 0 or 1-5 Chinese friends had significantly lower emotional outcomes than those who made more than 11 Chinese friends.

Table 5. Difference Test in Making Friends with Chinese Individuals

	Number of Chinese Friends	Number of cases	Average	Standard Deviation	F	p	Multiple comparisons
Cognitive effectiveness	0 pcs.	15	3.97	0.754	1.538	0.206	/
	1-5 pcs	88	3.88	0.575			
	6-10 pcs	32	3.92	0.653			
	More than 11	48	4.12	0.667			
Emotional effectiveness	0 pcs.	15	3.95	0.723	5.199	0.002	0 < 11, 1-5 < 11 or more
	1-5 pcs	88	4.12	0.554			
	6-10 pcs	32	4.24	0.532			
	More than 11	48	4.46	0.505			

In summary, different disciplines and majors have different numbers of Chinese friends, and there are significant differences in emotional outcomes.

2.4.4. Analysis of Student Suggestions

This survey also uses open-ended question design to further understand the suggestions and opinions of international students. In-depth interpretation based on high-frequency word statistics shows that international students express their expectations for school support through four core demands, namely the demand for improving Chinese, the demand for integrating practice, the demand for precise support, and the demand for cultural integration.

The demand for breaking through Chinese proficiency is the strongest. They hope that schools can provide more high-quality Chinese courses, as well as related tutoring and practical activities to help them improve their Chinese proficiency faster. At the same time, they also hope that schools can provide more resources and opportunities related to Chinese learning, such as Chinese clubs, cultural lectures, etc.

There is a strong call for the "practical internship" activity. International students hope to broaden their horizons, make more friends and better integrate into campus life by participating in various activities. They hope that the school can provide more internship opportunities to help them apply what they have learned to practical work and lay a solid foundation for future career development.

Curriculum and teachers are also one of the focuses of international students. The frequent appearance of the word "course" shows that international students pay attention to the school's curriculum setting and teaching quality. They hope that schools can adjust and optimize curriculum settings according to the characteristics and needs of international students, and provide more flexible and personalized learning plans. As for the teachers who implement the courses, international students have high expectations in all aspects, not only teaching ability, but also English proficiency, cross-cultural communication skills, etc. For example, many international students have reported that "there are no professional Chinese teachers in the International Teaching Department of our school", "teachers should improve their English and interact more with international students", and "schools should provide teachers with training related to cross-cultural communication".

The emergence of words such as "support/support students" reflects the expectations of international students for school support services. They especially hope that the school can provide them with more psychological and life support to help them better adapt to studying and living in a foreign country.

Table 6. Statistics of High-frequency Words in Opinions and Suggestions of Chongqing International Students

High-frequency words	School	Students	Chinese/Chinese Class/Chinese Proficiency	Learning	Internship	Courses	Support/Support Students	Teacher/Teacher	Culture
Occurrence frequency	13 times	10 times	9 times	7 times	5 times	5 times	4 times	4 times	4 times

3. Research Conclusion

Based on the questionnaire survey and data analysis of 183 "Belt and Road" international students from four universities in Chongqing, this study draws the following main conclusions:

1) There are structural differences in learning outcomes, and the effect of emotional integration is significant: The overall learning outcome of international students shows a distinctive feature of "emotional effectiveness higher than cognitive effectiveness". Affective outcomes (mean: 4.22) were significantly better than cognitive outcomes (mean: 3.96), indicating that the current study abroad experience has a more prominent effect in promoting cultural understanding, social identity and cultivating positive emotional attitudes, while there is relatively greater room for improvement in hard cognitive aspects such as professional knowledge and language skills. This highlights the unique value of education for international students in China in promoting cross-cultural understanding and cultural exchanges.

2) Motivation for studying abroad is a key antecedent variable affecting effectiveness: Research has confirmed that the initial motivation of international students is closely related to their ultimate gains. Students who are motivated to study abroad by "high quality education" and "helpful in finding a good job" show significant advantages in both cognitive and emotional outcomes. This shows that a clear and pragmatic career and development orientation can effectively translate into stronger learning engagement and a more positive learning experience. In contrast, the motivation of simply "learning Chinese" or "understanding China" has no significant differentiated effect on results.

3) Social and cultural integration is the core regulator of emotional effectiveness: social networks and subject environment have a profound impact on the emotional adaptation of international students. Data analysis shows that the number of Chinese friends made is significantly positively correlated with emotional outcomes, and international students with extensive local social networks are more emotionally integrated. At the same time, different disciplinary backgrounds show differences. The emotional performance of medical students is significantly lower than that of students majoring in engineering, business and other majors, suggesting that high-intensity professional learning and a specific training environment may bring challenges to social and cultural integration.

4) Students have clear demands for optimization of the support system: Open feedback from international students reveals four core demands: improving the pertinence and quality of Chinese teaching and tutoring; increasing internship and practice opportunities to connect academic and career development; optimizing curriculum settings and teaching methods, and improving teachers' cross-cultural teaching capabilities; providing more accurate and personalized academic, psychological and life support. These demands point directly to the weaknesses of the current support system.

4. Development Suggestions

(1) Establish a student-centered education quality concept for international students in China. At present, "student-centered" has entered the discourse of higher education policy and gradually become the core concept of the reform and development of higher education in the world. Specifically, it means to make students masters of learning and pay attention to their needs, ideas and learning outcomes in the formulation, design and specific operation of higher education [5]. As a special learning group, international students may face multiple challenges such as language barriers, cultural differences, and adapting to new environments, and should be given more attention. Improper implementation, or omissions or improper handling of any link may have a negative impact on cognitive effectiveness, thereby weakening the positive effect of international student education activities on cognitive development. Through questionnaires, student interviews and other forms, regular learning surveys of international students can be carried out to improve their learning experience and effectiveness.

(2) Explore the education support system for international students in China under the concept of convergent training. The current differentiated management model for Chinese and foreign students has affected the improvement of the quality of education for international students to a certain extent. On the basis of considering necessary differentiated services, the teaching management of international students should adopt the same quality standards as Chinese students, and promote integration in student activity management and life management [6]. Research shows that according to the learning characteristics of international students in China, colleges and universities should build a strong learning support system from multiple aspects such as carrying out collective activities, providing scientific courses, helping cross-cultural exchanges, and providing financial support. Adhere to the principle of gradual progress, formulate diversified academic training programs by category and level, optimize the education operation system, education and teaching methods, etc., to help international students in China gradually adjust their learning status and adapt to the educational environment of Chinese universities.

(3) Guide international students to build a self-driven learning model based on their characteristics. The intrinsic motivation of international students to learn is an important condition for carrying out high-quality educational activities and a key driving force for enhancing their learning investment and achieving higher learning outcomes. It is recommended to guide international students to actively establish clear learning goals, scientifically plan time management, actively integrate into various academic

activities, and make full use of the rich resources provided by the school to deepen their learning. At the same time, by encouraging cross-cultural exchanges and promoting cultural understanding and integration, it can stimulate their intrinsic learning motivation. In the process of continuous self-motivation and reflection, international students should flexibly adjust their learning strategies, effectively overcome learning obstacles, and then steadily increase their learning investment under self-driving, laying a solid foundation for the comprehensive development of academic ability and cross-cultural literacy.

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