

University Students' Sense of Education Acquisition: Structural Dimensions and Characteristic Analysis



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Abstract: In order to construct the structural dimensions of university students' SEA, develop the test with good reliability and validity indexes, and analyze the characteristics of university students' SEA, Open questionnaire was used to develop the preliminary scale in 120 students of 10 universities, and then 1358 students were tested with stratified random sampling in 17 universities of nationwide. The whole sample was divided into two sub-samples randomly, the sample 1 ($n=701$) was used to carry out item analysis and EFA to determine the scale's dimension structures, and the sample 2 ($n=657$) was used to test reliability and validity to formulate the formal scale. The total sample was used to analyze the characteristics of college students' SEA. The results showed that the preliminary scale of SEA had 65 items; All of the 65 items had good discrimination; The formal scale of SEA had 39 items, including seven dimensions: social responsibility, interpersonal relationship, professional accomplishment, self-growth, emotional management, practical ability and academic achievement, the total variance was 53.9%. The formal scales' Cronbach's α were 0.66-0.94, split half reliability were 0.66-0.89, retest reliability were 0.79-0.87, Synthetic reliability were 0.78-0.93. The seven-factor structural model of the formal scale was stable, the goodness of fit were better, indicating the structure validity were good; the scale's criterion validity were 0.23-0.64. The total scale and dimension score of SEA of college students were above the middle level; Female students scored significantly higher than male students; Different dimensions of college students' SEA showed different developmental trends with the increase of grade; The score of regular college students' SEA was significantly higher than that of "double first-class" college students. University students' SEA is a multi-dimensional construct, the formal scale of SEA have good psychometric indexes and can be used in university students as a tool for further research. The overall level of college students' SEA is higher; there are significant differences in gender, grade and school type of college students' SEA.

Keywords: University Students; Sense of Educational Acquisition (SEA); Structural Dimensions; Characteristic Analysis

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1 Introduction

As China's economy reforms and society develops, the public is increasingly emphasizing a sense of acquisition at the psychological level. As a concept unique to the Chinese era, sense of acquisition originally denoted the public's sense of satisfaction after obtaining certain benefits. In recent years, the use of the sense of access has become fixed, and is mostly used to refer to the sense of happiness and satisfaction generated by the people's sharing of the fruits of reform [1-3]. The sense of gain reflects the social demands of the masses to develop fairness and justice and meet the needs of a better life, and becomes a positive psychological experience combined with satisfaction and happiness, which is a common term used to evaluate people's needs satisfaction and life experience [4]. As the primary focus of research, although researchers have different interpretations on the connotation of the sense of gain, most people have reached the following consensus, that is, the sense of gain is the subjective comprehensive feeling generated by the public based on the objective enjoyment and acquisition of the results of economic and social development, which generally has multiple dimensions [5]. Dong Hongjie *et al.* defined sense of acquisition as an individual's cognitive evaluation of the content, realization approach and required conditions of obtaining their own needs, as well as the psychological experience generated during this process [4]. The Scale of Chinese People's Sense of Gain compiled by them accordingly established the five-factor theoretical structure of Chinese people's sense of gain, including five dimensions of experience acquisition, environment acquisition, content acquisition, access to acquisition and sharing [4]. Huang constructed an evaluation index system for college counselors' sense of gain and compiled corresponding tests [6].

Sense of Educational Acquisition (SEA) refers to the satisfaction and happiness generated by college students in receiving various educational and teaching activities at school [5, 7-9]. Under the background of high-quality development of higher education in our country, the sense of education acquisition of college students has become an important index to measure the quality of talent training in higher education [7]. To enhance the sense of education acquisition of college students is an internal requirement for the development of high-quality higher education in our country [8]. The existing researches of domestic scholars on college students' sense of educational

acquisition mainly focus on the field of ideological and political education [10], which mainly involve the following two aspects: one is the connotation and dimensional structure of college students' sense of ideological and political education acquisition; the other is the path or strategy to improve college students' sense of ideological and political education acquisition. Liu defined the sense of acquisition of ideological and political education as the positive subjective experience obtained by the educatees through education, including three types of psychological sense of acquisition, conceptual sense of acquisition and behavioral sense of acquisition [11]. Wang believes that college students' sense of acquisition of Marxist belief education is a positive subjective experience they get from Marxist belief education. The scale she compiled mainly includes three aspects: sense of knowledge acquisition, sense of emotion and value acquisition, and sense of behavior acquisition [12].

Zhou *et al.* believe that students' sense of gain refers to the positive comprehensive psychological feelings generated by the educational services provided by the school to meet the needs of students' study and life during their study [13]. The survey scale of students' sense of gain compiled by them includes four dimensions, such as degree of identification, satisfaction, participation opportunity and achievement level [13]. He *et al.* believed that relative sense of gain, also known as subjective sense of gain, refers to a subjective cognition and positive emotional experience in which an individual or group perceives itself to be in a favorable position by comparing with the reference object, and then experiences pleasure [14]. The scale of poor college students' sense of relative gain compiled by them includes six dimensions, including economic conditions, family support, interpersonal relationship, school support, teacher care and development opportunities [14].

To sum up, based on different understandings of the connotation of sense of gain, domestic researchers have tried to compile a sense of gain scale with different dimension structures for different target groups, which not only enriches the theoretical study of sense of gain, but also provides scientific tools for the objective measurement of sense of gain. However, the research on the sense of educational attainment of college students has not been involved, and there is no operable definition of the sense of educational attainment of college students, nor is there

a scale of the sense of educational attainment of college students that conforms to the psychometric standard, and there is a lack of analysis on the characteristics of the sense of educational attainment of college students. In this study, the sense of educational attainment of college students is defined as the satisfaction and happiness of college students in the acquisition of knowledge and skills, the cultivation of moral conduct, the establishment of social responsibility, the improvement of interpersonal communication, and the exercise of practical ability through various school education and teaching activities. The purpose of this study is to construct the connotation and dimension structure of college students' sense of educational gain, compile a test with good reliability and validity index, and analyze the characteristics of college students' sense of educational gain, so as to provide scientific and effective assessment tools for college education administrators to objectively evaluate college students' sense of educational gain. It provides empirical research basis for improving the quality of talents training in higher education and promoting the high-quality development of higher education.

2 Methods and Subjects

2.1 Compilation of Questions

An open questionnaire survey was conducted on 120 students from grade one to grade four in 10 universities in Shandong, Beijing, Liaoning, Zhejiang and other provinces, including 24 freshmen, 23 sophomores, 32 juniors, 35 seniors, and 6 students were missing information. There were 57 boys and 63 girls; There are 56 "double first-class" universities and 64 ordinary universities. The subjects completed an open questionnaire on a voluntary basis. The open questionnaire question is: Since entering college, what are the main aspects of your sense of gain? Please write down in detail.

The researcher instructed 3 psychology postgraduate students to search the topic keywords related to the sense of educational attainment, and classified and coded the open questionnaire data. The results showed that the code consistency was 0.85. The categories of the items with inconsistent codes were determined after discussion by the researcher. Finally, a total of 127 descriptive statements related to college students' sense of educational attainment were obtained, mainly involving the following six aspects: professional knowledge (24),

self-management (27), interpersonal communication (17), practical ability (21), thinking growth (18), and social responsibility (20).

After classification, the statements containing the topic keywords were itemized and standardized, and other members of the research group analyzed the preliminary articles sentence by sentence. On the premise of ensuring that the articles belonged to the measurement range of the sense of educational acquisition, the articles with similar meanings but slightly different were combined to ensure the representativeness of the articles. In order to highlight the characteristics of college students' sense of educational gain, "improve", "enhance", "perfect" and other verbs similar to "gain" are added in the expression of each item, as well as "more", "better" and other words indicating the increase of degree. After several rounds of repeated modification, the initial measurement scale of college students' sense of educational attainment containing 65 questions was finally formed. Likert5 points were used to score the initial measurement scale, with 1 representing "completely inconsistent" and 5 representing "completely consistent". All questions were scored in a positive way, and the total score of the scale was added by adding the scores of the corresponding items. The higher the total score of the scale, the stronger the sense of educational attainment of the subjects.

2.2 Subjects

Using stratified random sampling, 1,410 preliminary questionnaires were distributed to students from 17 universities in China, including Peking University, Tsinghua University, Beijing Normal University, Communication University of China, Renmin University of China, Beijing Forestry University, Minzu University of China, Beijing University of Chemical Technology, North China Electric Power University, Heilongjiang University, Qingdao University, Yantai University, Liaocheng University and Ludong University. 1358 valid questionnaires were collected, with an effective rate of 96.3%, and randomly divided into sample 1 and sample 2.

Sample 1 contains 701 valid questionnaires, of which 398 are male and 303 are female. There are 182 freshmen, 186 sophomores, 162 juniors and 171 seniors. There are 343 "double first-class" universities and 358 ordinary universities. Data from Sample 1 are used for project analysis and exploratory factor analysis.

Sample 2 contains 657 valid questionnaires, of which

331 were male and 326 were female. There are 182 freshmen, 179 sophomores, 165 juniors and 131 seniors. There are 312 "double first-class" universities and 345 ordinary universities. The data of sample 2 were used for reliability and validity test and confirmatory factor analysis.

2.3 Statistical Analysis

In this study, SPSS26.0 and AMOS26.0 were used for project analysis, exploratory factor analysis, reliability and validity analysis and confirmatory factor analysis of the recovered data.

3 Result

3.1 Project Analysis

The item analysis of the initial measurement scale is carried out in two ways. One method is to find the value of Critical Ratio (CR), that is, to calculate the total score of the educational attainment scale. After ranking from high to low, 27% samples before and after sampling are taken as high group and low group, and independent sample *t* test is conducted to compare whether the average score difference between high group and low group in each item is significant. The results showed that the CR value (*t* value) of all items reached the significance level of 0.001. Another method is to calculate the total correlation, that is, to calculate the product difference correlation coefficient between the total score of educational attainment and the score of each item of the scale. The results showed that all the product difference correlation coefficients ranged from 0.27 to 0.66, reaching the significance level of 0.001. The results of item analysis using the above two methods are completely consistent, indicating that the 65 items in the initial questionnaire have a good degree of differentiation, and all can be entered into the next exploratory factor analysis.

3.2 Exploratory Factor Analysis

Fitness test was conducted on the sample data of the initial measurement scale of college students' sense of educational acquisition, which included 65 items. The KMO value was 0.94 and the chi-square value of Bartlett's spherical test was 13076.88 ($df=1035$, $P < 0.001$), reaching a very significant level, indicating that the sample data

were suitable for exploratory factor analysis.

The principal component analysis method was used for factor analysis, and the number of factors extracted was determined according to the following criteria: (1) the eigenvalue of the factor was greater than 1, the contribution rate of variance interpretation of a single factor was more than 3%, and the overall variance interpretation rate was more than 50%; (2) The absolute value of factor load after rotation by Varimax is greater than 0.5, the difference of load on the two factors of the same project is greater than 0.3, and the common degree of a single project is not less than 0.40; (3) There is an obvious inflection point in the gravel map; (4) The number of questions contained in a single factor is not less than 3 questions. After several rounds of exploratory factor analysis, it was found that there were 7 factors meeting the above criteria, including 46 items, and the interpretation rate of the total variance was 53.59%. Considering that the first two factors contain too many questions, the four questions of the seventh factor are taken as reference, and only the six questions with factor load higher than 0.6 in the first two factors are retained to balance the number of questions of each subscale. Finally, the formal scale of college students' sense of educational attainment with 39 questions is obtained.

According to the internal relation of the key words of each factor in the exploratory factor analysis and the analysis result of the open questionnaire survey, the seven factors of college students' sense of educational attainment are named respectively. Factor 1, named social responsibility (6 items), includes responsibility, ability to handle details, ability to deal with difficulties, leadership, perseverance and other theme keywords that describe the individual's attitude towards people and things and perseverance to overcome difficulties. Factor 2 includes the concept, method, goal and attitude of professional learning, professional identity and other theme keywords reflecting the improvement of individual professional literacy, named professional literacy (6 items); Factor 3, named Interpersonal communication (6 items), includes the theme keywords of respecting others, communicating with others, empathy, choosing friends, and intimate relationship, which reflect individuals' consideration for others and mutual help in interpersonal interaction; Factor 4, named self-growth (6 items), includes the theme keywords of macro thinking, self-cognition, life planning, independent thinking, and overall starting, which reflect the continuous improvement of individual self-management ability. Factor 5, named as emotion management (6 items), includes the theme keywords of being positive, treating people with

sincerity, controlling emotions, understanding others, etc., which reflect the personal friendliness and reasonable emotional regulation. Factor 6, named practical ability (5 items), includes thematic keywords that describe the continuous enhancement of individual teamwork and working ability, such as work handling ability, social practice ability, team

cohesion and selfless dedication. Factor 7, named academic achievement (4 items), includes the subject keywords that reflect the individual's sense of academic achievement and satisfaction, such as obtaining certificates, achieving satisfactory results, and enhancing sense of accomplishment. The specific items contained in each factor are shown in Table 1.

Table 1 Dimensional structure and factor load of each item of college students' sense of educational Attainment Scale (n=701)

Item	Social responsi- bility	Professional accom- plishment	Interperson- al commu- nication	Self-g rowt h	Emotional manage- ment	Prac- tical ability	Academic achieve- ment	Com- mu- nality
I have improved my sense of responsibility and my ability to take responsibility has been enhanced.	0.76							0.67
I have improved my ability to deal with details.	0.71							0.58
I gradually improved my ability to cope with difficulties.	0.69							0.54
My ability to distinguish right from wrong is gradually improving.	0.67							0.50
In the face of various difficulties, I became more persevering.	0.66							0.59
Item	Social responsi- bility	Professional accom- plishment	Interperson- al commu- nication	Self-g rowt h	Emotional manage- ment	Prac- tical ability	Academic achieve- ment	Com- mu- nality
Through practice, I have developed my leadership skills.	0.65							0.53
I set up a suitable professional learning concept.		0.69						0.53
I have mastered the professional learning method suitable for myself.		0.69						0.53
I have defined my professional learning goals.		0.62						0.45
My professional learning attitude is more correct.		0.62						0.43
Item	Social responsi- bility	Professional accom- plishment	Interperson- al commu- nication	Self-g rowt h	Emotional manage- ment	Prac- tical ability	Academic achieve- ment	Com- mu- nality
I have improved my professional and academic quality.		0.61						0.46
I have enhanced my recognition of my major.		0.60						0.50
I have learned to respect the different views and ideas of others.			0.85					0.76
I learned how to communicate better with people.			0.82					0.74
In life, my ability to put myself in other people's shoes continues to improve.			0.81					0.73
Item	Social responsi- bility	Professional accom- plishment	Interperson- al commu- nication	Self-g rowt h	Emotional manage- ment	Prac- tical ability	Academic achieve- ment	Com- mu- nality
Through meeting people, I've learned to be selective about who you choose.			0.75					0.57
In dealing with people, I have learned to follow the example of others.			0.73					0.66
I gained intimacy by interacting with people.			0.70					0.56

Item	Social responsi- bility	Professional accom- plishment	Interperson- al commu- nication	Self-g rowt h	Emotional manage- ment	Prac- tical ability	Academic achieve- ment	Com- mu- nality
I was able to think from a bigger per- spective.				0.80				0.69
I have a much clearer sense of who I am.				0.80				0.76
Item	Social responsi- bility	Professional accom- plishment	Interperson- al commu- nication	Self-g rowt h	Emotional manage- ment	Prac- tical ability	Academic achieve- ment	Com- mu- nality
I have a clearer vision of my life path.				0.73				0.66
I have developed the ability to think independently and analyze problems.				0.63				0.56
I learned to see things from the big pic- ture.				0.56				0.51
In life and study, I look at problems more logically.				0.55				0.43
I become more positive in the face of life.					0.64			0.50
Item	Social responsi- bility	Professional accom- plishment	Interperson- al commu- nication	Self-g rowt h	Emotional manage- ment	Prac- tical ability	Academic achieve- ment	Com- mu- nality
I learned to be honest with others.					0.64			0.49
I can control my emotions well.					0.62			0.51
I've become more mature in the way I look at things.					0.61			0.46
I learned to understand others better.					0.60			0.42
I learned to deal with interpersonal con- flicts more appropriately.					0.55			0.39
Item	Social responsi- bility	Professional accom- plishment	Interperson- al commu- nication	Self-g rowt h	Emotional manage- ment	Prac- tical ability	Academic achieve- ment	Com- mu- nality
I joined many clubs and improved my work ability.						0.72		0.57
I have improved the spirit of teamwork and cohesion.						0.69		0.57
I took part in many activities and im- proved my social practice ability.						0.67		0.60
By participating in various activities, I enhanced my expression in front of peo- ple.						0.65		0.51
Through participation in volunteer activ- ities, I have cultivated the spirit of self- less dedication.						0.56		0.52
Item	Social responsi- bility	Professional accom- plishment	Interperson- al commu- nication	Self-g rowt h	Emotional manage- ment	Prac- tical ability	Academic achieve- ment	Com- mu- nality
I have obtained various certificates through self-study and training.							0.68	0.53
Through hard work, I have achieved satisfactory results in my studies.							0.59	0.45
My sense of accomplishment in solving problems by relying on my own ability continues to grow.							0.57	0.41
During college, my living habits were constantly improved.							0.51	0.45
eigenvalue	5.14	4.03	4.02	3.54	3.31	2.63	1.96	-
Contribution rate (%)	11.18	8.77	8.75	7.69	7.20	5.72	4.25	-

3.3 Reliability Analysis

Cronbach's α coefficient, split half reliability and retest reliability were used as the reliability test indexes for college students' sense of educational attainment. The results showed that the Cronbach's α coefficient of each dimension and the overall Cronbach's α coefficient ranged from 0.66-0.94, and the split half reliability ranged from 0.66-0.89. Retest reliability for 73 subjects with a

two-week interval ranges from 0.79-0.87. The single factor exploratory factor analysis method was used to calculate the composite reliability of a single dimension in the multidimensional test [15, 16]. The results showed that the composite reliability of each dimension ranged from 0.78 to 0.93, indicating that Cronbach's α coefficient underestimated the reliability of each dimension of the scale of college students' sense of educational attainment. The specific results are shown in Table 2.

Table 2 Reliability analysis of college students' sense of educational attainment scale

	Social responsibility	Professional quality	Interpersonal relationship	self-growth	Emotion management	Practical ability	Academic achievement	totality
Cronbach's α	0.83	0.79	0.90	0.87	0.78	0.77	0.66	0.94
Split half reliability	0.79	0.78	0.89	0.87	0.79	0.73	0.66	0.83
Retest reliability	0.79	0.85	0.83	0.86	0.81	0.87	0.80	0.87
Composite reliability	0.88	0.85	0.93	0.90	0.85	0.84	0.78	/

3.4 Validity Analysis

3.4.1 Content Validity

The scale of college students' sense of educational attainment conforms to the standard procedure of psychometrics. First of all, based on the existing research in China, the basic concept and dimension structure of college students' sense of educational gain are determined. Secondly, through the coding and classification of the open questionnaire survey data, and after the review and revision of experts, the preliminary test questions of the scale were compiled, and the dimensional structure of the scale was determined. The above measures ensure to the greatest extent that the scale can fully and truly reflect the college students' sense of educational attainment, and provide a guarantee for the content validity of the scale.

3.4.2 Structural Validity

Firstly, the correlation between the factors in the scale of college students' sense of educational attainment was investigated. As shown in the results of Table 3, there is a significant moderate to low positive correlation between the two factors of the scale, and the correlation coefficient is between 0.31 and 0.47, indicating that the factors of the scale are not only in the same direction, but also have a certain degree of independence, and cannot be replaced by each other. The correlation between each factor of the scale and the total score is between 0.63-0.73, which is a significant medium and high positive correlation, indicating that each factor is consistent with the overall concept and better reflects the content to be measured in college students' sense of educational attainment.

Table 3 Correlation between the total score of college students' Sense of educational Attainment Scale and each dimension (r)

Dimensionality	1	2	3	4	5	6	7	8
1. Sense of educational attainment	1							
2. Social Responsibility	0.71**	1						
3. Professional quality	0.69**	0.38**	1					
4. Interpersonal Communication	0.64**	0.31**	0.33**	1				
5. Self Growth	0.73**	0.40**	0.39**	0.36**	1			
6. Emotion Management	0.73**	0.47**	0.41**	0.35**	0.46**	1		
7. Practical ability	0.69**	0.42**	0.42**	0.33**	0.43**	0.41**	1	
8. Academic Achievement	0.63**	0.37**	0.36**	0.34**	0.41**	0.39**	0.42**	1

Note: * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Secondly, according to the factor structure of the formal scale determined by exploratory factor analysis, AMOS26.0 was used to conduct confirmatory factor

analysis on sample 2 data of the 39-item scale of college students' sense of educational Attainment, in order to investigate the stability of the seven-factor

model in this study. The results show that the fitting indexes of the seven-factor model are good, namely: $\chi^2/df=1.85 < 3$, $GFI=0.91 > 0.90$, $AGFI=0.88 > 0.80$, $CFI=0.94 > 0.90$, $NFI=0.88 > 0.80$, $TLI=0.94 > 0.90$, $RMSEA=0.04 < 0.05$. The factor load of each item in the formal scale is between 0.48 and 0.84, so it can be considered that the seven-factor structure model of the scale of college students' sense of educational attainment is stable.

3.4.3 Criterion Association Validity

The life satisfaction Scale of adolescent students was adopted as the school standard. The life satisfaction of

adolescent students includes six dimensions, namely friendship satisfaction, family satisfaction, academic satisfaction, freedom satisfaction, school satisfaction and environmental satisfaction, which can reflect the life satisfaction of Chinese adolescent students in a relatively comprehensive way [17]. The results of Table 4 show that the total scale of college students' sense of educational attainment and its subscales are significantly positively correlated with the total scale of adolescent students' life satisfaction and its subscales, and the correlation coefficient is between 0.23 and 0.64, indicating that the criterion of the scale of college students' sense of educational attainment has good correlation validity.

Table 4 Validity coefficients of college students' sense of educational attainment scale and subscale

dimensionality\satisfaction	Friendship	Family	Academic	Freedom	School	Environmental	Life
1. Sense of educational attainment	0.64**	0.44**	0.59**	0.45**	0.44**	0.36**	0.64**
2 Social Responsibility	0.52**	0.35**	0.45**	0.35**	0.36**	0.29**	0.50**
3 Professional quality	0.49**	0.38**	0.52**	0.39**	0.39**	0.30**	0.53**
4 Interpersonal Relationships	0.54**	0.39**	0.37**	0.36**	0.38**	0.35**	0.52**
5 Self Growth	0.55**	0.35**	0.49**	0.42**	0.36**	0.28**	0.53**
6 Emotion Management	0.54**	0.42**	0.43**	0.40**	0.41**	0.35**	0.55**
7 Practical ability	0.52**	0.35**	0.53**	0.30**	0.36**	0.27**	0.51**
8 Academic Achievement	0.51**	0.34**	0.58**	0.38**	0.29**	0.23**	0.51**

4 Analysis of Characteristics of College Students' Sense of Educational Attainment

4.1 Descriptive Statistical Results of College Students' Sense of Educational Attainment

Table 5 Descriptive statistical results of college students' sense of educational attainment ($n=1358$)

Dimension	Average score	Standard deviation
Social responsibility	3.61	0.77
Professional quality	3.51	0.73
Interpersonal relationship	3.83	0.80
Self-growth	3.49	0.76
Emotion management	3.57	0.72
Practical ability	3.47	0.76
Academic achievement	3.59	0.69

Table 5 describes the statistical results showing that the average score of college students' total sense of educational attainment is 3.58 ± 0.52 , and the average score of each dimension is between 3.47 and 3.83, which belongs to the upper medium level. The results of repeated measurement ANOVA showed that there were significant differences in the scores of each dimension

($F=44.28$, $P<0.001$), and the score of interpersonal dimension was the highest (3.83 ± 0.80). Social responsibility (3.61 ± 0.77), emotional management (3.57 ± 0.72) and academic achievement (3.59 ± 0.69) were the second. Professionalism (3.51 ± 0.73), self-growth (3.49 ± 0.76) and practical ability (3.47 ± 0.76) had the lowest scores.

4.2 Gender Difference Analysis of College Students' Sense of Educational Attainment

Table 6 Results of multivariate analysis of variance show that there are significant gender differences in col-

lege students' sense of educational attainment ($F=7.62$, $P<0.001$). In addition to practical ability and academic achievement, female students' scores in the dimensions of social responsibility, professional accomplishment, interpersonal relationship, self-growth and emotional management are significantly higher than those of male students.

Table 6 Comparison of the difference in the sense of educational attainment of college students of different genders (M $\pm$ SD)

Dimension	Male (n=729)	Female (n=629)	F
Social responsibility	3.54 $\pm$ 0.82	3.69 $\pm$ 0.70	11.45***
Professional quality	3.46 $\pm$ 0.77	3.57 $\pm$ 0.69	7.34**
Interpersonal relationship	3.74 $\pm$ 0.88	3.92 $\pm$ 0.69	16.81***
self-growth	3.37 $\pm$ 0.78	3.62 $\pm$ 0.72	37.91***
Emotion management	3.48 $\pm$ 0.73	3.68 $\pm$ 0.68	25.29***
Practical ability	3.45 $\pm$ 0.77	3.51 $\pm$ 0.75	2.16
Academic achievement	3.56 $\pm$ 0.72	3.63 $\pm$ 0.66	3.14

4.3 Analysis of Grade Difference of College Students' Sense of Educational Attainment

Table 7 Comparison of the difference in the sense of educational attainment of college students of different grades (M $\pm$ SD)

Dimension	①Freshman (n=364)	②Sophomore (n=365)	③Junior (n=327)	④Senior (n=302)	F	Post-hoc test
Social responsibility	3.79 $\pm$ 0.74	3.56 $\pm$ 0.73	3.49 $\pm$ 0.75	3.58 $\pm$ 0.85	10.17***	①>②③④
Professional quality	3.56 $\pm$ 0.78	3.50 $\pm$ 0.68	3.45 $\pm$ 0.69	3.54 $\pm$ 0.78	1.63	----
Interpersonal relationship	3.92 $\pm$ 0.75	3.72 $\pm$ 0.76	3.76 $\pm$ 0.84	3.92 $\pm$ 0.85	6.13***	①④>②③
self-growth	3.70 $\pm$ 0.77	3.42 $\pm$ 0.73	3.31 $\pm$ 0.69	3.51 $\pm$ 0.81	16.80***	①>②③④
Emotion management	3.78 $\pm$ 0.74	3.52 $\pm$ 0.66	3.46 $\pm$ 0.66	3.51 $\pm$ 0.75	14.77***	①>②③④
Practical ability	3.60 $\pm$ 0.79	3.35 $\pm$ 0.75	3.43 $\pm$ 0.71	3.53 $\pm$ 0.78	7.72***	①④>②③
Academic achievement	3.60 $\pm$ 0.74	3.53 $\pm$ 0.67	3.57 $\pm$ 0.64	3.69 $\pm$ 0.71	3.08*	④>①②③

Table 7 Results of multivariate analysis of variance show that there are significant grade differences in the scores of all dimensions of college students' sense of educational attainment ($F=5.60$, $P<0.001$). Except the dimension of professional accomplishment, the grade differences of the other six dimensions reach significant level. The results showed that the scores of social responsibility, self-growth and emotion management in grade One were significantly higher than those in grade two, three and four. The scores of interpersonal relationship and practical ability in grade 1 and Grade 4 were significantly higher than

those in grade 2 and grade 3. On the academic achievement dimension, the fourth grade is significantly higher than the first, second and third grade. In other words, each dimension of college students' sense of educational attainment presents a different development trend with the increase of grade. However, from the general trend, the second and third grades are the "low period" of the development of college students' sense of educational gain (see Figure 1), and the second grade is the "critical period" of the development of college students' sense of educational gain.

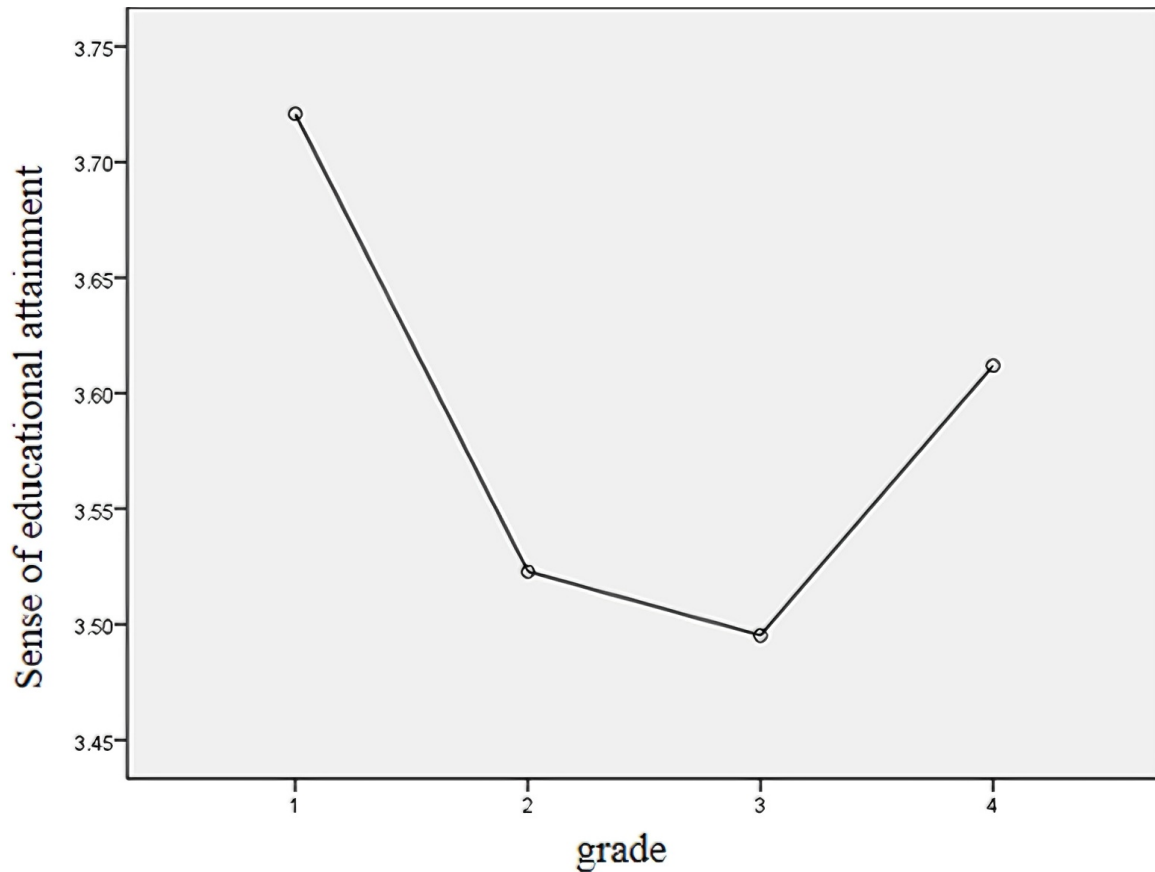


Figure 1 The grade development trend of college students' sense of educational attainment

4.4 Analysis on the Difference of Students' Sense of Educational Attainment in Different Types of Schools

Table 8 Comparison of students' sense of educational attainment in different types of schools (M $\pm$ SD)

Dimension	Double first-class universities (n=655)	Colleges and universities (n=703)	F
Social responsibility	3.51 $\pm$ 0.79	3.71 $\pm$ 0.74	23.32***
Professional quality	3.43 $\pm$ 0.73	3.59 $\pm$ 0.73	15.91***
Interpersonal relationship	3.78 $\pm$ 0.88	3.87 $\pm$ 0.73	4.10*
self-growth	3.36 $\pm$ 0.73	3.61 $\pm$ 0.78	36.72***
Emotion management	3.43 $\pm$ 0.68	3.71 $\pm$ 0.72	49.54***
Practical ability	3.43 $\pm$ 0.73	3.52 $\pm$ 0.79	4.69*
Academic achievement	3.56 $\pm$ 0.68	3.62 $\pm$ 0.70	2.49

Table 8 Results of multivariate analysis of variance show that there are significant differences in students' sense of educational attainment in different types of schools ($F=10.20$, $P<0.001$). The scores of ordinary university students in the six dimensions of interpersonal relationship, social responsibility, emotional management, self-growth, professional quality and practical ability are significantly higher than those of double-first-class university students.

5 Discussion

5.1 Dimensional Structure of College Students' Sense of Educational Attainment

The sense of educational attainment is a concept with unique Chinese characteristics, which has rich psycholog-

ical connotation and great social significance. This study uses an open questionnaire to collect data, categorizes the subject keywords related to the sense of educational attainment of college students, and writes an initial measurement scale containing 65 items. Through project analysis, exploratory and confirmatory factor analysis and reliability and validity test, the seven-factor theoretical structure of the scale of college students' sense of educational attainment, which includes 39 items, is finally established, including seven dimensions such as social responsibility, interpersonal relationship, professional quality, self-growth, emotional management, practical ability and academic achievement. Based on this, this study defines college students' sense of educational attainment as the positive psychological experience generated by the acquisition of professional quality, the establishment of social responsibility, the enhancement of interpersonal relationship, the promotion of self-growth, the improvement of practical ability, the improvement of emotional management, and the acquisition of academic achievement in various educational and teaching activities at school [18]. The seven-dimensional structure model of college students' sense of educational attainment finally determined in this study is highly consistent with the results obtained after subject-key classification and sorting of open questionnaire data by content analysis method.

Social responsibility, interpersonal communication and practical ability are the social aspects of college students' sense of educational acquisition, which belong to the sense of social acquisition and reflect the basic requirements of the country and society for the cultivation of talents in higher education. Social responsibility refers to the individual's attitude towards life and perseverance to overcome difficulties. Interpersonal communication refers to whether individuals can think for others and help each other in interpersonal interaction. Practical ability refers to the individual's teamwork and work ability. The report of the 18th National Congress of the Communist Party of China pointed out that comprehensively implementing quality education and cultivating students' sense of social responsibility, innovative spirit and practical ability are not only the fundamental requirements for implementing quality education in the new era and promoting the high-quality development of education in China, but also have vital significance for the physical and mental health development of college students.

Professional quality and academic achievement are the academic aspects of college students' sense of educational

gain, which reflects the basic expectations of parents and schools on the quality of talents training in higher education. Professional quality refers to the idea, attitude, method, goal and professional recognition of college students. Academic achievement refers to college students' sense of academic achievement and satisfaction. Professional education is the foundation of higher education. To improve professional accomplishment of college students is an inexhaustible drive for modernization of higher education governance in our country. However, academic achievement is a form of externalization of professional accomplishment of college students. It is not only an objective index for high-quality development of higher education, but also an important reference for society and parents to evaluate the quality of talent training in colleges and universities.

Self-growth and emotional management is the self-level of college students' sense of educational gain, which belongs to the sense of self-gain, and reflects the basic demands of parents and college students for higher education to promote personal growth. Self-growth refers to the continuous improvement of college students' self-management ability. Emotional regulation refers to the affinity of individual college students and the rationality of emotional regulation. The basic value of higher education is to promote the healthy physical and mental development and the continuous improvement of the level of social adaptation of college students. Self-growth and emotional management are the cornerstones of the comprehensive physical and mental development of college students, which covers two important aspects of the comprehensive development of individuals - self and emotion. After all, promoting the all-round development of people is the ultimate value of all education.

Therefore, the seven-dimensional structure model of college students' sense of educational acquisition determined in this study evaluates college students' sense of educational acquisition from the social level, self-level and academic level, which can fully reflect the talent cultivation goals under the background of China's higher education governance modernization. It can also be regarded as an important evaluation indicator for the high-quality development of higher education and the continuous improvement of the quality of talent training [19-21].

The dimensional structure of college students' sense of educational attainment determined in this study does not include the innovative spirit which is particularly emphasized by higher education administrators at present. Innovation is the behavior of making use of the existing condi-

tions to improve or create new things in a specific environment and achieving beneficial effects by putting forward ideas that are different from conventional ideas based on the existing thinking mode. The spirit of innovation refers to the ability to comprehensively use existing knowledge, information, skills and methods to propose new methods and new ideas, and the will, confidence, courage and wisdom to invent, reform and innovate. The spirit of innovation is an inexhaustible driving force for the development of a country and a nation, and it is also a quality that modern people should possess. In the context of the high-quality development of higher education, higher conditions are needed to cultivate the innovative spirit and ability of college students. In particular, the innovative spirit should be taken as an evaluation index of the quality of higher education personnel training and can be reflected in students, and it is more necessary to modernize the governance of higher education and improve the collaborative education mechanism. This just shows that our higher education administration departments and colleges have more work to do to promote the high-quality development of our higher education and continuously improve the quality of personnel training in higher education.

5.2 Reliability, Validity, and Applicability of the College Student Educational Satisfaction Scale

The development of the College Student Educational Satisfaction Scale strictly followed the steps and procedures for constructing psychometric instruments. Results from item analysis, factor analysis, and reliability/validity testing indicate that this scale serves as an effective measurement tool for assessing college students' educational satisfaction.

Regarding reliability, the Cronbach's α coefficients for each dimension and the overall scale ranged from 0.66 to 0.94. Split-half reliability ranged from 0.66 to 0.89, test-retest reliability from 0.79 to 0.87, and composite reliability for each dimension from 0.78 to 0.93. These findings indicate that the scale's reliability metrics meet psychometric standards. Regarding validity, significant moderate-to-low positive correlations were observed between all scale factors, while all factors showed significant moderate-to-high positive correlations with the total score. Results from confirmatory factor analysis confirmed the structural validity of the seven-factor model, with all fit

indices meeting acceptable criteria. Criterion-related validity analysis revealed significant positive correlations between all dimensions and the total score of the College Students' Educational Gain Scale and corresponding dimensions and total scores of the Adolescent Students' Life Satisfaction Scale, with the strongest correlations observed for friendship satisfaction, academic satisfaction, and life satisfaction. This confirms that the scale's validity meets psychometric standards. In summary, the College Students' Educational Gain Scale developed in this study demonstrates sound reliability and validity, making it suitable for application among college student populations.

5.3 Characteristics of College Students' Sense of Educational Attainment

5.3.1 The General Situation of College Students' Sense of Educational Attainment

The results of this study show that the average score of college students' sense of educational attainment is 3.58 ± 0.52 , and the average score of each dimension is between 3.47 and 3.83, which belongs to the upper medium level. College students' sense of educational attainment is the satisfaction and happiness they get from various educational and teaching activities. From the perspective of experienced happiness, this result is consistent with Diener's survey on more than 1 million subjects from 45 countries [22-24], that is, people in general are relatively happy (on the scale of 0 very unhappy to 10 very happy, the average happiness score of all the survey results is 6.75, which belongs to the upper middle level). Therefore, it can be concluded that the sense of educational attainment of the college students participating in the survey is on the whole at the above average level of level 5. In other words, the general sense of educational attainment of college students is relatively high, and they have experienced a high sense of satisfaction and happiness in the process of receiving college education.

The results of this study show that the scores of each dimension of college students' sense of educational attainment are significantly different, and the score of interpersonal relationship is the highest. Social responsibility, emotional management and academic achievement scored second. The three dimensions of professional accomplishment, self-growth and practical ability scored the lowest. The result shows that the higher overall level of college

students' sense of educational attainment is mainly reflected in their perception of good interpersonal relationship, strong sense of social responsibility, emotional management ability and higher academic achievement. In order to further enhance the overall sense of educational attainment of college students, it is necessary to improve professional quality, promote self-growth and improve practical ability.

5.3.2 Gender Differences in College Students' Sense of Educational Attainment

The results of this study show that in the seven dimensions of college students' sense of educational attainment, female students score higher than male students, but only the five dimensions of social responsibility, professional accomplishment, interpersonal relationship, self-growth and emotional management have significant gender differences. The results of this study are not consistent with the survey results of domestic researchers on the sense of educational attainment of private university students and poor college students [14, 25], but it is consistent with the findings of Blanchflower after comprehensive analysis of a number of international surveys on happiness, that is, women's happiness is stronger than men's [26, 27].

Due to their different social gender roles, male and female college students have different social cognitive evaluation standards. Compared with female students, male students have higher psychological expectations of satisfaction or success, which is in line with the public's social expectations of "good men aim at all places". The level of college students' sense of educational acquisition is determined by the relative relationship between their actual acquisition and psychological expectation in educational and teaching activities. In other words, the closer college students actually get to their psychological expectations in educational teaching activities, the stronger their sense of educational gain. Even if the actual attainment in education and teaching activities is the same, the overall level of male college students' sense of educational attainment is lower than that of female students because of their high psychological expectations.

5.3.3 Grade Differences of College Students' Sense of Educational Attainment

The results of this study show that the different dimensions of college students' sense of educational attainment show different development trends with the increase of

grade. From the general trend, the second and third grade is the "low period" of the development of college students' sense of educational gain, and the second grade is the "critical period" of the development of college students' sense of educational gain.

For college students, moving from high school to college is an important turning point in their professional life, which means that they have gradually increased social responsibilities; At the same time, entering the university usually means leaving the care of parents and family, and starting their own independent life, which provides an opportunity for their self-growth and emotional management ability to improve. In other words, a good start in the dimensions of social responsibility, self-growth and emotional management of college students' sense of educational attainment is the inevitable result of the important turning point of life from high school to university. The real thing to do as a college education management worker is how to further promote the continuous improvement of college students' sense of educational attainment through the organic integration of various ways.

The dimensions of interpersonal relationship and practical ability of college students' sense of educational attainment show a U-shaped development trend with the increase of grade. Both interpersonal relationship and practical ability belong to the category of "people doing things". In the freshman year, college students' interpersonal relationship is still in the stage of "first acquaintance", and their practical activities are not professional. With the rise of grade, college students will inevitably encounter more and more interpersonal troubles, and their practical activities will also face the test of "quantity and quality", which will affect their evaluation of their interpersonal relationship and practical ability to a certain extent. Therefore, the improvement of senior students' interpersonal relationship and practical ability is the real harvest after they have experienced interpersonal troubles and practical exercises.

The scores of senior students in the academic achievement dimension of the sense of educational attainment are significantly higher than those in the first, second and third grades, which not only accords with the theoretical expectation that the sense of educational attainment of college students will gradually increase with the increase of grade, but also is the ideal result that higher education workers hope to see most. After four years of college education, college students' learning habits have been continuously improved, their independent learning ability has

been gradually enhanced, and they have obtained various certificates through hard work, achieved good academic results, and their problem-solving ability and sense of accomplishment have been continuously improved. All these make college students experience a sense of education in terms of academic results.

5.3.4 Differences in Students' Sense of Educational Attainment in Different Types of Schools

The results of this study show that students of different types of schools have significant differences in their sense of educational attainment. In addition to the dimension of academic achievement, the scores of ordinary college students in six dimensions of interpersonal relationship, social responsibility, emotional management, self-growth, professional accomplishment and practical ability are significantly higher than those of "double first-class" colleges and universities. Although this result is not in line with the theoretical expectations of higher education administrators for college students' sense of educational attainment in different types of schools, and is inconsistent with the survey results of Ding Qinnan on college students' professional satisfaction [28], it just shows that different social comparison criteria are adopted when college students of different types evaluate their sense of educational attainment. The sense of educational attainment is a sense of satisfaction and happiness produced by college students in receiving various educational and teaching activities, which is subjective and relative. There is no denying that under the existing higher education system in China, the quality and comprehensive quality of students in ordinary colleges and universities certainly have a significant gap with the "double first-class" colleges and universities. However, in the subjective evaluation of their sense of educational attainment, the expectation of ordinary university students may be relatively low, while that of "double first-class" university students is relatively high, which leads to a significant difference in the subjective evaluation of the sense of educational attainment of ordinary universities and "double first-class" university students. Therefore, in order to make students have a sense of "deserving" education, the construction task of "double first-class" colleges and universities in improving the quality of talent training and promoting the high-quality development of higher education is naturally more difficult than ordinary colleges and universities.

Ethical Approval

All research procedures involving human participants were in accordance with the ethical standards reviewed by the Ethics Committee of Qinghai Normal University and the Declaration of Helsinki of 1964 and its subsequent revisions or equivalent ethical standards. This study was approved by the Ethics Committee of Qinghai Normal University (Approval Number: QHNU2025LS-07).

Informed Consent

All the participating college students fully understood the purpose, content and methods of the research, and expressed their informed consent by signing the consent form. They clearly stated their willingness to participate and their agreement to use their data for the purpose of this research.

Data Availability Statement

Due to privacy concerns, the data generated during this research process is not publicly available. However, it can be obtained upon reasonable request from the corresponding authors.

Conflict of Interest

The authors have no competing interests to declare that are relevant to the content of this article.

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