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The Extraction of Cultural Adaptability Rules for Chinese as a Foreign Language Based on Artificial Intelligence and Big Data Algorithm

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Abstract: With the further development of China's economy and the increasing demand of foreign students to come to China, the issue of cross-cultural adaptation of international students in China should also be more widely concerned and studied. This study mainly discusses the extraction of cultural adaptation rules for Chinese as a foreign language based on artificial intelligence and big data algorithms. In the field of education, with the development of educational informatization, a large amount of data is being generated all the time in the teaching process. Big data provides a method for scientific decision-making based on data for teaching, which will have a profound impact on education and teaching. This paper analyzes and studies the cross-cultural adaptation of international students in China from five dimensions: social adaptability, psychological adaptability, campus adaptability, language adaptability and religious adaptability. This research uses the decision tree method to classify and predict the cross-cultural adaptability of international students in China, and compares the decision tree research method with the conclusion of the traditional regression Formula. The purpose of this paper is to compare the advantages and disadvantages of the two methods in classification efficiency, and the effective use of decision tree method in psychometric data. In addition, the decision tree method can generate understandable rules, which are close to people's cognition and representation of things in the real world, which is more conducive to the application in practical work. During the research process, the overall average score of social and cultural adaptation of international students in China was 2.7660. This research will help to better understand the problems of cross-cultural adaptation of international students in China, reduce the problems caused by cross-cultural students in China, and better adapt to the Chinese environment.

1. Introduction

As a specialized subject, Chinese as a foreign language is also an emerging subject. It is

developing rapidly, and there are more and more researchers in academia and those engaged. However, the cultural teaching in the teaching of Chinese as a foreign language has not really matured and perfected system, and it needs to continue to pay attention to it. While cultural teaching is subordinate to language teaching, its great influence on language teaching cannot be ignored. In the teaching process, we should consciously and methodically introduce culture to better promote language teaching. Is closely integrated with language teaching, which promotes and influences each other, and profoundly changes the traditional teaching concept and mode of teaching Chinese as a foreign language.

Since the increase of time spent studying abroad is inversely proportional to the degree of adaptability of international students on campus, it is recommended that international students strengthen their subjective initiative and view their campus environment with a positive and developmental attitude. In addition, international students, especially undergraduates, should strengthen their self-discipline and learning initiative. They should not relax their studies easily. They can make their own study plans and take exams independently to increase their motivation. In campus communication, it is necessary to strengthen the communication with others and teachers, and it is suggested to enhance the degree of campus cultural adaptability through teachers looking for Chinese students, counseling exchanges and group discussions.

Through the investigation of the uses the theory of cross-cultural adaptation and communication, the theory the theory of life satisfaction to analyze the adaptation of international students. This paper explores the performance of international students in terms of communicative adaptation, academic adaptation and life adaptation. Combined with the current era background, this paper explores cross-cultural adaptation in international students. This article provides practical suggestions for international students to better integrate into the local society, improve their academic performance, and help international students better integrate into the process of foreign exchange and learning.

2. Related Work

For the subject of cultural teaching in teaching Chinese as a foreign language, both domestic and foreign countries have paid considerable attention. Everyone unanimously recognized that the learning of a second language should not be simply the learning of language knowledge, but should be a combination of language and culture. Kupcsik A believes that in robotics, lower-level controllers are often used to enable robots to solve specific tasks in a fixed environment [1]. Pomorski D's work involves fault detection and isolation (FDI) of induction motors [2]. Hester T introduced texplore with the Variance-And-Novelty-Intrinsic-Rewards algorithm, an RL algorithm based on the intrinsic motivation mode [3]. Makridakis S believes that the impact of the industrial and digital (information) revolution has undoubtedly had a major impact on almost all aspects of society, life, companies and employment[4]. Zhengping H U proposed a neighborhood exclusion metric learning algorithm based on local feature fusion[5]. Rongpeng, Li believes that it is worth digging into the entire candidate technologies and examining the design philosophies behind them[6]. The traditional language teaching mechanism can no longer meet the needs of Chinese as a second language learner. Chinese as a foreign language is not only the study of the Chinese language, but the desire to understand a deeper level of Chinese culture has become the main purpose and demand of today's Chinese learners. Although the introduction of the syllabus of Chinese as a foreign language has put forward the teaching tasks, teaching purposes and cultural curriculum settings for students with different levels of Chinese, a certain degree of exploration and research has been carried out on the cultural teaching in the teaching of Chinese as a foreign language. And it has achieved certain results, reaching a consensus to make it the norm and basis

for cultural teaching. However, there are still theoretical and practical shortcomings in cultural teaching, which need to be further studied.

3. Methods for Extracting Rules for Cultural Adaptation to Chinese As a Foreign Language Based on Artificial Intelligence and Big Data Algorithms

3.1. Decision Tree Rule Extraction Algorithm

This paper will use the CART algorithm to construct the decision tree, so as to traverse the constructed decision tree to extract the rules.

There are two main steps in the CART algorithm:

(1) Recursively divide the sample into the tree-building process.

(2) Pruning with validation data.

The reduced decision table [7]:

$$S=\{N,U,C,D,V,F\} \tag{1}$$

Initialize a node Node with the reduced decision table $S=\{N,U,C,D,V,F\}$, if the condition attribute [8]:

$$C=\{c_1,c_2,\ldots,c_n\} \tag{2}$$

C is empty, that is, there is no optional feature, then Node is used as a leaf node[9].

$$T=\{T_1,T_2,\ldots,T_n\} \tag{3}$$

Calculate the surface error rate gain value for all non-leaf nodes [10]:

$$\alpha=\{\alpha_1,\alpha_2,\alpha_3,\ldots,\alpha_N\} \tag{4}$$

Where [11-12],

$$\alpha_i=\frac{R(t)-R(T)}{N(T)-1} \tag{5}$$

$$R(t)=r(t)\cdot p(t) \tag{6}$$

$$R(T)=\sum r(T)\cdot p(T) \tag{7}$$

$R(T)$ denotes the subtree error cost [13].

3.2. Framework

According to the theory of culture and cross-cultural communication, the cross-cultural interpersonal communication of Chinese international students studied in this paper is supported by the social support theory, and the judgment standard is mainly based on the subjective feelings of international students. Considering that the frequent daily interaction circles of international students are generally the people who are in contact with the school, it also focuses on the support from peers and the degree of acceptance of Chinese students among their foreign peers, as well as the situation of Chinese students making friends with foreigners and the situation of extended contacts in group communication. At the same time, this paper considers that Asian culture belongs

to high-context culture, while European and other countries belong to low-context culture. The frequency of communication in different contexts is a great test of whether Chinese students can interact freely with local people in foreign social and cultural environments to convey clear messages. Its ability to interact with people in different contexts has an important impact on cross-cultural communication adaptation. Therefore, the ability of international students to master foreign communicative culture and language is also regarded as a dimension to examine the cross-cultural communicative competence of international students. In addition, according to the cross-cultural influencing factors mentioned in the review, the degree of understanding of foreign countries, demographic gender, age, length of sojourn, source and scope of income, economic expenditure, and whether there is overseas experience are also used as influencing factors to investigate cross-cultural communication.

3.3. Learning to Adapt

Combining the research, combining the interpretation of the two learning adaptation theories and the dimension division of the existing learning adaptation scale, the learning adaptation dimension can be divided into two types: self-regulation and adaptation to the external environment. Self-regulation generally includes dimensions such as study motivation, study ability, study attitude, study skills, study pressure/physical and mental health, and self-evaluation. Adapting to the external environment includes adapting to the teaching mode, school environment and other learning-related scenarios. Therefore, this research also explores the dimensions of international students' learning levels. However, internal adaptation as the main dimension, and the questionnaire dimension is learning ability, learning attitude, learning pressure, teaching mode, learning environment, and self-evaluation. It is subdivided into four aspects: class participation, homework, and academic activities. As for the influencing factors of learning adaptation, this study mainly examines learning adaptation, so when studying the academic adaptation of should be combined. On the basis of combining the two theories of cross-cultural adaptation and learning adaptation, this questionnaire is mainly divided into personal factors and external factors. Personal factors include age, gender, length of study abroad, language ability and overseas experience in demographic information. The external factors are mainly the social support system, including the demographic information of school type, education level, major, language of instruction, daily living expenses, rent expenses, sources of living expenses and tuition fees, as well as interpersonal and life adaptation conditions.

3.4. Adaptation to Life

For foreign students who are new to foreign countries, the basic life aspects such as transportation are the most uncomfortable aspects. In addition, psychological feelings and economic foundations also have an important impact on the life adaptation . The Life Adaptation Scale in this paper mainly evaluates the life adaptability students from their experience of solving basic life needs and psychological cognition. It is mainly divided into four dimensions, basic life includes the natural environment, food, clothing, housing, transportation, etc. The social communication dimension includes factors such as seeking help and dealing with administrative problems. The economic dimension includes entertainment life, entertainment support, daily life support, etc., and emotional factors include loneliness and life satisfaction. The main influencing factors are set with reference to age, language, length of study abroad, sources of income and expenditure, knowledge of foreign countries, and previous experience of going abroad, as well as some situational variables, including interpersonal relationships.

3.5. Data Preparation and Parameter Setting

Due to the establishment of a binary tree, the demographic factors are basically multi-category variables, which are not included in the scope of analysis in this study. In addition, in order to obtain the rules more accurately, the items that do not have significant variance in the reasons for studying abroad are no longer included in the classification model. However, the whole model shows that social and cultural factors, school environment factors and personality psychological characteristics all have an impact on the level of adaptability, so these factors are all reserved into the model. Therefore, decision tree analysis variables include the following aspects:

(1) Reasons for studying abroad: 1) Got a scholarship 2) Low tuition fees 3) Like Chinese;

(2) School influencing factors: four dimensions: teacher image, teaching management, canteen environment, and learning conditions;

(3) Social and cultural influencing factors: service mode and public morality awareness;

(4) Personality psychological characteristics: three dimensions of extroversion, flexibility and independence. The level of adaptability includes three dimensions: social and cultural adaptation, psychological adaptation, and campus adaptation.

3.6. Classification Rule Extraction and Interpretation

It can be seen that a total of 29 leaf nodes are generated, that is, 29 classification rules. Taking the adaptive total score as an example, the generated eight rules are listed, and other adaptive model rules are similar.

Service mode is not only the best predictor of total fitness, but also the best predictor of sociocultural and psychological adaptation. Extraversion was the best predictor of campus adaptation. Specifically, flexibility, extroversion, teacher image, teaching management, and reason for studying abroad are other influencing variables of sociocultural adaptation. Extraversion, independence, and cafeteria environment are other variables that affect psychological adaptation. Flexibility, learning conditions, teaching management, teacher image, the reasons for studying abroad are like Chinese and the reason for studying abroad is to want to understand China also affect the campus adaptability to varying degrees.

4. Results of the Extraction of Cultural Adaptation Rules for Chinese as a Foreign Language

A CART model is established for the overall adaptability, social and cultural adaptability, psychological adaptability and campus adaptability of international students, and four classification trees are obtained through the establishment and pruning process of the decision tree. The risk assessment results of each model are shown in Table 1, and the standard errors obtained are all less than 0.02, indicating that the model fits well.

Table 1: Results of risk assessment for each model

Model	Method	Estimate	Standard error
Total fitness score	Replace	0.279	0.018
	Cross-validation	0.310	0.018
Sociocultural adaptation	Dongxin Substitute	0.255	0.017
	Intersection verification	0.270	0.018
Psychological adaptation	Replace	0.352	0.019
	Intersection verification	0.402	0.019
Campus adaptation	Replace	0.325	0.018
	Cross-validation	0.352	0.019

Service mode is the main influencing factor of total adaptability and sociocultural adaptability, extraversion is the best predictor of psychological adaption, and learning condition is the main effect of campus adaption. Specific analysis, extroversion, teacher image, flexibility and reasons for studying abroad are various factors that affect the overall adaptation. Flexibility and teacher image are other factors that affect sociocultural adaptation. The reason for studying abroad is that he likes Chinese and the service mode will also affect the psychological adaptation. Extraversion and flexibility are two other factors that influence campus adaptation. The influencing factors of the model are shown in Table 2.

Table 2: Model influencing factors

Model	Step	Chi-square	df	Sig
Total fitness model	5	9.796	7	0.200
Sociocultural adaptation model	3	3.537	6	0.739
Psychological adaptation model	3	3.032	6	0.803
Campus adaptation model	3	8.539	6	0.201

The item analysis of the Chinese Cultural Identity Scale is also carried out using the critical ratio method (CR value) and the correlation analysis method. The analysis results showed that the critical ratios of all 7 items of the Chinese Cultural Identity Scale reached a significant level ($P<0.01$). At the same time, the correlation between the 7 items and the total score of the questionnaire reached a significant level ($P<0.01$) and the correlation coefficients of all items were also greater than 0.4, that is, all items passed the test and did not need to be deleted. Therefore, it can be shown that the items of the Social Cultural Adaptation Scale have good homogeneity. As shown in Table 3.

Table 3: Analysis results of Chinese cultural identity of international students in China

Project	CR value	Related to total score
A1	11.651	0.547
A2	16.516	0.684
A3	15.030	0.652
A4	12.601	0.612
A5	10.331	0.511
A6	19.457	0.737
A7	11.247	0.561

The overall average score of is M=2.7660, M is lower than the critical value of 3, and the standard deviation is SD=0.49502. The scores are in the lower middle level, and the social and cultural adaptation experience of most international students is between "easy=2" and "average=3". In addition, the average M of each factor of the scale is between 2.5623-2.9623 ($M<3$), that is, overall, the degree of difficulty of is in the lower middle level. Difficulty in sociocultural adaptation is: cultural attitude adaptation>social interaction adaptation>stress coping adaptation>language communication adaptation>academic adaptation>daily life adaptation. It main pressure in China comes from value conflicts, cultural differences, emergency response, social support and language exchanges. The overall situation of cross-cultural adaptation of international students in China is shown in Table 4.

Table 4: Overall situation of cross-cultural adaptation of international students in China

Different aspects	MIN	MAX	M	SD
Language communication adaptation	1.00	5.00	2.7348	0.63115
Daily life adaptation	1.00	5.00	2.5623	0.73554
Cultural attitude adaptation	1.00	5.00	2.9623	0.72945
Academic adaptation	1.00	5.00	2.6413	0.74881
Stress coping adaptation	1.00	4.67	2.7957	0.70361
Social adaptation	1.00	5.00	2.9203	0.68169
Sociocultural adaptation	1.25	4.75	2.7660	0.49502

Through the independent sample T test on the gender condition of the intercultural adaptation level of China, the results and its various factors are in different genders. Except that language communication adaptation (T=0.634, P=0.527>0.05), there were significant differences. And the scores of males (M value) are higher than those of females (M value), that is, the cross-cultural adaptation of males is more difficult than that of females. However, there was no significant gender difference in psychological adaptation. The results of gender differences in cross-cultural adaptation of international students in China are shown in Table 5.

Table 5: Analysis results of gender differences in cross-cultural adaptation of international students in China

Factor	Gender	N	M	SD
Language Exchange	Male	197	2.7563	0.64612
	Female	263	2.7186	0.62045
Everyday life	Male	197	2.6717	0.76003
	Female	263	2.4804	0.70706
Cultural attitude	Male	197	3.0575	0.76788
	Female	263	2.8910	0.69222
Study	Male	197	2.7327	0.74508
	Female	263	2.5729	0.74569

The analysis results show that the significance P of each factor of Chinese international students' inter-generational level of Chinese students' cross-cultural adaptation. The results of the analysis of intergenerational differences among international students with Chinese identity are shown in Figure 1.

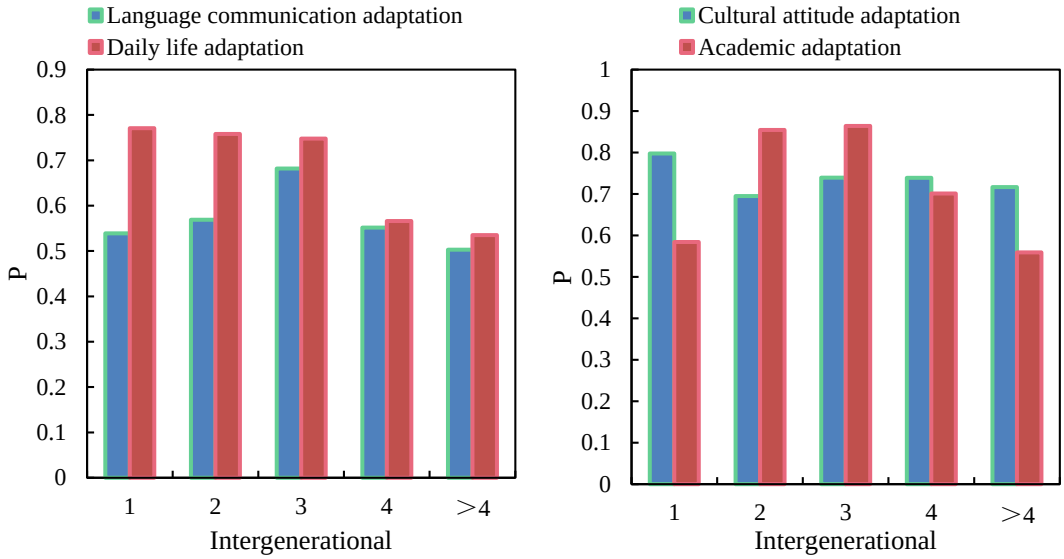

Figure 1: Analysis results of intergenerational differences

Through the analysis, M of the foreign students in Chinese proficiency is between 2.4964-2.8764. The level of adaptation increased with the increase of their Chinese proficiency. Further analysis found that there were significant differences in social and cultural adaptation and its various factors, except for daily life adaptation (P=0.052>0.05) and academic adaptation (P=0.145>0.05). While the average M of international students' psychological adaptation is between 3.2194-3.2347, further analysis found no significant difference (P=0.586>0.05). Figure 2 shows the differences in Chinese proficiency among international students in cross-cultural adaptation.

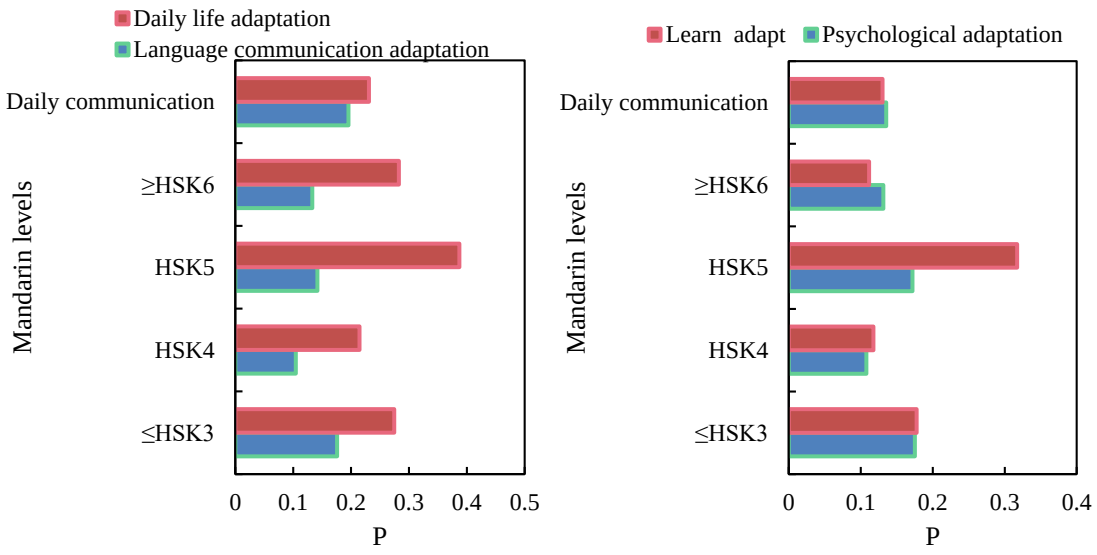

Figure 2: Differences in Chinese proficiency in cross-cultural adaptation of international students

The average M of the socio-cultural adaptation China time of coming to China is between 2.6216-2.8798, and P=0.000<0.001.And at the same time, among the factors of social and cultural adaptation, except for academic adaptation (P=0.751>0.05), there are significant differences. The average M of the psychological adaptation level time in China is between 3.2195-3.2287, but P=0.633>0.05, that is, there is no significant difference. Figure 3 shows the differences in the time of international students' cross-cultural adaptation in China.

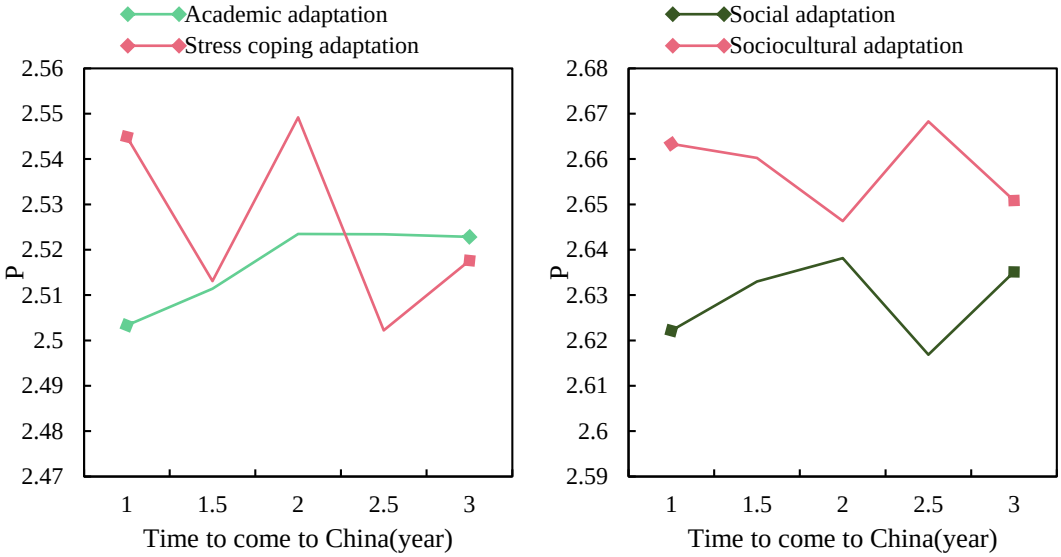

Figure 3: Differences in the time of international students' cross-cultural adaptation in China

The average M of the social and at different ages is between 2.7205-2.9924, and the difference in difficulty is: 20 years old and below > 20-30 years old > 30 years old and above. Through further analysis, P=0.002<0.05, that is at different ages. At the same time, there were significant differences in language communication time, daily life adaptation, and academic adaptation in each factor (P<0.05). Psychological adaptation of international students at different ages (P=0.403>0.05). The age difference of international students' cross-cultural adaptation is shown in Figure 4.

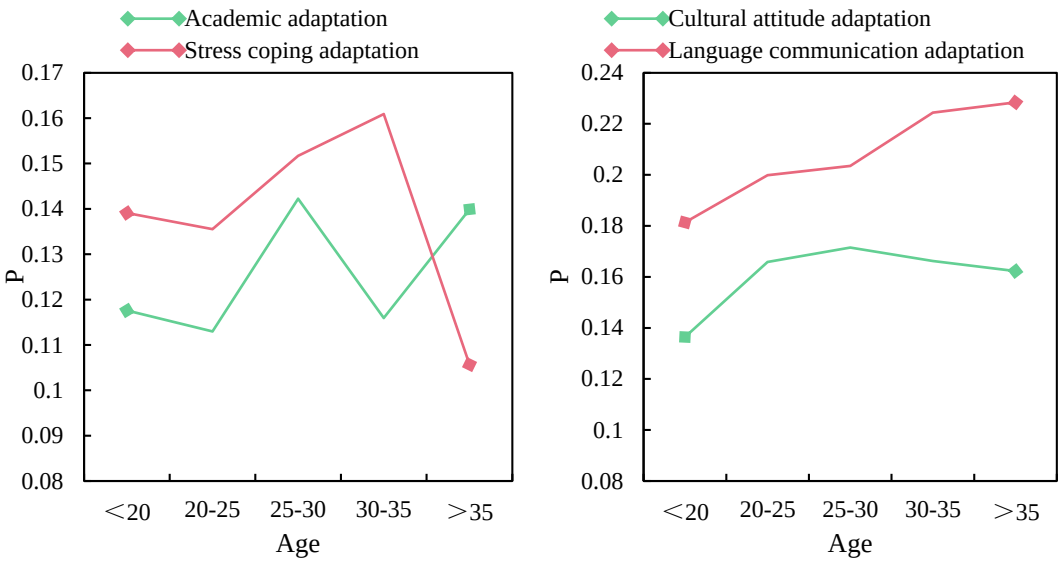

Figure 4: Age differences in cross-cultural adaptation of international students

The learner's interest in learning is an important basis for teachers to formulate cultural teaching content, and the survey results of Chinese cultural content that students are most interested in can help teachers to arrange teaching content more scientifically and reasonably, so as to be targeted and detailed.

5. Conclusion

And the evaluation method of big data has also field of school-running quality in colleges. However, there are few applications focusing on the quality evaluation of talent training in colleges, and the application in local colleges is more limited, which obviously does not conform to the pace of technological innovation. This study provides an overview of the theory of intercultural adaptation. Including the definition and classification of intercultural adaptation, the basic theory of interculturality and the intercultural adaptation. The development of related scales includes research tools, research objects, quantitative research and qualitative research. Cultural teaching should permeate all aspects of teaching Chinese as a foreign language. While teaching language, we must closely integrate relevant cultural teaching. It is necessary to cultivate the ability to discover the cultural factors contained in the language all the time, and use it to assist language teaching, cultivate language ability, train language skills, and finally improve communicative ability.

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