



On Cultivation of Intercultural Communication Competence in College Students' Autonomous Language Learning Via Computer Technology

Nan Qin^(✉) 

Department of International Business, Jin Cheng College of NUAA, Hangjin Avenue, Jiang Ning District, Nanjing, China
81121649@qq.com

Abstract. The informatization and modernization of education represent the higher level of education development in a country. With the rapid development of computer network technology, the application of computer technology in education informatization has become a major trend of teaching reform in colleges and universities. Guided by the components of intercultural communication competence proposed by Judith Martin and Thomas Nakayama of the United States, this paper designs a Likert questionnaire from the perspectives of knowledge, emotion, mind and situation and randomly selected about 150 college students to investigate their current cultivation of intercultural communication competence by using computer technology. It starts with a visual analysis of the Status Quo of domestic college students' computer-based autonomous cultivation of intercultural communication competence by relevant data retrieved from CNKI, then carries out a linearity regression analysis of the questionnaires retrieved from the students. By studying the independent variables, dependent variables and the relations between the two in the Coefficients, Histogram, and Normal Q-Q plot, the paper finds out that in the information age of college education, computer technology is profoundly affecting the level of intercultural communication competence of contemporary college students, and the knowledge aspect of college students' intercultural communication competence is rather high thanks to the convenience and accessibility to computer technology. However, their intercultural communication competence needs to be further strengthened in the other three aspects due to possible subjective factors involved in their emotion, complexity in different language environments and the lack of opportunities of application of foreign languages. Based on the results, this paper further puts forward corresponding suggestions on the ways to autonomously cultivate college students' intercultural communication competence through computer technology.

Keywords: information era · computer technology · intercultural communication competence · autonomous learning

1 Introduction

As a learning goal, learning autonomy has a far-reaching impact on academic circles around the world. As early as the 1970s, foreign countries had begun to carry out a lot

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of researches on autonomous learning, including a large number of researches on using the Internet for autonomous learning. For example, Palfreyman and Amiths conducted an in-depth analysis on learning autonomy and believed that learners should make full use of Internet resources [8]; Norlan proposed the importance of using the Internet and technology in language learning [7]. Murphy believed that although there is no unified autonomous learning theory so far, people have reached a consensus on the importance of autonomous learning and the diversity of autonomous learning methods based on learning contents and learners’ characteristics [6]. At the end of the 20th century, domestic scholars began to introduce and discuss the problem of autonomous language learning, and relevant research results are quite abundant. Meanwhile, the popularity of the internet in recent years has also made the research on the internet and learning autonomy a new hot-spot. For instance, Zhao Shanshan and others analyzed how to effectively use the internet to cultivate students’ English autonomous learning ability from different aspects [10]; Zhang Zenghu explored the new mode of autonomous learning in colleges and universities in the age of big data [11]; Dai Jianbo deeply analyzed the impact of mobile phones on college students’ autonomous Learning [2].

The study on intercultural communication competence arose in the United States in the 1950s. Different scholars have studied it from different perspectives. For example, the famous scholar Benjamin Bloom proposed that intercultural communication competence should be composed of attitude, knowledge and skills [3]. Yong Yun Kim believed that intercultural communication competence consists of cognitive ability, emotional ability and behavioral ability [1]. Judith Martin and Thomas Nakayama proposed in *Intercultural Communication in Context* that intercultural communication competence model includes four elements: knowledge factors, emotional factors, mental activity and situational competence [5]. The domestic research on intercultural communication competence began in the 1980s, and now there have been a large number of multi-dimensional and multi-domain related studies.

As of August 8, 2022, a total of 721 relevant papers have been retrieved through CNKI with “In-formation Age” + “autonomous learning” as the search terms. As can be seen from the visual analysis (Fig. 1), the number of relevant articles began to increase year by year in the past decade, and reached the top in the year of COVID-19 outbreak of 2019. This shows the unstoppable trend of autonomous learning of students in the information age in view of the new normal of epidemic situation.

These research results were again screened by using “college students” as the key word, and 83 relevant research papers were obtained. The visual analysis chart (Fig. 2) shows that the trend related to the number of papers issued in relevant years is basically

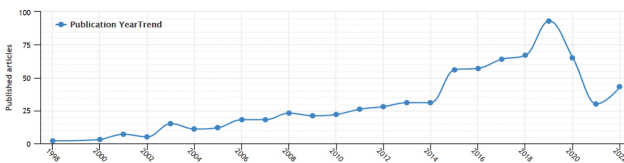


Fig. 1. Publication Year Trend of Papers Retrieved by “Information Age” + “Autonomous Learning”

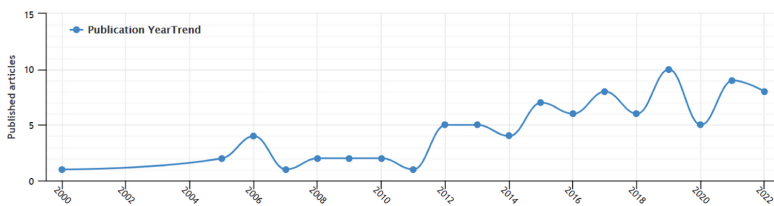


Fig. 2. Publication Year Trend of Papers Retrieved by “Information Age” + “Autonomous Learning” + “College Students”

consistent with the trend showed in Fig. 1, which means that the research on the cultivation of college students’ intercultural competence by autonomous language learning in the information age conforms to the development trend of the times.

Taking “computer” + “intercultural communication” as the search term, the research group screened the cultivation of students’ intercultural communication competence based on computer technology. Only 6 research articles published in the near years were found. It can be seen that the research on the strategy of using computer technology to cultivate students’ cross-cultural communication competence in the information age not only meets the requirements of the times, but also fills the research gap in this area to a certain extent.

2 Research Content

With the development of globalization, intercultural communication competence has become an inevitable requirement of the residents of the “global village”. The level of intercultural competence determines whether communicators from different cultures can avoid conflicts, understand each other and advance together [9]. At the same time, the multicultural context of the new era also puts forward new requirements for the cultivation of contemporary college students, that is, a qualified college student must have certain intercultural awareness and intercultural communication competence, which has become an important requirement for qualified international talents and an important guarantee for college students to improve their competitiveness in society.

Intercultural communication competence is a concept put forward against cultural conflict. It is the ability to flexibly deal with practical problems in intercultural communication on the basis of understanding and mastering foreign cultural knowledge and communication skills. Guided by the components of intercultural communication competence proposed by Judith N. Martin and Thomas K. Nakayama, the research group designed the Likert scale questionnaire from the perspectives of knowledge, emotion, mind and situation, randomly selected about 200 students from Jincheng college of NUAA, and investigated the current situation of college students’ cultivation of intercultural communication competence through autonomous learning with computer-based technology; Based on the statistical survey results, this paper analyzes the similarities and differences of contemporary college students in using computer technology to independently cultivate intercultural communication competence, and puts forward corresponding suggestions on the ways of college students’ self-cultivation of intercultural communication competence based on computer technology in the information age.

3 Research Process

3.1 Pre-research

In view of the influence of the information age on the autonomous language learning tools and learning styles of college students, the research group conducted a survey on the current situation of college students' use of computer technology in learning, and investigated the "hardware" and "soft-ware" used by college students in the cultivation of their intercultural competence. A total of 203 valid questionnaires were collected, and the results are as follows.

It can be seen from the Table 1 that desktop computer is the most frequently used hardware device in language learning, accounting for 38% of the total, followed by notebook computer (22%), laptop (19%), smart phone (18%) and other forms of device (3%). Although smart phones are light to carry and easy to operate, compared with notebook computers and desktop computers, they are still unable to realize many functions that notebook computers and desktop computers can easily manage. Therefore, desktop computers still have absolute advantages in college students' language learning. The research group also conducted a survey on the "software" resources used by contemporary college students in language learning through computer networks. The research results are as follows.

Table 2 shows that 58% of college students conduct autonomous language learning based on various social media platforms on the internet, which further verifies the subversive impact of the internet on contemporary college students. In addition, the proportion of using special language learning apps for language learning is also relatively high, accounting for 14%, which implies that contemporary college students still have

Table 1. Hardware Application in Intercultural Communication Competence Training

Computer-based Language Learning Tools	Notebook Computer	Desktop Computer	Smart phone	Laptop	Other Electronic Equipment (E-reader, etc.)
Percentage	22	38	18	19	3

Table 2. Statistics of Computer Network Software Used by College Students

Computer Network Software	Language Learning Apps	Micro-lectures	MOOC	Social Media Platforms (Social Networking Sites, Micro-blogs, We-chat, Blogs, Podcasts, etc.)	Others (Computer-based Training and Learning)
Percentage	14	8	10	58	12

a great demand for basic language knowledge. As the educational methods that colleges and universities have been vigorously promoting in recent years, micro-lectures and MOOCs do not account for a high proportion of all of the language learning tools. The reason may be that as new forms of learning tools in the information era, micro-lectures and the MOOC are not fully developed and there is still large room to explore in terms of their scale, pertinence and popularization. In addition, other computer-based training and learning methods also play a role in college students' language learning.

Guided by the four components—knowledge factors, emotional factors, mental activity and situational factors—of intercultural communication competence proposed by Judith N. Martin and Thomas K. Nakayama of the United States, the research group summarizes the current situation of contemporary college students in using computer technology to cultivate intercultural communication competence. The results are as shown in Table 3.

Components of Intercultural Communication Competence Knowledge Emotion Mind Situation

It can be seen from the Table 3 that contemporary college students mainly acquire language knowledge through rich multimedia resources; At the same time, various social platforms, multimedia interactive platforms, e-mails and other learning forms provided by computer networks can build up students' intercultural knowledge, reduce students' intercultural communication anxiety, and cultivate students' emotional aspect in intercultural communication competence; Meanwhile, students can conduct multi-directional and multi-angle listening, speaking, reading and writing ability through the computer

Table 3. Status Quo of Autonomous Intercultural Communication Competence Cultivation

Components of Intercultural Communication Competence	Knowledge	Emotion	Mind	Situation
Sources	Network Resources: MOOC; SPOC; Social Media Platforms (Social Networking Sites, Micro-blogs, We-chat, Blogs, Podcasts, etc.); Micro-lectures; Learning Software; Other Computer-based Training and Learning, etc.)	Social Media Interaction Platforms (Forums, Social Networking Sites, Micro-blogs, We-chat, Blogs, Podcasts, etc.); E-mail; Film and television drama, etc.	Computer-based Listening, Speaking, Reading and Writing Practice Based on Different Roles inside and outside the Class	Sound Computer-based Learning Environment; Suitable Language Context; Reasonable Identity Positioning

and its associated network resources to strengthen their minds and improve their intercultural communication competence; Beside, a sound computer learning environment can help to simulate the suitable language context, guiding students to participate in the training with different identities and roles to improve their cross-cultural ability.

According to the comprehensive survey, the autonomous language learning style of contemporary college students has changed greatly under the influence of the rapid development of internet technology. Although learning tools that are easy to operate and light to carry are more and more popular among college students, desktop computers and notebook computers are still the most frequently used language learning tools for college students; At the same time, contemporary college students are more inclined to learn language through entertaining and interactive learning tools. In view of this, it is necessary to learn about the level of their intercultural communication competence in the computer-based information age.

3.2 Likert Questionnaire Survey

Under the background of fully considering the learning resources and learning modes in the information age, the research group is guided by the four components of intercultural communication competence proposed by Judith N. Martin and Thomas K. Nakayama of the United States and de-signed a Likert scale questionnaire for college students to cultivate their intercultural communication competence through autonomous learning based on computer technology according to specific content contained in each component. The contents of the questionnaire are all positive statements of using computer technology to cultivate students' intercultural communication competence through autonomous learning. Each statement has got five responses, namely "totally agree", "agree", "partly agree", "disagree" and "disapproval", which are scored as 5, 4, 3, 2 and 1 points respectively. The total attitude score of those surveyed is the sum of the scores obtained from their correspondent answers to each question. This total score can indicate their attitude to or different status, which can also implies their level of intercultural communication competence. The higher the students score, the higher is their intercultural communication competence.

According to Judith N. Martin and Thomas K. Nakayamas, the four components of intercultural communication competence are interrelated (See Fig. 3), and each of them involves certain factors that decide students' intercultural communication competence. The research group has designed different statements reflecting the different aspect of students' intercultural communication competence. Through online questionnaires, a total of 150 valid questionnaires have been collected and sorted out. The results are as follows:

The Fig. 4 shows that most students' intercultural communication competence are of a medium level by choosing the score 3, taking up 29.33% of the total. Student who chose score 1 and 2, which show the lower cultural communication ability, are slightly higher than those who chose score 4 and 5. This means contemporary college students' overall intercultural communication competence are still at a relatively low level and need further strengthening.

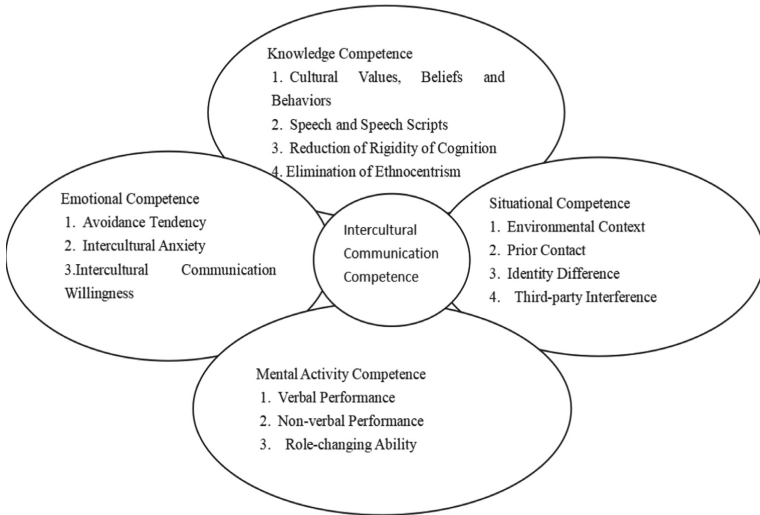


Fig. 3. Components of Intercultural Communication Competence

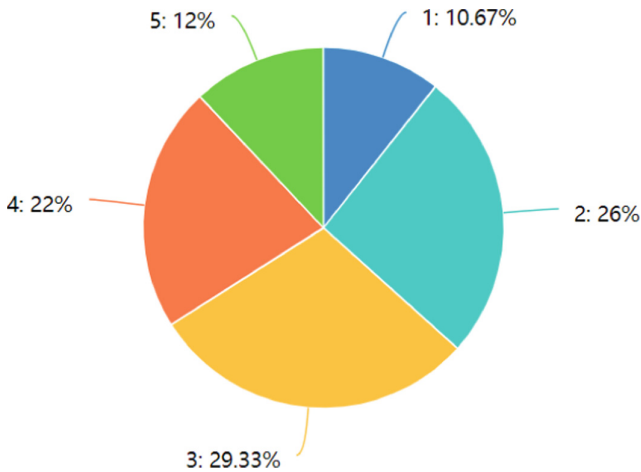


Fig. 4. Likert Scale Survey: Intercultural Communication Competence Percentage Level Curve

The data of students’ intercultural communication competence is also analyzed according to the four components of intercultural communication competence. The results are as shown in Figs. 5, 6, 7 and 8.

Through comparative analysis, it can be seen that the contemporary college students’ intercultural communication competence is at a high level in term of knowledge learning through computer-based autonomous learning. However, their intercultural communication competence in view of the emotion, mind and situation is at a low level without exception. This might be caused by the fact that students still tend to avoid intercultural communication and are easy to produce anxiety in intercultural communication,

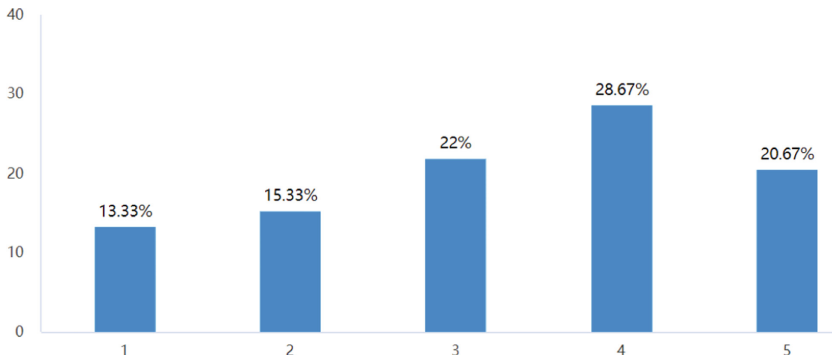


Fig. 5. Bar Chart of Likert Percentage Level of Students' Knowledge Competence

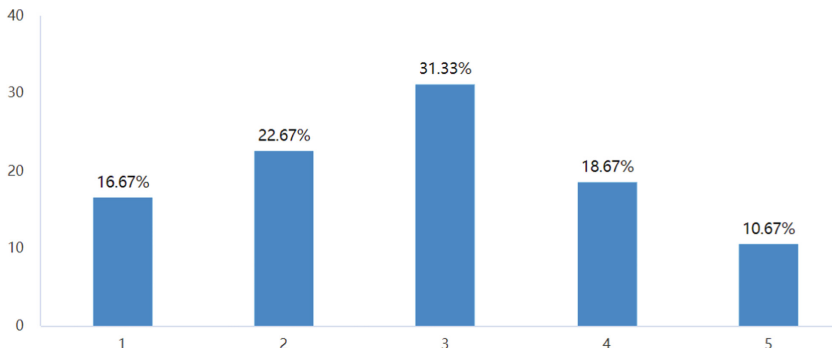


Fig. 6. Bar Chart of Likert Percentage Level of Students' Emotional Competence

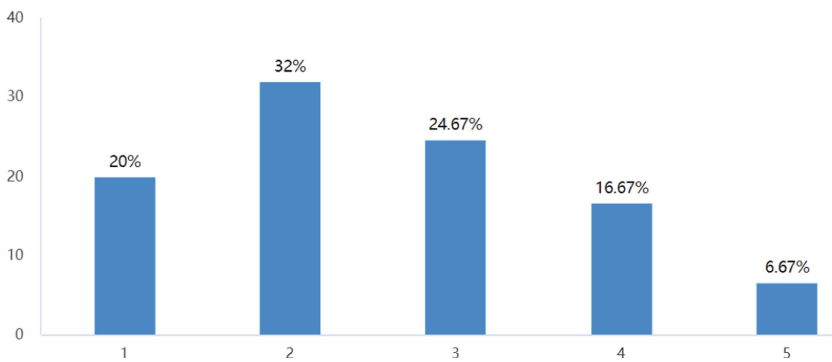


Fig. 7. Bar Chart of Likert Percentage Level of Students' Situational Competence

and their willingness in intercultural communication is not strong; Students' language competence in verbal expression and role-playing in intercultural communication also needs to be improved. In terms of situational adaptability, most students can manage to

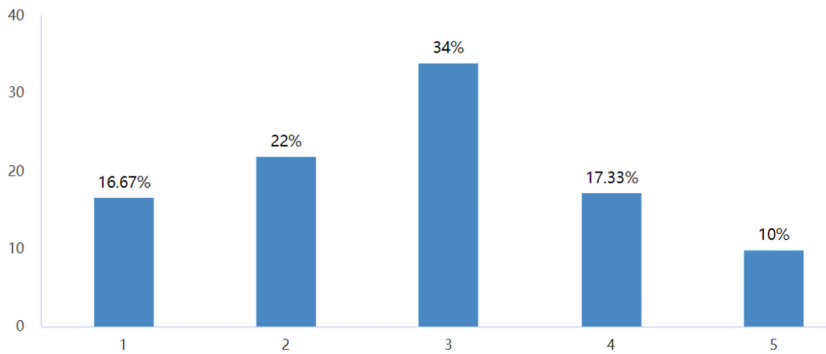


Fig. 8. Bar Chart of Likert Percentage Level of Students' Mind Competence

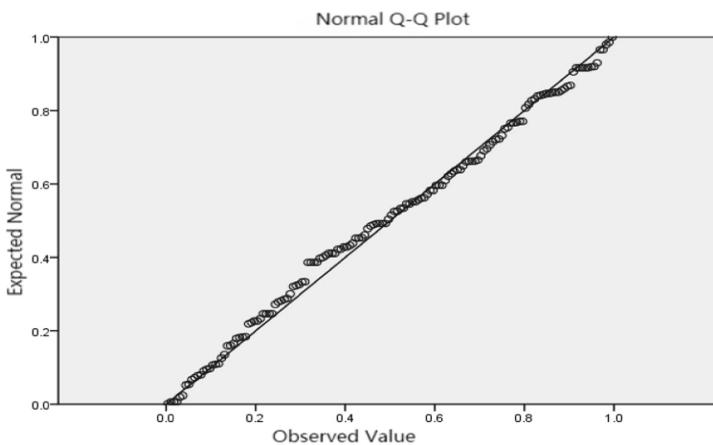


Fig. 9. Normal Q-Q Plot

maintain a medium-level intercultural communication competence, which still demands further improvement.

3.3 Linear Regression Analysis

The paper conducts linear regression analysis on the data of Likert questionnaire, analyzes the relationship and correlation between independent variables and dependent variables, and then verifies the feasibility and effectiveness of the questionnaire. After importing data in SPSS.19, the following charts and table are obtained:

Figure 9 is a normal P-P diagram of regression analysis, which gives a comparison between the residual distribution of the observed value and the expected normal distribution. It can be seen from the figure that the distribution of the scattered points of the standardized residual is close to the straight line, so it can be judged that the normal distribution of the standardized residual is normal. Figure 10 is the histogram of regression normalized residuals, and the normal curve is also displayed on the histogram to

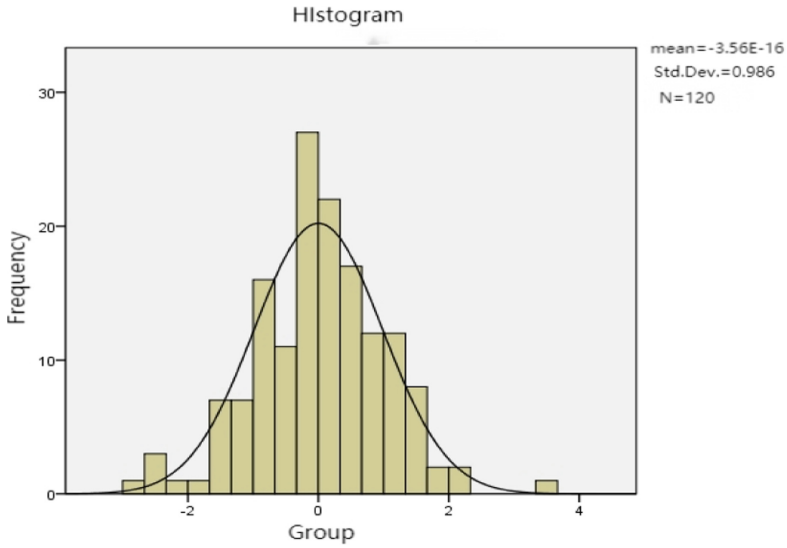


Fig. 10. Histogram

Table 4. Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std.Error	Beta			Tolerance	VIF
1	(Constant)	-.019	.218		-.085	.932		
	Question1	.350	.058	.390	6.059	.000	.669	1.495
	Question2	.268	.062	.277	4.348	.000	.683	1.464
	Question3	.178	.062	.177	2.883	.005	.734	1.362
	Question4	.226	.057	.230	3.946	.000	.817	1.225

a. Dependent Variable: Question5 (The Overall Competence of College Students' Intercultural Communication)

judge whether the normalized residuals are normally distributed. It can be seen from the sample curve that there is a positive distribution, indicating that the model is highly correlated.

This Table 4 is a list of coefficients of linear regression. The table shows the partial regression co-efficient (B), Std. Error, constant, beta, t-statistic observation value and corresponding probability p value (sig.) of regression coefficient test, and collinearity statistics that show the tolerance and VIF of variables.

If x1 denotes the knowledge aspect of intercultural communication competence, x2 denotes the emotion aspect of intercultural communication competence, x3 denotes the

mental aspect of intercultural communication competence, and x_4 denotes the situational adaptability of intercultural communication competence. The multivariate linear regression equation established according to the model can be seen as follows:

$$y = -0.019 + 0.058 x_1 + 0.062 x_2 + 0.062 x_3 + 0.057 x_4$$

The constant term in the equation is -0.019, and the partial regression coefficient b_1 is 0.058, b_2 is 0.062, b_3 is 0.062, and b_4 is 0.057. Through t-test, the probability p values of b_1 , b_2 , b_3 , and b_4 are 0.000, 0.000, 0.005, and 0.000 respectively, which means there are statistically significant differences in the extent of adherence among the groups under the given significance level of 0.10. According to the tolerance, the VIF values among independent variables are all less than 2, indicating that the collinearity is not obvious and the correlation between sample tables is strong.

3.4 Research Results

Based on the survey results of the current situation of contemporary college students' cultivation of intercultural communication ability through autonomous language learning via computer technology, and taking the college students as the survey object, this paper analyzes the similarities and differences of their intercultural communication competence by using computer technology and the current level of their intercultural communication competence, and tries to find a more effective way for contemporary college students to apply computer technology in the cultivation of their intercultural communication competence. The results are as follows:

- 1). The overall intercultural communication competence of contemporary college students who conduct autonomous learning through computer networks is mostly at a medium level, and there are still a considerable number of college students whose intercultural communication competence needs to be improved;
- 2). The traditional desktop computers and notebook computers are still preferred as the main learning tools by college students in the information age. Meanwhile, smart phones and laptops are also favored by college students due to their lightweight and rapid technological innovation.
- 3). In the information age, college students are increasingly relying on social media platforms in their study, and 88 percent of their learning is done online. The traditional offline autonomous learning is no longer the dominant mode.
- 4). In the era of knowledge explosion with the rapid development of internet technology, college students in China can easily access various intercultural knowledge through various internet resources, and can better understand the differences among different cultures, have a more objective understanding of different values and cultural concepts. They have developed profound love for their native culture, and have a high sense of national identity.
- 5). College students in China need to pay more attention to the cultivation of intercultural communication competence in their emotional and mental aspects. To overcome intercultural anxiety, they should actively participate in all kinds of cross-cultural communication activities, improve their willingness of intercultural communication, and get ready

to adjust their roles of communication with appropriate communication skills when the language environment changes. For example, students can participate in English corner activities on different themes and conduct intercultural communication with different foreign teachers, students and friends in English, so as to improve their intercultural communication competence in their emotional and mental aspects.

6). Contemporary college students are rather passive in terms of the change of situations in their autonomous cultivation of intercultural communication competence, which indicates that the change of environments, language context and other situations has great impact on the intercultural communication competence of college students. College students in China can improve their learning results and their intercultural communication competence by autonomously creating certain language contexts or learning in a comparatively quiet environment.

4 Conclusion

College students are the mainstay of the construction of the nation. The cultivation of their intercultural communication competence is an important support for the implementation of China's policy of the "Belt and Road" and the "globalization of Chinese culture". In the Internet era with rapidly changing information technology, the traditional teaching-oriented educational mode has been unable to meet the needs of the intercultural communication competence training of college students, and the integration of computer technology and traditional learning methods has become an inevitable trend in which college students cultivate their intercultural communication competence with the help of computer technology [4]. College students nowadays are good at using the rich internet technologies to acquire various intercultural knowledge in their autonomous language learning process of cultivating intercultural communication competence. However, there are still many problems in the output of intercultural knowledge. For example, their willingness of intercultural communication is not strong, their anxiety in intercultural communication and inability in adapting to the change of roles or the change of language contexts in intercultural communication are still prominent. In order to improve their intercultural communication competence, college students in the information age should not only be good at using various internet resources for language learning, but also be better shaped with an intercultural mind, overcome intercultural anxiety, and improve their awareness of intercultural participation.

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