

First Exploration on Statistical Physics Study on Students' Behavior in the Second Class of Colleges and Universities

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ABSTRACT

The internalization and externalization of thought and behavior are an important research area of ideological and political education. The behavior of students in the second class is one of the direct results of ideological and political education. However, since it is not easy to master and evaluate the behavioral track, content and effectiveness of students in the second class, it lowers down the evaluation of the effectiveness of ideological and political education. With the development of information technology and thinking and theory of data, it is possible to master and study the rules and contents of behavior of students in second class. The methodology and data research on behavioral state, rules and characteristics of students in second class enables us to introduce ideological and political education into a new field of objective quantitative research, which will effectively improve the timeliness, objectivity and comprehensiveness of effectiveness evaluation of ideological and political education.

Keywords: *Second class of colleges and universities, Students' behavior, Statistical physics study, Current status.*

1. INTRODUCTION

The human developmentalism of Marxist Theory points out that the all-round development of human is "the general improvement and coordinated development of individual in social relations, ability, quality, and personality, etc." and "the duty, mission and task of anyone is to develop all abilities in an all-round way for himself". All the abilities here cover intelligence, physical strength, organizing ability, leadership, willpower and so on. Comrade Xi Jinping emphasized that "we should focus on students, take care of students and serve students to improve their ideological level, political awareness, moral quality and cultural accomplishment to help them develop into talents with all-round development and integrity." This has pointed out the direction for talent training in universities. As an important platform to cultivate comprehensive qualities of college and university students, the second class plays an irreplaceable role in personnel training.

2. LITERATURE REVIEW AND RESEARCH DESIGN

The concept of "second class" was formally put

forward in the 1980s and 1990s. Compared with the in-class teaching of "first class", second class refers to all kinds of meaningful and healthy extracurricular activities carried out by students excluded by the teaching plan. The research on the second class of college and university students mostly focuses on the theoretical level of the connotation and extension, function orientation, methods and talent training mode of the second class. Some scholars have conducted a questionnaire survey on the effect and feeling of college students in participating in the second class. For example, JU Jiqing proposed that from the perspective of the types of activities, it mainly includes cultural practice, moral education and practice, professional practice, innovation practice, social practice and the like. [1]WEI Peizheng and MA Huaxiang divided college and university students into four categories according to the degree of their participation in the second class, namely, non participants, mild participants, moderate participants and deep participants. [2]However, since such factors as serious distortion, large time span, diversity of contents, non-structural data sample and difficulty in data collection, scholars rarely study the specific situation of students participating in the second class, including what

they participate in, how much they participate in and how to participate.

The statistical research of human behavior has become an important issue in the complex system. The research method is called statistical physics research, which is different from the traditional psychological experiment. The research of human behavior is mainly achieved through the quantitative statistics of a large number of human behavioral events and the establishment of theoretical model to explore the

generation mechanism of these laws and possible dynamic effects. [3]Therefore, combined with the research and practice of scholars, this study adopts the method of real-time objective record rather than questionnaire survey to form a closed-loop data collection mechanism. It takes six years for me to collect the specific behavior of students in three grades in the second class during their freshmen and sophomores in a university, and carries out empirical research from the aspects of the types and ways of participation in the second class.

Table 1. General Situation of Variable T of Ability Factor Classification of Students in Second Class

Ability factor	Activity frequency of freshmen	Activity frequency of sophomores	Difference between freshmen and sophomores	Total activity frequency of freshmen and sophomores	Proportion to total frequency
t ₁ Public responsibility	1017	189	-828	1206	4.8%
t ₂ Social cognition	468	152	-316	620	2.5%
t ₃ Sports and entertainment	1340	856	-484	2196	8.7%
t ₄ General knowledge of culture	2046	2153	107	4199	16.7%
t ₅ Art and aesthetic education	2904	2951	47	5855	23.3%
t ₆ Related disciplines	58	43	-15	101	0.4%
t ₇ Discipline innovation	816	598	-218	1414	5.6%
t ₈ Learning ability	249	102	-147	351	1.4%
t ₉ Academic discipline	1724	1062	-662	2786	11.1%
t ₁₀ Spoken and written language	726	247	-479	973	3.9%
t ₁₁ Ideological and political	722	1342	620	2064	8.2%
t ₁₂ Social contact organization	1991	1362	-629	3353	13.4%
Total	14061	11057	-3004	25118	100%

Table 2. A Survey of the Variable Y of Students' Participation in the Second Class

Mode of participation	Activity frequency of freshmen	Activity frequency of sophomores	Difference between freshmen and sophomores	Total activity frequency of freshmen and sophomores	Proportion to total frequency
y ₁ Audience	7522	7738	216	15260	60.8%
y ₂ Integration	3664	766	-2898	4430	17.6%
y ₃ Practice	2875	2553	-322	5428	21.6%
Total	14061	11057	-3004	25118	100%

3. DATA DESCRIPTION AND EMPIRICAL ANALYSIS

3.1 Basic Data Description

3.1.1 Number of Student Samples

There are 501 students in Grade 2013, 435 students in Grade 2015 and 368 students in Grade 2016, covering more than 95% of the students in this grade. Among them, 450 valid samples are from Grade 2013, 326 from Grade 2015 and 198 from Grade 2016. The total frequency of effective sample activities was 10,755 in Grade 2013, 10,352 in Grade 2015 and 4,011 in Grade 2016.

3.2 Description of Specific Behavior in Second Class

According to the classification of students' ability factors and activity participation methods proposed in this paper, 25,118 effective samples are classified and described from three perspectives.

3.2.1 From the Perspective of Ability Factors to Meet the Development of Students in the Second Class

For the convenience of subsequent analysis and description, this classification variable is named T, which is as shown in Table 1.

3.2.2 From the Perspective of Mode of Participation in the Second Class

According to the mode of participation in the second class, we can divide it into three modes, such as audience, integration and practice. The audiences indicate that they have participated in the second class, such as being an audience in the cultural show; the integration indicates that they have certain tasks in the second class activities; the practice indicates that they have played a leading role in the second class. For the convenience of subsequent analysis and description, we name it Y, which is as shown in Table 2.

3.3 Descriptive Analysis of Data

3.3.1 Basic Statistical Characteristics of Students' Behavior in Second Class

The basic statistical characteristics of students' behavior in the second class are as shown in Table 3.

Table 3. Basic Statistical Characteristics of Students' Behavior in Second Class

	Mean value (expectation)	Standard deviation	Median	Mode
Activity frequency of freshmen	14.44	8.41	13	9
Activity frequency of sophomores	11.35	6.33	10	9
Total activity frequency	25.79	12.29	23	21

3.3.2 Mathematical Model of Students' Behavioral Frequency in the Second Class

In order to test the relationship between distribution and participation times of second class, we need to verify it. With the help of the idea of non-parametric statistics, we first draw the Kernel Density diagram of total number of the second class in the effective table (diagram omitted). Intuitively, the image is close to normal distribution. In order to further confirm it, we test the normal distribution.

When we verify the statistics of normal distribution of behavioral frequency of students in the second class, the statistical significance of Kolmogorov Smirnov and Shapiro-Wilk tests is 0.000, which means that the total frequency distribution does not obey normal distribution. However, by drawing the kernel density diagram of behavioral frequency of students in the second class under different capacities (as shown in Figure 1), we can see that with the increase of sample size, the kernel density function diagram of the sample tends to be close to theoretical normal distribution. Therefore, we believe that when the sample size increases infinitely, the limit distribution is a normal distribution, that is, an asymptotic normal distribution.

*Instruction: In the figure, red represents the normal distribution theoretic graph of the second class frequency, and the sample sizes of blue, green and orange are 300, 600 and 900 respectively.

4. CONCLUSIONS

The second class is a kind of educational activity to meet the development of comprehensive quality of students, which has diverse types, educational contents,

satisfaction of needs and the degree of participation. We can draw conclusions as follows after we study the data:

4.1 Students are Keen on Participating in Cultural Activities.

Among 12 types of student activities, the sum of cultural lectures (26.2%) and cultural shows (22.1%) is close to half of all activities. These two kinds of activities show common characteristics. First, it is easy for students to take part in; second, the contents focus on general knowledge education such as culture and art. This proves that on the one hand, students' demand for general culture education is clear, on the other hand, students' participation in activities should be considered from two aspects: demand and difficulty of participation.

4.2 The Total Frequency of Public Welfare Activities and Social Practice Activities with the Theme of Cultivating Students' Sense of Responsibility and Mission Meets the Requirements, but that of Senior Students Declines Obviously.

In second year, the frequency of students participating in the second class generally decreases, which is in line with the living pattern of university students. When studying in a higher grade, students get greater academic pressure and they have richer after-school life. However, public welfare activities decreased from 1.02 times per freshman to 0.15 time per sophomore; social practice decreased from 0.97 time per freshman to 0.26 time per sophomore. This shows that the administrative color of the practical education of the sense of responsibility is still strong, and the ideological

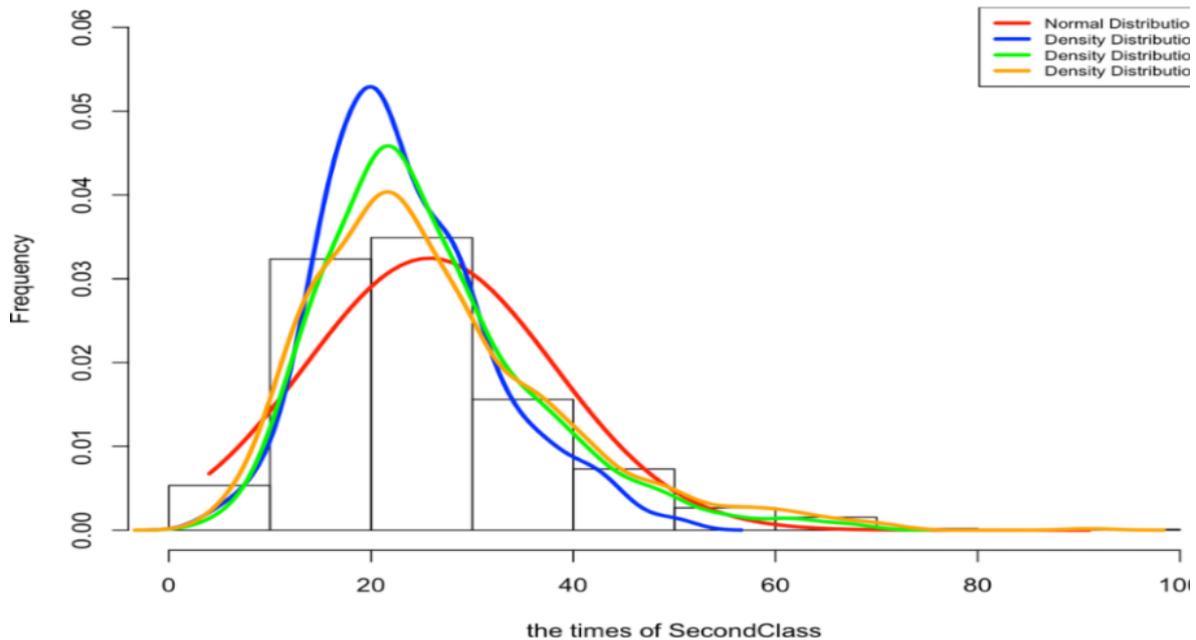


Figure 1 Kernel Density Diagram of Students' Behavioral Frequency in Second Class*

and practical education of the sense of social responsibility should be normalized and deepened.

4.3 Activities Closely Related to Academic Studies are not as High as Expected.

Discipline innovation (5.6%) and academic discipline (11.1%) are the two main activities related to students' academic performance. Some scholars point out that contemporary students are more utilitarian and more concerned about academic training related to their vital interests, while ignoring the cultivation of comprehensive quality such as moral and aesthetic education, which is also the reason why the second class is difficult to carry out. However, the data show that this is not the case. The participation rate of the two activities directly related (16.7%) is far lower than 43.9% of aesthetic education of literature and art, and spoken and written language, the two activities most related to meeting the needs of students in general knowledge education.

4.4 The Mathematical Model of Students' Behavior in Second Class has Significant Characteristics.

In the two years, the average participation frequency of our samples is 25.8 times, and the activity frequency presents a gradual normal distribution, which has judgment value for evaluating whether the content of the second class is rich, whether the organizing power is strong, and whether the guidance is in place.

REFERENCES

- [1] JU Jiqing. Analysis of the "Embedding" of Revolutionary Culture in Second Class Activities of College and University Students [J]. Party Construction and Ideological Education in Schools, 2020 (06): 89-91.
- [2] WEI Peizheng, MA Huaxiang, MA Liping. Research on the Relationship between the Second Class and the Cultivation of College and University Students' Innovative Quality [J]. Research on Ideological Education, 2011 (10): 99-102.
- [3] WANG Binghong, ZhOU Tao, ZhOU Changsong. Statistical Physics Research on Human Behavior, Complex Network and Information mining [J]. Journal of University of Shanghai for Science and Technology, 2012,34 (02): 103-117