



## Theoretical Innovation and Practical Exploration of Academic Style Construction in Higher Vocational Colleges Driven by Chuyi Spirit

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**SUMMARY:** *As an important legacy of modern vocational education in China, the key components of the Chuyi Spirit such as patriotism, knowledge, entrepreneurship, and industry all demonstrate a high level of consistency with the educational goals pursued by higher vocational colleges and universities in the country today. In this study, a survey was conducted on the population of students attending a higher vocational college, and measures of the Chuyi Spirit and the construction of academic culture in higher vocational institutions were created. SPSS was used to analyze data collected for reliability and interrelations among the variables included in the model. Moreover, the demographic attributes of the Chuyi Spirit and its elements were analyzed to see if there are any significant differences between them. Structural equation modeling was performed to analyze the impact mechanisms through which the Chuyi Spirit affects the formation of academic style in higher vocational colleges and universities. The impact configurations of the Chuyi Spirit on the development of academic style in higher vocational institutions were studied by fsQCA. The analysis shows that patriotic spirit and sense of responsibility, practical and sophisticated professional skills, pioneering and innovative entrepreneurial personality, diligence and lifelong learning, and unity and cooperation spirit can affect directly the construction of academic style in higher vocational colleges and universities. Therefore, the following suggestions are made based on this research: organizing various activities as a response to the Year of Academic Style Construction campaign and conducting various activities related to "I Am a Reader" and "Practice Virtue and Establish Good Behavior."*

**KEYWORDS:** *Chuyi Spirit; Correlation Analysis; fsQCA; Structural Equation Modeling; Higher Vocational Colleges Academic Style Construction*

## 1 Introduction

The Chuyi spirit of “patriotism, knowledge, entrepreneurship, and industrial development” has been precipitated and inherited for a hundred years, and has been deeply integrated into the historical and cultural traditions of Hunan vocational education, which has become a spiritual mine of Hunan vocational education [1]. Under the guidance of the beautiful blueprint of “three high and four new”, Hunan accelerates the construction of “4×4” modern industrial system, vigorously develops the real economy, and promotes the transformation of a large manufacturing province into a strong manufacturing province [2]. In this respect, vocational schools and universities make efforts towards fostering the Chuyi spirit and developing an

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environment conducive to the cultivation of the Chuyi spirit. The contribution of such efforts to the development of highly skilled workforce in the province cannot be underestimated.

For spiritual legacy, there must be a suitable carrier. It is necessary for vocational colleges and universities to carry the spirit of Chuyi by studying the spiritual implications of it first and then establishing campus culture, optimizing the orientation of the education which focuses on personnel training, making the diversified teaching platform and stressing capability cultivation. In this way, the spirit of Chuyi will become part of education and teaching in all aspects within the vocational college and university, promoting its empowerment in educational practice and talent cultivation [3-5]. There are two interpretations when talking about the building of academic ethos of higher vocational colleges and universities. The limited definition of academic style means the atmosphere of studying. It involves such elements as the clarity of learning goals, learning motivation, learning attitudes, high quality of study effects and other related factors [6-8]. On the basis of the existing situation of the construction of academic culture in higher vocational colleges and universities, some creative strategies in academic culture construction are put forward in the literature [9], including that (a) party building work leads to the construction of academic culture with strengthened supervision and feedback mechanisms, (b) the student organization promotes academic culture and innovates and refines the "three-in-one" parenting system, and (c) service-oriented approaches contribute to the development of academic culture with improved effect of collaboration parenting. Literature [10] finds that construction of school spirit, teaching method, and learning style represents a vital mechanism of improving the quality of education and the overall performance of educational institutions. Literature [11] highlights that the development of academic style represents a significant element of talent cultivation within college and universities as it plays the role of the key internal factor determining the quality of education and teaching, and ensuring sustainable development of higher education system. With the help of statistical analysis of data, it attempts to identify the key drivers behind academic style formation and provides the empirical basis for optimizing the development process and improving its quality and results in terms of benefiting parents/students, and identifying the path forward. Literature [12] discusses existing gaps in building an optimal academic style and proposes to explore innovative approaches to building excellent academic style, and encourages stakeholders within colleges/universities to change their views concerning the way of nurture of academic style and to apply modern technologies in this process as well as engage multiple parties, including schools and enterprises Literature [13] through the phenomenon of college students cheating on exams, analyze the deep-rooted addresses the issue of cheating in examinations within college students by analyzing the root causes and the state of current academic style construction in higher education system and proposes practical ways of improving it.

Academic-style construction in the broad sense refers to the learning environment of the school, whereas the learning atmosphere is related to the learning environment of all teachers and students in the school throughout a prolonged period. During the educational process, this construction tries to promote the cultivation of a more clear purpose of learning, a more rigorous academic spirit, a proper learning attitude, and practical learning methods [14-16]. For example, literature [17] identified the quality of campus services and academic climate as key factors affecting students' experience of academic completion, and found that current campus services are inadequate and the overall climate is unsupportive, which causes many students to feel uncomfortable at school and even have difficulty in adhering to classroom learning. Literature [18] takes local ordinary colleges and universities as a case study, investigates the status quo and demand of academic atmosphere through questionnaires, and points out that the construction of academic atmosphere is a comprehensive affair combining ideological-political work and academic characteristics, which requires counselors and professional tutors to form a

synergy, give full play to their respective advantages, and work together to optimize the academic atmosphere. Literature [19] focuses on the fit between the architectural design of university campuses and the concept of educational campuses, and uses the hierarchical analysis method (AHP) to establish the priority design principles of educational campuses, and then constructs a quantitative decision-making model through a fuzzy logic system in order to assess the quality of the campus educational and academic atmosphere. Literature [20] argues that the creation of an academic ambiance within colleges should be based on the physical environment, institutional structure, and spirituality, so as to make both the teachers and students associate themselves with cultural standards through ideological beliefs, psychological adjustment, behavior norms, and value orientation. It is believed that through this process character can be developed, a sense of unity formed, and the competitive strength of the university clarified along with institutional spirituality. Literature [21] suggested that academic style of higher learning institutions consists of academic concepts, academic spirit, academic ethics, and academic ambiance. Campus culture has the features of being distinct, scholarly, open, leadership, diverse, and innovative. Furthermore, academic culture can be seen as a facilitator to the development of campus culture, and vice versa.

The article begins with a research design that identifies college students in A higher education institution as the target population. Subsequently, the structural equation model used in the study of this article is introduced, including three parts: basic concepts, structure and modeling steps. Subsequently, the Chuyi Spirit and Academic Style Construction Scale in Higher Vocational Colleges was established, and the data were analyzed for reliability and validity, and the variables were analyzed for correlation. SPSS was then used to analyze whether the demographic characteristics of Chuyi Spirit and its dimensions were significantly different. With the help of SEM analysis and fsQCA, this paper explores the key elements behind the integration of Chuyi Spirit into the formation process of academic style in higher vocational colleges, based on previous studies. In conclusion, the framework for incorporating Chuyi Spirit in the construction of academic style in higher vocational colleges is formulated.

## **2 Research methodology**

### **2.1 Study design**

#### **2.1.1 Scale development**

The study adopted a questionnaire designed by the researcher himself based on data collected from interviews. The preliminary questionnaire was developed after careful analysis of the data collected from the interviews among the respondents. The preliminary questionnaire was then revised through careful refinement processes, including the elimination and combination of items, resulting in the development of the final questionnaire. The questionnaire consists of two major parts. The first part involves the collection of demographic data of the respondents, such as their gender, grade level, and place of origin. The second part contains the actual questionnaire that consists of two constructs: (a) the Chu Yi Spirit construct and (b) the academic style construction construct.

#### **2.1.2 Objects of study**

The questionnaire was mainly distributed through Questionnaire Star website, addressing students studying in A Higher Vocational College. In all, 500 questionnaires were handed out and 500 questionnaires were returned, thus making the response rate 100%. Out of the sample

size, 56% were males while 44% were females. As far as their class level is concerned, freshmen constituted 12%, sophomores 70%, juniors 11%, and seniors 7%.

### 2.1.3 Analytical tools

At the beginning of this study, correlations were analyzed by using SPSS to determine any existing relationship between the variables. After that, this proposed model of this study was analyzed by using AMOS to see the relationships between the latent variables. Ultimately, Bias-corrected nonparametric percentile Bootstrap technique was used to test the mediating effect of the independent variable.

## 2.2 Structural equation modeling (SEM modeling)

### 2.2.1 Basic concepts of structural equation modeling

The Structural Equation Model is one type of multivariate statistical analysis that utilizes a system of linear equations to represent the association between observed and latent variables as well as among the latent variables. This method became a widely-used tool for analyzing data in social sciences. The SEM brings together both factor analysis and path analysis in one statistical analysis process that comprehensively incorporates statistical techniques such as factor analysis, exploratory factor analysis, confirmatory factor analysis, path analysis, multiple regression, and analysis of variance (ANOVA).

### 2.2.2 Basic structure of structural equation modeling

Structural equation modeling usually consists of two elements: measurement model and structural model. The measurement model represents the relationship between observed and latent variables, whereas the structural model represents the relationship between latent variables.

The measurement model represents a set of equations for the relationship between the observed variables  $X, Y$  and the latent variables  $\xi, \eta$ .

$$X = \Lambda_x \xi + \delta \quad (1)$$

$$Y = \Lambda_y \eta + \varepsilon \quad (2)$$

where  $X$  is the variable consisting of the observed variables,  $Y$  is the variable consisting of the endogenous variables,  $\xi$  is the variable consisting of the exogenous latent variables,  $\eta$  is the variable consisting of the endogenous latent variables,  $\Lambda_x$  is the factor loading matrix on the exogenous latent variables of the observed variables,  $\Lambda_y$  is the factor loading matrix on the endogenous latent variables of the endogenous variables and  $\delta$  is the vector of measurement errors for  $X$  and  $\varepsilon$  is the vector of measurement errors for  $Y$ .

The structural model represents the set of equations for the relationship between the latent variables and the latent variables

$$\eta = B\eta + \Gamma \xi + \zeta \quad (3)$$

where:  $\eta$  is the variable consisting of endogenous latent variables,  $\xi$  is the variable consisting of exogenous latent variables,  $B$  is the path coefficient (indicating the relationship between endogenous latent variables),  $\Gamma$  is the path coefficient (indicating the effect of the

exogenous latent variables on the endogenous latent variables), and  $\zeta$  is the residual term of the structural equation (indicating the part of the equation that fails to be explained).

In addition, the following basic assumptions need to be satisfied for the above two models: (1) the mean value of the error term  $\varepsilon$  and  $\delta$  of the measurement equation is zero, (2) the mean value of the residual term  $\zeta$  of the structural equation is zero, (3) the error term  $\varepsilon$  is uncorrelated with  $\delta$  and is uncorrelated with the coefficients of  $\eta$  and  $\xi$  uncorrelated, and (4) uncorrelated between the error term  $\zeta$  and the factors  $\xi$ ,  $\varepsilon$ , and  $\delta$ .

### 2.2.3 Modeling steps for structural equation modeling

Structural equation modeling can be divided into seven steps, and the structural equation modeling steps are shown in Figure 1.

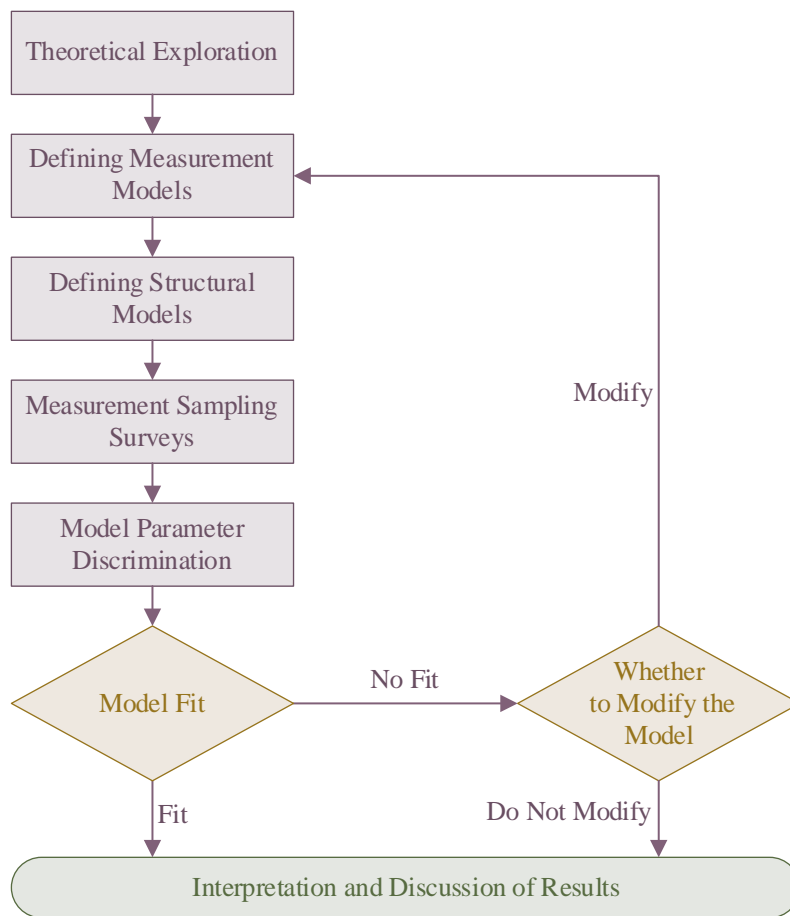


Figure 1: Modeling steps for structural equation models

## 2.3 Scale of Chuyi Spirit and Academic Style Construction in Higher Education Institutions

### 2.3.1 Higher Education Institutions Academic Styles Scale

The academic style scale of higher vocational colleges and universities contains seven factors: learning character (A1), learning effectiveness (A2), learning spirit (A3), learning environment (A4), learning methods (A5), learning attitude (A6), and learning habits (A7).

### 2.3.2 Chuyi Spirituality Scale

The Chuyi Spirit Scale contains five factors: patriotism and responsibility (A8), pragmatic craftsmanship (A9), pioneering and innovative entrepreneurial character (A10), lifelong learning (A11), and unity and cooperation (A12).

## 2.4 Research hypotheses

This study postulates the following research hypotheses:

H1: Patriotic sentiments and sense of responsibility positively affect the formation of academic style in higher vocational colleges.

H2: Practicality and sophistication in craftsmanship positively affect the formation of academic style in higher vocational colleges and universities.

H3: Entrepreneurship-oriented pioneering and innovativeness positively affect the formation of academic style in higher vocational colleges and universities.

H4: Diligence in study under the lifelong learning approach positively affects the formation of academic style in higher vocational colleges and universities.

H5: Unity and cooperation among students positively affect the formation of academic style in higher vocational colleges and universities.

H6: Chuyi spirit positively affects the formation of academic style in higher vocational colleges.

H7: Entrepreneurship-oriented pioneering and innovativeness positively affect the formation of academic style in higher vocational colleges.

H8: Chuyi spirit acts as a mediator between patriotic sentiments and responsibility and the formation of academic style in higher vocational colleges.

H9: Chuyi spirit acts as a mediator between practicality and sophistication in craftsmanship and the formation of academic style in higher vocational colleges.

## 3 Findings and analysis

### 3.1 Data analysis

#### 3.1.1 Common method bias test

The information collected in this research was gathered through self-reporting by students, thereby posing the problem of common method variance. In order to solve the above problem statistically, the Harman one-factor test was used. The test revealed that there are 14 factors with an eigenvalue higher than 1, while the highest eigenvalue is 24.897%, which is less than 40%. There is, therefore, no evidence of common method variance in this research data.

#### 3.1.2 Reliability testing of measurement instruments

This paper measured the reliability and validity of the measurement tools. Reliability and validity measures of each of the dimensions are shown in Table 1. Internal consistency was tested using Cronbach's alpha measure where all the measures exceeded 0.80. This suggests that the measurements have sufficient reliability. On the other hand, average variance extracted (AVE) measures of each of the scales exceeded 0.50, suggesting sufficient convergent validity. Moreover, AVE open root measures were higher than Pearson correlation coefficients in the corresponding rows and columns. Hence, discriminant validity is established between the five measurements.

Table 1: Reliability and validity tests in each dimension

Variable	Convergent validity		Discriminative validity											
	Cronbach's alpha	AVE	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	0.909	0.877	0.935											
A2	0.844	0.576	0.424	0.778										
A3	0.89	0.738	0.38	0.415	0.869									
A4	0.86	0.551	0.575	0.507	0.561	0.768								
A5	0.923	0.576	0.523	0.483	0.426	0.554	0.766							
A6	0.901	0.723	0.663	0.647	0.581	0.589	0.582	0.925						
A7	0.841	0.662	0.377	0.495	0.371	0.413	0.468	0.383	0.964					
A8	0.907	0.813	0.644	0.562	0.43	0.476	0.555	0.518	0.469	0.845				
A9	0.84	0.767	0.618	0.546	0.446	0.383	0.494	0.528	0.668	0.48	0.665			
A10	0.95	0.827	0.516	0.468	0.462	0.392	0.679	0.407	0.68	0.47	0.601	0.869		
A11	0.824	0.69	0.587	0.648	0.429	0.621	0.594	0.39	0.568	0.652	0.38	0.597	0.867	
A12	0.834	0.668	0.544	0.409	0.467	0.486	0.588	0.645	0.636	0.432	0.406	0.599	0.616	0.788

3.1.3 Descriptive and correlation analysis between variables

Table 2 shows the mean values, standard deviation, and correlation coefficient for the variables under study, where p < 0.01. The findings show that there is a positive correlation between the students' academic character and collective spirit.

Table 2: The mean, standard deviation and correlation coefficient between variables

Variable	Mean	SD	Relevance											
			A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	3.563	0.686	-											
A2	4.018	0.862	0.377**	-										
A3	3.774	0.771	0.366**	0.57**	-									
A4	3.418	0.774	0.431**	0.529**	0.559**	-								
A5	3.505	0.723	0.363**	0.447**	0.425**	0.333**	-							
A6	3.511	0.72	0.453**	0.362**	0.523**	0.395**	0.538**	-						
A7	4.01	0.777	0.387**	0.351**	0.534**	0.448**	0.408**	0.467**	-					
A8	3.503	0.779	0.473**	0.326**	0.51**	0.362**	0.399**	0.427**	0.471**	-				
A9	3.346	0.733	0.565**	0.582**	0.368**	0.355**	0.463**	0.457**	0.429**	0.439**	-			
A10	3.744	0.78	0.396**	0.412**	0.394**	0.498**	0.322**	0.334**	0.454**	0.322**	0.359**	-		
A11	3.742	0.786	0.381**	0.381**	0.536**	0.337**	0.473**	0.428**	0.502**	0.503**	0.425**	0.423**	-	
A12	3.388	0.796	0.493**	0.365**	0.512**	0.511**	0.464**	0.337**	0.5**	0.544**	0.47**	0.326**	0.372**	-

3.2 Demographic Characterization of the Influence of Chuyi Spirit on the Development of Academic Ethics

3.2.1 Differential analysis of Chuyi spirituality in terms of gender

The difference analysis of Chuyi spirit and its dimensions in gender is shown in Table 3. As can be seen from the table, there is no significant difference in the gender analysis of Chuyi Spirit. In the survey of 280 boys and 220 girls, it is found that the mean value of girls' patriotic sentiment and responsibility, pragmatic and refined craftsmanship, pioneering and innovative entrepreneurial character, and diligent learning and lifelong learning are higher than those of boys, and the standard deviation of the four dimensions is lower than that of boys, and the variations of the four dimensions are higher than that of boys in girls. The coefficients of

variation for patriotic sentiment and responsibility, pragmatic and refined craftsmanship, pioneering and innovative entrepreneurial character and diligent and inquisitive outlook on lifelong learning are smaller than those for male students, indicating that the effect of female students' academic style construction is higher and more stable.

*Table 3: The spirit of Chu Yi and the gender differences in its various dimensions*

	Gender	N	Average	Standard deviation	F	Sig	t	Sig
A8	Male	280	30.33	10.15	1.182	0.318	-0.455	0.653
	Female	220	30.55	9.71				
A9	Male	280	23.62	7.693	0.192	0.615	-0.512	0.6
	Female	220	23.96	7.228				
A10	Male	280	20.53	6.97	0.055	0.8	-0.34	0.751
	Female	220	21.19	6.695				
A11	Male	280	22.94	7.627	0.704	0.398	-1.268	0.221
	Female	220	23.91	7.508				
A12	Male	280	23	8.034	0.115	0.729	-0.973	0.283
	Female	220	23.76	8.014				

### 3.2.2 Differential Analysis of Chuyi Spirit in Household Registration

Difference analysis of the Chuyi spirit and its dimensions according to household registration is presented in Table 4 below. It can be seen from the table above that out of 500 samples taken, there are 208 urban students and 292 rural students. The results of an independent-samples t-test for urban students and rural students show a maximum mean difference value of 2.99. There is no significant difference between the levels of the Chuyi Spirit and its dimensions according to household registration. Thus, within the Chuyi spirit concept, there is no superiority or inferiority between urban and rural students. What should be noted is the relatively high level of patriotism and responsibility among rural students.

*Table 4: Analysis of the Differences in Chu Yi's Spirit and Its Various Dimensions*

	Household registration	N	Mean	Standard deviation	F	Sig	t	Sig
A8	Town	208	30.96	10.267	0.986	0.366	-1.057	0.273
	Rural areas	292	33.95	9.759				
A9	Town	208	23.76	7.798	0.366	0.488	-1.164	0.215
	Rural areas	292	23.06	7.363				
A10	Town	208	21.3	6.855	0.514	0.428	-2.596	0.012
	Rural areas	292	19.95	6.67				
A11	Town	208	23.85	7.987	0.789	0.377	-1.316	0.205
	Rural areas	292	22.52	7.515				
A12	Town	208	24.21	8.516	2.027	0.156	-2.504	0.04
	Rural areas	292	22.31	7.784				

### 3.2.3 Differential Analysis of Chuyi Spirit in Grade Levels

Variability analysis on Chuyi Spirit and dimensions among different grades is illustrated in Table 5 below. It can be noted from Table 5 that out of the total 500 participants, 60 were first-year students, 350 were second-year students, 55 were third-year students, and 35 were fourth-year students. From the one-way ANOVA analysis done where the grade level was taken as the independent variable, it was observed that the means for all the dimensions of Chuyi Spirit

increased in the following order, with fourth-year being greater than third-year, which was again greater than second-year, which in turn was greater than first-year. No significant difference was observed between first-year and second-year, as well as third-year and fourth-year students in terms of Chuyi Spirit and dimensions.

Table 5: The Chu Yi Spirit and the differences in its various dimensions across grades

	Grade	N	Average	Standard deviation	F	Sig	t	Sig
A8	Grade 1	60	29.21	9.771	0.377	0.68	4.482	0.357
	Grade 2	350	28.82	9.459				
	Grade 3	55	31.83	10.233				
	Grade 4	35	31.88	10.265				
A9	Grade 1	60	23.05	7.813	0.142	1.073	2.446	0.011
	Grade 2	350	23.05	7.594				
	Grade 3	55	24.4	7.398				
	Grade 4	35	24.21	7.794				
A10	Grade 1	60	19.58	6.799	0.543	0.719	3.493	0.005
	Grade 2	350	20.22	6.484				
	Grade 3	55	21.31	6.602				
	Grade 4	35	21.62	6.88				
A11	Grade 1	60	22.02	7.372	0.264	0.809	2.803	0.007
	Grade 2	350	22.54	7.422				
	Grade 3	55	24.31	7.597				
	Grade 4	35	23.96	8.161				
A12	Grade 1	60	22.49	7.814	1.362	0.098	2.444	0.173
	Grade 2	350	22.38	7.909				
	Grade 3	55	29.21	9.771				
	Grade 4	35	28.82	9.459				

### 3.2.4 Regional Variability Analysis of Chuyi Spirituality

Table 6 shows the variations in the levels of Chuyi Spirit and its subdimensions based on the region. It can be seen that there is a great variation in the sample sizes between the two regions, with Guangdong having 385 out of the total 500 participants while Guangxi has only 115. There is no significant difference in the Chuyi Spirit and its subdimensions between Guangdong and Guangxi when an independent-samples t-test is performed. It is important to note that Guangdong participants perform better than their counterparts from Guangxi in terms of Chuyi Spirit and its subdimensions, especially for the subdimensions dealing with lifelong learning, diligence, and unity.

Table 6: Chu yi spirit and its various dimensions are different in the region

	Region	N	Average	Standard deviation	F	Sig	t	Sig
A8	Guangdong	385	30.73	10.544	1.759	0.177	1.022	0.285
	Guangxi	115	29.82	9.66				
A9	Guangdong	385	23.91	7.809	0.227	0.636	1.383	0.184
	Guangxi	115	23.15	7.857				
A10	Guangdong	385	21.05	7.318	0.795	0.363	1.225	0.212
	Guangxi	115	20.59	6.528				
A11	Guangdong	385	24.15	7.889	0.098	0.769	1.645	0.08
	Guangxi	115	22.82	7.775				
A12	Guangdong	385	24.06	8.307	0.245	0.607	2.14	0.055
	Guangxi	115	22.9	7.943				

### 3.3 Structural equation modeling

#### 3.3.1 Equation model fitness test

The model fit indices are shown in Table 7. Comparison of the statistical values of the models in the table with the recommended values shows that, except for the GFI index, which is close to the standard value of 0.9, all the other model fit indices are within the range of the recommended values, which indicates that the models have a good fit.

Table 7: Model fit index

Model fitting index	Statistical value	Recommended value	Fitting situation
$\chi^2$	551.265	the smaller the better	—
$\chi^2 / df$	2.945	<3	Good
GFI	0.887	>0.8	Acceptable
RMSEA	0.06	<0.08	Good
NNFI	0.926	>0.9	Good
IFI	0.926	>0.9	Good
CFI	0.926	>0.9	Good
TLI	0.967	>0.9	Good

#### 3.3.2 Hypothesis testing

Utilizing AMOS software for analyzing the questionnaire data, hypothesis testing was carried out to examine the validity of the structural equation model. The outcomes of the hypothesis tests are provided in Table 8, where \*\*\* implies  $p < 0.001$ . Within the context of a 95% confidence interval, the following paths are significant at  $p < 0.05$ : patriotic sentiment and responsibility ( $\beta = 0.166$ ,  $p = 0.005$ ), pragmatism and meticulous craftsmanship ( $\beta = -0.137$ ,  $p = 0.050$ ), innovation and entrepreneurship ( $\beta = 0.315$ ,  $p < 0.001$ ), lifelong learning theory of diligent study and thirst for knowledge ( $\beta = 0.519$ ,  $p < 0.001$ ), and team spirit of solidarity and collaboration ( $\beta = 0.647$ ,  $p < 0.001$ ). From the above results, it is clear that all the five paths significantly affect the impact of Chuyi spirit on the creation of academic style in higher vocational colleges and universities, with the beta coefficients having the same sign as those indicated in the respective hypotheses; therefore, hypotheses H1 to H5 have been validated. Moreover, Chuyi spirit ( $\beta = 0.289$ ,  $p < 0.001$ ) and innovation and entrepreneurship ( $\beta = 0.256$ ,  $p < 0.001$ ) satisfy the criteria of  $p < 0.05$  and significantly positively influence the development of academic style in higher vocational colleges and universities, which validate hypotheses H6 and H7, respectively.

*Table 8: Study the results of hypothesis testing*

Hypothesis	Variable relationship	Standardized path coefficient	Standard error	Standard error	P	Conclusion
H1	The Spirit of Chu Yi←Love and responsibility	0.166	0.065	2.793	0.005	Support
H2	The Spirit of Chu Yi←The spirit of practicality	-0.137	0.06	-2.036	0.05	Support
H3	The Spirit of Chu Yi←Develop innovative entrepreneurial character	0.315	0.047	5.62	***	Support
H4	The Spirit of Chu Yi←The lifelong learning view of the study	0.519	0.051	9.806	***	Support
H5	The Spirit of Chu Yi←Collective spirit of solidarity and collaboration	0.647	0.045	15.985	***	Support
H6	Academic atmosphere construction←The Spirit of Chu Yi	0.289	0.047	7.535	***	Support
H7	Academic atmosphere construction←Develop innovative entrepreneurial character	0.256	0.045	6.053	***	Support

### 3.3.3 Testing for mediating effects

Currently, the Bootstrap mediation test has been regarded as the best technique to use when evaluating mediation effects. There is a presence of a mediation effect if the confidence interval of the indirect effect estimate does not contain zero. In this case, Bootstrap techniques were applied in AMOS to assess the mediating effect of three indirect pathways after hypothesis testing using 2000 bootstrap samples. Table 9 shows the result of the mediation tests of the structural equation model. For Mediation Path 1, the Bias-Corrected approach estimates the 95% confidence interval of [0.048, 0.191] while the Percentile approach gives a 95% confidence interval of [0.027, 0.211]. Since both intervals are free from zero, there is the existence of an indirect effect of Path 1. Thus, it could be concluded that patriotism and responsibility have an indirect effect on the influence of academic style construction in vocational institutions via the spirit of Chuiyi. Hence, the estimated indirect effect was 0.032, which makes Hypothesis 8 valid and has a complete mediating effect. For Mediation Path 2, a confidence interval of [-0.212, 0.029] was obtained using the Bias-Corrected approach at the 95% confidence level, whereas a 95% confidence interval of [-0.209, 0.035] was obtained using the Percentile approach. As the two intervals include zero, the existence of an indirect effect is absent in Path 2. Therefore, pragmatism and refined craftsmanship influence the spirit of Chuiyi directly but not indirectly on the effect of academic style construction in vocational institutions.

Table 9: The test results of the mediating effect of the structural equation model

Path	Indirect effect	Bias-corrected 95%CI		Percentile 95%CI		Conclusion
	Coefficient $\gamma$	Lower	Upper	Lower	Upper	
Love and responsibility→The Spirit of Chu Yi→Academic atmosphere construction	0.032	0.048	0.191	0.027	0.211	Established
The spirit of practicality→The Spirit of Chu Yi→Academic atmosphere construction	0.057	-0.212	0.029	-0.209	0.035	Not valid
Develop innovative entrepreneurial character→The Spirit of Chu Yi→Academic atmosphere construction	0.071	0.056	0.37	0.065	0.348	Established
The lifelong learning view of the study→The Spirit of Chu Yi→Academic atmosphere construction	0.075	0.165	0.406	0.207	0.417	Established
Collective spirit of solidarity and collaboration→The Spirit of Chu Yi→Academic atmosphere construction	0.046	0.199	0.426	0.188	0.406	Established

### 3.4 Qualitative comparative analysis of fuzzy sets

The use of Structural Equation Modeling (SEM) as used in the previous part aims to determine and investigate the influence paths among latent variables, both direct and indirect influence paths. This method has been applied to confirm the main factors and their influence paths that have an effect on the efficiency of academic style development in higher vocational schools and universities. However, since SEM usually works with linear models, it may not provide a more thorough understanding of non-linear models of variables. Fuzzy set Qualitative Comparative Analysis (fsQCA), based on fuzzy set theory, determines the necessary and sufficient conditions of a variable through logical operations and can identify non-linear and complex relationships among different combinations of variables. Combining the two methods can lead to more accurate results and reveal the significant linkages between Chuyi Spirit and the influence of students' academic style development in higher vocational schools and universities.

#### 3.4.1 Data calibration

The results of the single-factor necessary condition analysis are illustrated in Table 10. The analysis shows that the consistency ratio of each individual condition is less than 0.9, which does not meet the standard for identifying necessary conditions. Hence, the next step will be to analyze condition clusters.

Table 10: The results of the single factor are necessary

Dependent variable	Independent variable	Consistency	Coverage
The effect of the school wind construction	Love and responsibility	0.79865	0.69213
	The spirit of practicality	0.79534	0.76393
	Develop innovative entrepreneurial character	0.79029	0.66756
	The lifelong learning view of the study	0.6884	0.75195
	Collective spirit of solidarity and collaboration	0.85166	0.75884

### 3.4.2 fsQCA analysis

The analysis through fsQCA group states generates both a simple solution and an intermediate solution. In this research, the conditions appearing both in the intermediate solution and in the complex solution are considered core conditions, and those appearing only in the intermediate solution are considered edge conditions. The consistency threshold is set at 0.8, case threshold at 2, and the PRI consistency level threshold at 0.70. Using these thresholds, the fsQCA software is used to generate the truth table and to conduct conditional group analysis. The grouping of the effect of forming the academic style in the higher vocational institutions is shown in Table 11. The meanings of the symbols used in the truth table include: ● or · represents the presence of the condition; ⊗ or ⊘ represents its absence; blank represents the existence and non-existence of the condition simultaneously in the configuration; ● or ⊗ denotes a core condition while · or ⊘ denotes a marginal condition. From the above table, it can be seen that in the effect of forming the academic style in the higher vocational colleges and universities, there is only one antecedent grouping state where patriotism and responsibility, pragmatism and fine craftsmanship, innovation and pioneering entrepreneurship spirit, diligence and curiosity in lifelong learning, and unity and collaboration spirit of the collective play the role of core conditions. This implies that when the teachers and the students are properly cultivated with chuyi spirit, they have successfully formed an academic style in higher vocational colleges and universities.

Further through the reverse case analysis, it was found that there were six types of antecedent configurations with an overall consistency level at 0.913, thus explaining the academic culture building effect in low higher vocational institutions. The antecedent configurations with the same type of core conditions were categorized so as to group them into the following two triggering modes for the effect of academic climate building in low-higher vocational institutions, as follows:

(1) NC1: This pattern contains the NC1a~NC1d 4-seeded grouping, which is typically characterized by the collective spirit of negative solidarity and collaboration and accompanied by the insufficiency of the degree of at least one spirit type. The grouping of NC1a shows that with the presence of low offline classroom interactions and negative academic atmosphere, there will be a low effect of influence on the growth of academic spirit in higher vocational education institutes. This grouping has an index of consistency and coverage equal to 0.937 and 0.513 respectively, which shows that the grouping explains well the effect under consideration. In the category of constructs, the spirit of unity and cooperation becomes the key factor influencing the efficacy of the formation of academic styles; furthermore, a negative spirit of unity and cooperation has a bad influence on the effectiveness of academic style formation.

(2) NC2: This pattern contains two sub-groupings of NC2a~NC2b, which is typically characterized by a low degree of chuyi spirit. As in the NC2b grouping state, its core conditions are all at a low level.

Combining the results of the group state analysis of the above positive and negative cases,

the reasons affecting the effect of the construction of academic style in higher vocational colleges and universities are characterized by asymmetry. Students with high effect of building academic style in higher vocational institutions, Chuyi spirit and collective spirit of unity and cooperation are at a good level. Teachers and students of Chuyi spirit and the collective spirit of unity and cooperation are both indispensable.

*Table 11: The Configuration of the Effect of Academic Atmosphere Construction*

Causative condition	High school wind construction effect group state	Low learning wind construction effect group state					
	C1	NC1				NC2	
		NC1a	NC1b	NC1c	NC1d	NC2a	NC2b
Love and responsibility	●		⊗	⊗	●	●	⊗
The spirit of practicality	●	●		●	⊗		●
Develop innovative entrepreneurial character	●	⊗			●		⊗
The lifelong learning view of the study	●		⊗	●	●	⊗	⊗
Collective spirit of solidarity and collaboration	●	⊗	⊗	⊗	⊗		
Consistency	0.912	0.937	0.981	0.958	0.975	0.924	0.922
Coverage	0.509	0.513	0.414	0.342	0.258	0.404	0.43
Overall consistency	0.933	0.913					
Overall coverage	0.511	0.765					

### 3.5 The Implementation Means of Integrating Chuyi Spirit into the Construction of Academic Style in Higher Vocational Colleges and Universities

#### 3.5.1 Conduct activities related to the Year of Academic Excellence

Through the implementation of the "Learning Style Construction Year" and the series of activities such as "Read Good Books, Practice Virtue, Establish Good Conduct", the concept of "Learning is the top priority for students" has been firmly established. This helps students to strengthen their ideals and beliefs, correct their learning attitudes. Through the persistent efforts of all staff, students, and the entire process, a good learning atmosphere has been constructed in the school, and the school atmosphere has been driven by the learning atmosphere. A working mechanism of "Party Secretary and Principal taking the lead, teachers setting an example, and students participating" has been established. New approaches and methods for learning style construction have been explored, relevant systems for learning style construction have been improved, and a long-term mechanism for learning style construction has been formed. Students are guided to set clear learning goals in areas such as book reading, scientific research creation, innovation and entrepreneurship, club activities, skill certification examinations, English proficiency tests, upgrading to higher education, and higher education. They learn scientific learning methods and possess strong professional awareness and diligent learning

spirit.

### **3.5.2 Conducting a series of thematic activities on “I am a reader”**

Through such activities, students are guided to establish the will to serve the country, learn a skill, and understand the reason for studying. Help students to clarify learning goals, correct learning attitudes, stimulate learning motivation, develop good learning habits, and create a good learning atmosphere. Hold a class meeting on the theme of “I am a reader” among all students. Throughout the year, we have carried out the “five mornings and one night” academic style construction activities, campus anti-smoking action, classroom cell phone into the bag action, the January flag-raising activities, and dormitory civilization construction “the most beautiful dormitory” competition activities. Held symposiums on academic style construction, education on integrity examination and examination style and discipline, and experience exchange meetings on academic style construction. Invite outstanding graduates to demonstrate their style, enliven the campus learning atmosphere, broaden students' knowledge field, and stimulate students' interest in learning.

### **3.5.3 Carrying out a series of thematic activities on the theme of “Aroma of Books in the School”**

Through the implementation of the "Read Chinese Classics to Become a Great Craftsman, Read the Magnificent Hunan to Paint the Splendid Xiangxiang" activity, we focus on a variety of reading activities to create a campus cultural atmosphere conducive to the construction of academic atmosphere, build a "Library Full of Books" and promote it through publicity and promotion. Through the launch of the book donation initiative, the number of books in the school library is increased. Regularly recommend reading lists to students to guide them to participate in reading and book review activities. Conduct student reading service activities to increase students' reading volume, build a "Library of Books" campus, and enhance students' humanistic literacy. Carry out theme reading conferences such as "Read Through the Sea and Leap into the Future", "Read the New Era and Pursue the New Journey" theme writing activities, "Readiness of the College Department, Readiness of the Class, Chu Yi Reading Star" evaluation activities, "Teaching Style Leads Learning Style, Classrooms are Excellent and Superior" evaluation activities, and other related thematic activities.

### **3.5.4 Carrying out a series of thematic activities on the theme “Read with me”**

Through the promotion of exemplary traditional Chinese culture, it helps students and teachers to read extensively, which requires them to go through many books and travels to help them develop themselves, nurture their characters, and practice good behaviors, all within the context of socialist core values. The idea is to foster more communications between teachers and students and to always communicate with great people, role models, and society through literature. There is a focus on reading not only written books but also picture books and even life itself. Carry out summer "Undergraduate Go-to-Villages" social practice activities, "Entering the Library" social practice activities, "Selection of Good Teachers in My Heart" activities, and "Taking a Class, Reading a Textbook" textbook study activities.

### **3.5.5 Carrying out a series of thematic activities on the theme of “happy readers”**

By emphasizing the spirit of leadership, the school demonstrates in a variety of ways the diligent and enterprising spirit of teachers and students, and creates a healthy and lively atmosphere on campus. We will strengthen the role of role model leadership by carrying out a series of activities such as the selection of this year's reading masters, the selection of “advanced class

groups” and the display of “My Learning Marks - Good Notes and Good Assignments”. We will improve the professional skills and innovation ability of teachers and students by carrying out academic early warning and academic support, self-training for higher education and skills certification promotional activities, students' vocational skills competitions, teachers' teaching competitions, and counselors' quality competitions.

### **3.5.6 Carrying out a series of thematic activities on the theme of “practicing virtues and establishing good practices”**

By emphasizing the implementation of the effect of consistency between words and deeds, reading and educating people, we advocate that students, in the series of reading and learning and other activities to build the academic style, think about whether they are consistent with the requirements of “reading to cultivate one's moral character, reading to be a person, reading to get along in the world”, and emphasize the appearance and qualities of college students of the new era in all aspects, so as to achieve consistency between words and deeds and create a good learning atmosphere. The study atmosphere is the same in all aspects.

## **4 Conclusion**

The current paper attempts to investigate the ways in which the influence of the Chuyi Spirit on the effectiveness of construction of academic styles in higher vocational colleges and universities works. The process is performed through the use of the sample of 500 cases and a methodology that consists of combining structural equation modeling and fsQCA. In addition, the paper puts forward an implementation path for applying the Chuyi Spirit in developing an academic style in higher vocational institutions. The findings of this paper are summarized below:

(1) In analyzing the variation of the Chuyi Spirit and its components among various grade levels, no statistically significant differences were found between first and second-year students, as well as between third and fourth-year students. This means that there is a marked improvement in the Chuyi Spirit of the students after the third year of studying in the university.

(2) According to fsQCA, one particular configuration of antecedents plays an important role in the effect of developing an academic ethos in higher vocational colleges and universities. In particular, they include patriotic sentiments and sense of responsibilities, pragmatic skills and craftsmanship, entrepreneurial personality characterized by innovation, learning orientation towards diligence and knowledge, and collectivism and cooperation. Overall, it can be concluded that the stronger the inculcation of the Chuyi Spirit by teachers and students, the faster the process of construction of the academic ethos takes place.

(3) The construction of the academic atmosphere in higher vocational colleges can be accomplished through activities conducted under the framework of the Academic Atmosphere Construction Year, the I am a Student of Learning project, Plenty of Books on Campus project, and Reading Guides me Along project.

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