An Empirical Study on the Changes of Value Orientation of Physics Curriculum in Chinese Senior High Schools: A statistical analysis based on syllabus and curriculum standards

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Abstract

Whether in its objective or in its content, the curriculum always includes the requirements of value orientation for students' Individual-being and Social-being by mainstream culture. Curriculum value varies with different countries, societies and times. This paper will make a statistical analysis of the requirements for the students' value orientation of the 10 versions of the Physics Curriculum Standards (syllabus) for Senior High Schools promulgated by China since 1948 to 2003, which is based on the related theories of sociology, in order to find relevant rules. At the same time, what is the difference between the new curriculum reform in 2014 and the curriculum reform in 2003 in terms of value orientation? What values are abandoned? What new values are strengthened? In combination with our findings, we will make another statistical analysis of the Physics Curriculum Standards for Senior High Schools published in 2017, to demonstrate the new changes in the value orientation of this curriculum reform began in 2014.

Key words: chinese senior high school; physics curriculum; value orientation; individual-being; social-being; statistical analysis

Introduction

Whether in its objective or in its content, the curriculum always includes the requirements of value orientation for students' Individual-being and Social-being by mainstream culture. Curriculum value varies with different countries, societies and times. Based on data analysis software, this paper adopts quantitative, qualitative and two methods to study curriculum texts，which including the 11 versions of Physics Curriculum Standards for Senior High Schools of China from 1948 to 2017. To do these, we want to point out the frequently neglected problem: what kind of value orientation does the government infiltrate in school curricula? As we would see in the following discussion, not only have we got a lot of valuable research conclusion which would be found and understood even explained through the traditional research methods, but also have we found some very interesting and hidden topics that were hard to get with traditional research methods. Moreover, this paper will show us a panoramic view of time dimension, through that we found the general rule of value orientation penetration into the curriculum standard, at the same time, the individual characteristics of different times and political environments have also been revealed. These findings are of positive significance for us to understand and innovate various courses in China, including curriculum standards, textbooks, curriculum and education itself.

Although our research is only the Chinese "high school physics curriculum standard", we firmly believe that this discussion and research methods are useful for other subjects in China, and even in other countries. As Borrego, Douglas and Amelink (2009) have noted, "Our position is that no particular method is privileged over any other……we expect that quantitative, qualitative, and mixed approaches will be essential in the future" (p. 53). We hope this paper could provide a model a model or paradigm for analyzing other curriculums to reveal the cross time or cultural changes of any subject in the course text.

Literature Review

The sociological research of curriculum has been in the ascendant in recent decades. It is mainly based on the relevant social factors to analyze and study the social justice, social control, social function and the explicit or implicit social value of curriculum content and so on. Among them, the research on curriculum and power, values, classes, strata and ideologies is particularly remarkable. The British educational sociologist Young (1972) who put forward the theory of "Knowledge and Control", which made a new interpretation about the problem of the choice of knowledge, organization and evaluation, which has been completely ignored by the course research for a long time. He believed that curriculum research should focus on the nature of curriculum and examine the rationality and legitimacy of curriculum. He argued that "consideration of the assumptions underlying the selection and organization of knowledge by those in positions of power may be a fruitful perspective for raising sociological question about curricula" (p. 31). In his view, the curriculum is not objective or value neutral. Curriculum is an ideology dominated and distributed by a specific interest group in which power can legitimize knowledge content. Young's theory is of great theoretical value, but lacks empirical research and case analysis. Bernstein (2003), a British educational sociologist, thought that "How a society selects, classifies, distributes, transmits and evaluates the public educational knowledge it considers to be public, reflects both the distribution of power and the principles of social control" (p. 254). He drew the studies on the nature of curriculum from macro research into micro research, and explained that the fundamental cause of curriculum developments and changes was the demands of the social power and class social control on the curriculum. Bourdieu (1974) believed that curriculum exists in the form of a cultural capital. The content of the course is the compulsive mainstream culture, ideology and social values, which implements its basic intention and logic by a relatively covert way in operational mechanism (p. 34). Apple (1976) noted that "curriculum determination and selection are not in and of themselves neutral" (p. 65), "whether we like it or not, differential power intrudes into the very heart of curriculum, teaching, and evaluation (Apple, 1993)." He added that the hidden values or the control and restriction of mainstream ideology, which is through the research on the history of curriculum, and these hidden things, are hard to find. Obviously, only through thorough and systematic investigation and analysis can we find out.

Through the analysis of relevant textbooks in the United States, Apple (2013) found that textbooks emphasize students' trust, identity and loyalty towards the state and the mainstream ideology, but covers up the conflicts, contradictions and struggles in society and hides social rights, classes, strata and other value issues. He also found that the mathematical curriculum, which has always been regarded as objective and value neutral, also deliberately avoids contradictions, conflicts and confusion, maintained social order and system, to achieve the purpose of social control. After Apple, the relevant research on curriculum has entered the micro and empirical stage. For example, in the study of how to select and distribute knowledge in the course, Lawton (1983) proposed "Cultural analysis models", advocated the selection of human culture, in which we can choose the most valuable knowledge for society and individual to plan curriculum. But Magendzo (1988) is critical of Lawton's cultural analysis, he pointed out that: "cultural analysis is, in a sense, a form of building into the curriculum a balance of power"(p. 24). Similar to Magendzo's point of view, Eggleston (1977) noted that the process of determining the content of the course is a conflict process, and eventually reaches the balance of a certain compromise, adjustment and the various degree of stability. This obviously implies the concept of "power" that curriculum decisions are mainly related to the use and distribution of power. Kelly (1981) studied a series of problems about illustration, language, theme selection and so on in school textbook and found that the textbooks use the male language and most of the illustrations and the theme selections in the textbook are male images which is lack of female images; Whyte (1986) showed the gender discrimination in the curriculum and how women and children were ignored through the analysis of children's reading and school textbooks in the United States. Sarup (2013) revealed how courses infiltrate racial discrimination through his research.

With the development of quantitative methods and data mining based text, some scholars began to study the value orientation in the curriculum with semi-quantitative, quantitative and

qualitative methods (Watkins, 2016; Apple, 2013; Bowen, 2009; Bratt, 2007; Kuckartz, 2014). Stevenson and Baker (1991) conducted a statistical analysis about the grade eight mathematics curriculum under 15 kinds of educational systems and found that there are obvious differences between the situations of curriculum content implementation in different educational system (such as state control and local control); Bowles and Gintis (2011) took the American education as the object, and studied the strengthen relationship which is caused by the curriculum to social stratum formation, social division of labor and the hierarchical structure; Sarup (2013) discovered how curriculum infiltrates racial discrimination by research through the investigation in many countries; By using the text analysis, Ida (2009) put forward a new method of analyzing higher education curriculum textual information, which he believed to be able to grasp the global characteristics of the changing trend of the subject in the syllabus. Bowen (2009) examined the function of documents as a data source in qualitative research and discusses document analysis procedure in the context of actual research experiences. In china, there are also several studies on quantitative and textual analysis based on specific curriculum texts for what has a positive impact on it is (ZHONG & YU, 2009; Zhu, 2002;Xue & Wang ,2012).

Theoretical Frameworks

The thought of Durkheim is of great value in how to cultivate, influence and control the students' personality through the permeation of value orientation. According to Durkheim's theory, in each of us, there exist two beings which, to be inseparable otherwise than by abstraction, are not without being distinct. One is made of all mental states that relate only to ourselves and to the events of our personal life: this is what we might call the Individual-being. The other is a system of ideas, feelings and habits that express in us, not our personality, but the group or different groups of which we are part; such are religious beliefs, moral beliefs and practices, national or professional traditions, collective opinions of all kinds. Together they form the Social-being (Durkheim, 1973). Many scholars at home and abroad have carried on the statistical studies on the curriculum content, especially the teaching material. Through the Chinese language course and the text of the textbooks, the Chinese scholar Zhu (2002) combined the theory of Durkheim with the reality of Chinese education, and made an empirical study on how the language curriculum put forward value requirements and influenced on the students from two dimensions of society and individual. On the training target of "Individual-being" for students, He said that, it is necessary to cultivate not only the adaptable people who can adapt to the present society, but also the people who can transcend the reality of the society. "Adaptive "value orientation as "Individual-being" includes honest and trustworthy, industrious and frugal, hard-working, good tolerance, professionalism, dedication, self-wit, brave and strong, modest and prudent, self-respect, self-love, telling right from wrong etc.; "Transcendence" orientation as "Individual-being" includes scientific spirit, the spirit of innovation, Independence, the pursuit of ideals, self-development, loving beauty, loving life. In the respect of "Social-being", as each society has some consensus on certain value standard, some of them are consistent with the interests of the ruling class and are used to support and maintain the existing social order, therefore, the goal of education must embody the value orientation of this "control" first. In addition, the existence of multiple values is bound to produce social contradictions, and the best way to solve the contradiction is to negotiate. Through negotiating, the social order can be maintained; therefore, the value orientation of this "negotiability" must be included in the educational goals. "Control" value orientation as "Social-being" includes patriotism, national spirit, loving the specific political system, political party, law-abiding, class struggle, respect teachers, filial piety, benevolence and honest, collectivism, revolutionary spirit, internationalism, mutual solidarity and cooperation etc.; "negotiation" value orientation as "Social-being" includes justice, equity, power, duty, freedom, democracy, human development, peace, etc..

Any course, whether in the target or in the content, will includes the requirements of the mainstream culture for the students' Individual-being and Social-being. Different countries, societies and cultures have different backgrounds and specific value performance in different times. To a certain extent, the curriculum goal is an expectation on the results of teachers'

teaching and students' learning behavior, and it is the most objective reflection of the demand of the mainstream culture to the character of the students. Therefore, this paper will be based on Durkheim's personality theory and Zhu's development of Durkheim's personality theory, and do a statistical analysis on its implicit and explicit value orientation to reveal the development of the value orientation in nearly 70 years, according to the texts of the Physics Curriculum Standards for Senior High Schools issued and implemented in China from 1948 to 2003.

Research Methodologies

Statistical Methods

Firstly, we especially extracted the excerpts the requirements of students' value orientation from a total of 10 published Physics Curriculum Standards for Senior High Schools from 1948 to 2003. For example, in the 2003, the following values have been introduced:

"(the ability to) appreciate the wonders and harmonies of the nature; develop curiosity and eagerness to learn; enjoy exploring scientific myths; experience the hardship and joy in science inquiry; participate in scientific activities with enthusiasm; apply physics knowledge in life and practice; investigate physics problems originated from real life; seek truth with persistence, creativity and objectivity; critique information with scientific lens; (Students should also be able to) proactively collaborate with others, communicate with others while still maintaining their own opinions perceived true; correct their own misconceptions and foster team-work spirits; understand and appreciate the contribution physics has made to our economics and societal progress; keep track of and ponder upon hot issues in the field of physics; develop sustainability awareness, and make contributions within their possible reach; show care about scientific and technological statuses and trends; nurture sense of mission and responsibility for their countries and regions, and aim at using scientific knowledge to meet human needs" (p. 8).

Through the software's segmentation, labeling process, we obtained the relevant keywords of the requirements of value orientation and the frequency that they were required. The visual results are shown in figure 1.

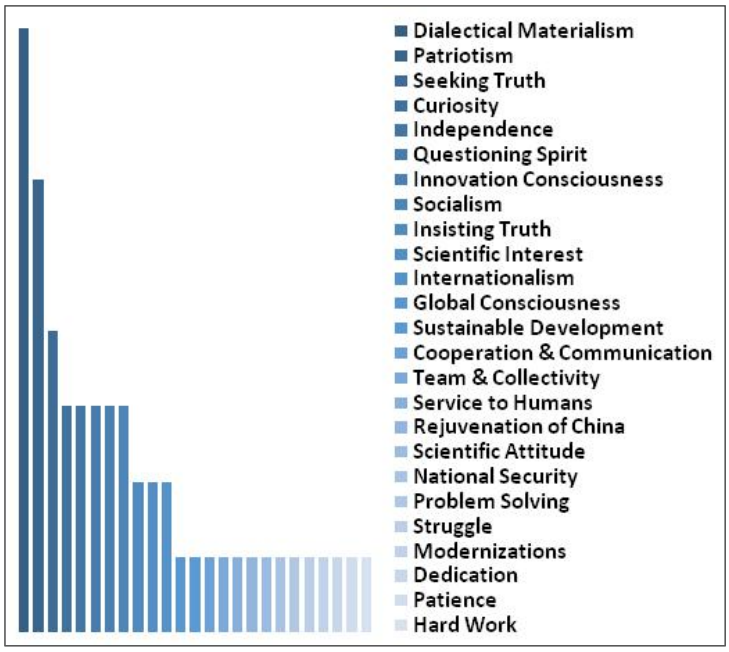

Figure 1 Keywords & Frequency List of Value Orientations

It is very intuitive to see that the key words that the distribution of key words representing the value orientation according to the frequency demanded. The order of values from high to low are "Dialectical Materialism", "Patriotism", "Seeking Truth", "Curiosity", "Independence", "Questioning Spirit", "Innovation Consciousness", "Socialism", "Insisting Truth", "Scientific Interest", "Internationalism", "Global Consciousness", "Sustainable Development", "Cooperation & Communication", "Team & Collectivity", "Service to Humans", "Rejuvenation

of China", "Scientific Attitude", "National Security", "Problem Solving", "Struggle", "Modernizations", "Dedication", "Patience", "Hard Work", etc.. Considering that some key words such as "Scientific Attitude", "National Security", "Problem Solving", "Struggle", "Modernizations", "Dedication", "Patience", "Hard Work" are very low in frequency. In addition, it is difficult to distinguish whether they belong to the Individual-being or the Social-being. Therefore, we only selected the value orientation of the top 17 as the key factors for the classification and statistics.

Then， we categorized those values based on previous research (Durkheim, 1973； Zhu, 2002). The value orientations of physics curriculum objectives can be divided into two categories, one is the Individual-being, and the other is the Social-being. The Individual-being value orientation includes two orientations—adaptation and transcendence, and the Social-being value orientation includes two orientations—control and negotiation. The specific value orientation breakdown categories are shown in Table 1.

Table 1 Breakdown of value orientation

Value of Individual-Being		Value of Social-Being	
Adaptive Orientation	Transcendental Orientation	Control Orientation	Negotiation Orientation
Seeking Truth From Facts	Curiosity	Dialectical Materialism	Global Consciousness
Insisting on Truth	Scientific Interest	Patriotism	Sustainable Development
Cooperation & Communication	Independence	Team and collectivity	Service to Humans
——	Questioning Spirit	Rejuvenation of China	——
——	Innovation Consciousness	Socialism	——
——	——	Internationalism	——

Statistical Results

According to the classification list of value orientations shown in Table 1, this article makes a statistical analysis on the frequency of value orientation requirements by the training objectives of the Physics Curriculum Standards for Senior High Schools (a total of 10 units) published in China since 1948. For example, the requirements for students' value orientation of the 1990 syllabus were cultivate "students' interest in learning physics, scientific attitude, independent thinking and creative spirit, and to establish the dialectical materialism and the concept of patriotism." According to the classification list, "Learning Interest" and "Scientific Attitude", "Independent Thinking" and "Creative Spirit" all belong to transcendental orientation in the Individual-being value , therefore the frequency of transcendental orientation is 4; because the requirements of the adaptive orientation do not appear in the target, the frequency of adaptive orientation was 0 and the statistical frequency of transcendental orientation is 100% of the total frequency on the value of the Individual-being. "Dialectical materialism" and "patriotism" belong to the control orientation of Social-being value, therefore, the frequency of control orientation is 2; Because there is no requirements of negotiation orientation in the target, the statistical frequency of the negotiation orientation is 0, and the statistical frequency of the control orientation is 100% of the total frequency of the Social-being value, the total frequency of Individual-being value is 66.7% of the total frequency of whole value orientation (the

frequency sum of Individual-being value orientation and Social-being value orientation). For another instance, 2003, under the background of the new curriculum reform, the requirements of value orientation in physics curriculum standards for students are “the development of students’ curiosity and thirst for knowledge and interest in scientific exploration, team spirit, cooperation spirit and desire to communicate, to uphold the truth, innovation and realistic scientific attitude and scientific spirit, establishment of the sense of mission and responsibility of the revitalization of China, and the consciousness of serving the human, the awareness of sustainable development and global ideas.” According to the classification list, “communication and cooperation”, “truth” and “seeking truth from facts” belong to the adaptation orientation of Individual-being value, and the statistical frequency is 3; “curiosity and thirst for knowledge”, “interest in scientific exploration”, and “innovative spirit” belong to the transcendental orientation of Individual-being value, the statistical frequency is 3; The statistical frequency of adaptation orientation and transcendence orientation are both 50% of the total value of the Individual-being. “Team spirit” and “establishment of the sense of mission and responsibility of the revitalization of China” belong to the control orientation of Social-being value, and the statistical frequency is 2; “the consciousness of serving the human”, “awareness of sustainable development” and “global ideals” belong to the transcendental orientation in Social-being value, and the statistical frequency is 3. On the whole, both the value of control orientation and the value of negotiation orientation are 50% of the total value of Social-being. The total frequency of individual orientation value is 54.5% of the total frequency of whole value orientation (the frequency sum of Individual-being value orientation and Social-being value orientation). The statistical results of value orientation of previous curriculum objective, as shown in table 2.

Table 2 frequency statistics of value orientation requirements of previous physics course target

Years	**Individual-being**					**Social-being**					**The ratio of Individual-being %**
	Adaptation		**Transcendence**		**total**	**Control**		**Negotiation**		**total**	
	freq.	rate%	freq.	rate %		freq.	rate %	freq.	rate %		
1948	0	0	1	100	1	0	——	0	——	0	——
1952	0	0	1	100	1	3	100	0	0	3	33.3
1956	0	——	0	——	0	4	100	0	0	4	0
1963	0	——	0	——	0	1	100	0	0	1	0
1980	0	——	0	——	0	3	100	0	0	3	0
1986	0	0	4	100	4	2	100	0	0	2	66.7
1990	0	0	4	100	4	2	100	0	0	2	66.7
1996	1	33.3	2	100	3	2	100	0	0	2	60.0
2000	1	25.0	3	75.0	4	2	100	0	0	2	66.7
2003	3	50.0	3	50.0	6	2	40.0	3	60.0	5	54.5

Results and Analysis

Handle the statistics in Table 2, as shown in Figure 2, figure 3, and figure4. As you can see from Figure 1, in the training target of Chinese senior high school physics curriculum, we have always attached great importance to the character of cultivating the Social-being value orientation, which is directly related to the political and cultural traditions of China. As for the requirement of the Individual-being value, it was involved in the curriculum goals of the 1952 before and after liberation, but for a long time after that, it was excluded from the training goals (mainly because of the political chaos, such as the Great Leap Forward and the Cultural Revolution). It didn't reappear in the curriculum goals until 1986. And it was directly related to China's political background during this period.

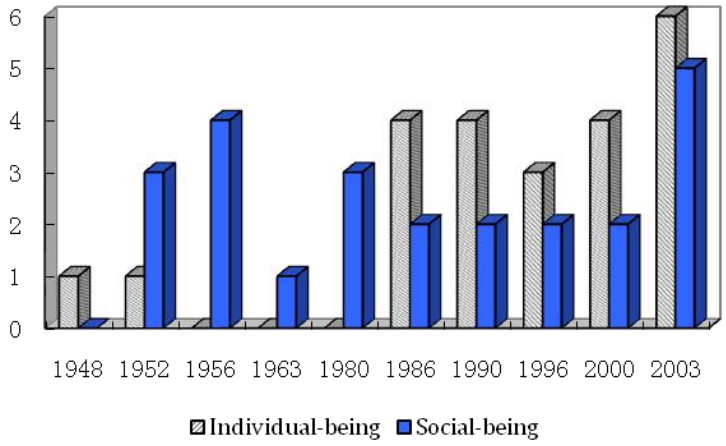

Figure 2 Histogram of Individual-being and Social-being

As you can see from figure 3, during the development of China physics curriculum in cultivating students' Individual-being value orientation except from 1956 to 1980 (mainly because of the political chaos, such as the Great Leap Forward and the Cultural Revolution), it has been attached importance to the development of students' Transcendence orientation. For example, pay more attention to the development of students' interest in physics, independence and so on. However, in the development of students' Individual-being value orientation, it wasn't emphasized until in the curriculum goal in 1996. This is a very thoughtful point.

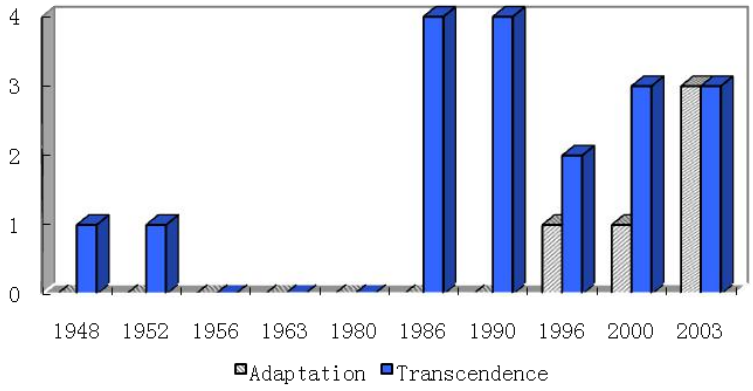

Figure 3 Histogram of Adaption and Transcendence in Individual-being Value

Education is to prepare students for their future social life; therefore, education should provide students with a variety of knowledge, skills, and moral values that students will adapt to social life in the future, so that students can successfully integrate into social life after going out of school. Therefore, the curriculum should meet the requirements of the students to adapt to the

various requirements of social life in the future. However, because China has long been centered on the progress of science and technology and economic construction, the idea of elite education has always been in the center of education. In order to cultivate elites, physics curriculum must pay special attention to the theoretical and experimental physics system, thus this will objectively weaken the link between the physics curriculum and the actual life of the students. In this way, the relationship between the physical course and the actual life of the students will be weakened objectively, so it is the inevitable result that the course goals do not require too much to adapt to the orientation. But in the round of new curriculum reform in our country, with particular emphasis on the idea of curriculum returning to "regression of students' real life", and just under the guidance of such an idea, we can see that the Individual-being value orientation is fully stressed in physics curriculum standards promulgated in 2003, such as the exchange and cooperation consciousness, practical attitude, scientific judgment etc..

As you can see in Figure 4, it focuses on the control orientation in the requirements of the students' Social-being value in our high school physics curriculum goals, and emphasize the students' love for the country, the nation, the socialism and the political systematic. For the Social-being value of the negotiation orientation, it was not required until in the new curriculum goals in 2003, such as global awareness and sustainable human development. This is undoubtedly one of the major progresses in the new round of basic education curriculum reform in the early twentieth Century. But the literature (Xue & Wang, 2012) argues that, there is still room for improvement in the curriculum value standards in 2003： "It is necessary to carry forward and embody the modern significance value of cultural tradition as much as possible while paying attention to overcoming the negative influence of cultural tradition." This view is based on the cultural perspective of the science and education, especially in non-western countries.

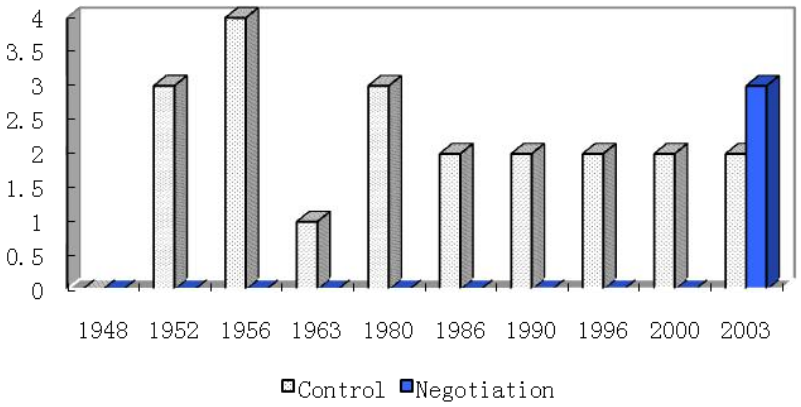

Figure 4 Histogram of Control and Negotiation in Social-being Value

From the perspective of culture, education is essentially a process of adaptation to culture, and as a cultural activity, it's inevitably involves the conflict between different cultures. As Cobern (1996) issued, "Modern science will influence a Non-western culture as surely as it has influenced Western culture" (p. 18). (1) The lack of scientific spirit in Chinese Traditional Culture has greatly hindered the origin and development of science in modern China, Therefore, the purpose of our introduction to western science is to use the rational spirit of western science to overcome and replenish some of the flaws in our traditional culture. (2) Physics is the original paradigm of science, the foundation of technology and a constitutive part of a rational culture, as Galili (2008) noted, "physics as a culture， it is the beliefs and ideology of generations of physicists， Teachers of physics demonstrate to the learners the kind of expression style, appealing to feelings, spiritual, moral and ethical values" (p. 3). Those would lead to (3) the purpose of physics education is s to enable students to adapt to physics culture, which is rooted in western culture and therefore has the characteristics of western culture. It means some of the best cultural traits in traditional culture that are not associated with or conflict with western culture may be marginalized or eliminated. Clearly, this is a dangerous practice for humans.

Therefore, the culture of non western countries should pay attention to this danger and try to cope with potential dangers. Just as Ogawa (1998) have noted, “History of science education in the world so far was regarded as the history of the effort of cutting off the factors, mainly indigenous factors, irrelevant to western modern science. Until 20 years ago, science educators had no doubt to this direction. However, recently, under the influence of science studies and constructivism, reexamination of science education enterprise is on-going. It is the time to search for the components which had been cut off and to be restored in each cultural region or for a new type of understanding of Shizen (nature) or its equivalent in each culture. And in this effort, what our attention should be directed to may be the interrelationship of people and their natural environments. We may just as well withdraw from the dualism of nature and culture, and move toward the world of the interrelationship” (p. 157).

Scholars in the humanities have long believed that there are fundamental differences between Eastern and Western folk theories of physics. Some Western historians who study ancient Chinese science and culture believe that ancient Chinese have more abundant and more "advanced" understanding of physics than ancient Westerners (e.g., the Greeks) and that this understanding more closely resembles modern physics (Capra, 2013).The core concepts such as, Yin and Yang, are inherently relational, contextual, and dialectical, and thus resemble features of contemporary quantum physics (Peng & Knowles, 2003). There are some very important principled stands in Chinese cultural traditions, such as Harmony Between the Heaven and Human， Dao Emulates Nature， People Live in Harmony with Nature， Respect for Nature and Humanity， etc.. Obviously, these values need to be further strengthened in the curriculum.

Expand Discussion and Conclusions

In order to expand discussion, we introduce the new curriculum standard of physics in senior high schools, which was promulgated in 2017 in China.

Since 2014, the Ministry of Education (MOE) of People's Republic of China has launched a comprehensive revision of the curriculum standards of ordinary high schools since 2003. The new reform and revision have affirmed the remarkable achievements made in the curriculum reform implemented in 2003, while also point out some problems and the need to make necessary adjustment. “It (the 2003 version) has guided the practice of reform on general high schools’ curricula for more than 10 years, and is truly congruent with the overall reform direction of our country as well as advanced pedagogical concepts. With its guidance, we have basically established a high school curricular system appropriate for our country’s local realities and contemporary developmental needs. Meanwhile, our pedagogical frameworks are updated, talent development models transformed, and the overall competence of our teachers greatly enhanced, all of which were significant contributions to China’s elementary education.” But what can’t be ignored is that “there are still some problems that need to be improved in the current curriculum standards for senior high schools, especially in the current era, when China’s economy and technology are changing rapidly and profoundly, when the paradox of our society is transforming, when there are constantly new demands for more civilized citizenship and talent with higher quality, and when high school becomes more common.”

After years of special research and summary analysis, on the basis of summarizing the valuable experience of Chinese curriculum development and making full use of the outstanding achievements of international curriculum reform, the Chinese Ministry of Education promulgated the new curriculum plan of high school and the curriculum standards of various disciplines in January 2018. The most prominent feature of the new amendments is the integration of core competence with existing educational goal system, proposing explicitly the aim to pinpoint the fundamental abilities of high school students through carefully selecting and rearranging subject learning content, through instructional design, various types of assessment and textbook editing. There are several reasons why core competence should be the key point of this curriculum reform.

First of all, such a move is consistent with the global emphasis on developing talents that meet the changing needs of our times.“In essence, the phrase core competence in the literature on education defines a set of learning outcomes (skills or competencies) which each individual should acquire during or demonstrate at the end of a period of learning. It is one of a number of

associated concepts, including core skills, core competency, generic skills and key qualifications. There are differences between all of these concepts, but they all relate to learning outcomes which support further learning, employment, personal development and socialization (Holmes & Hooper, 2000). That means the cultivation of students' core competence has become a major trend in elementary education research and practice reform all over the world.

Also, core competence epitomizes the most fundamental qualities of global citizenship, aiming to curate educated citizens with high sense of social responsibility. "A citizen of a democratic country should possess certain attitudes, skills, and knowledge to understand and participate in the process of political decision-making (Veldhuis, 1997)". Now, core competence has become the top-level design and implementation focus of curriculum reform in China.

Moreover, In the Chinese Students Develop Core Literacy, "Core Competence" was defined: "the most valuable and critical ability to be nurtured by all subject learning, the integration between knowledge and skills, process and methods, affective and attitudinal values, and finally a comprehensive quality that allows students to discover and solve problems regardless of how complicated and unpredicted they are." This delimitation is congruent with the direction of global education. Additionally, core competence represents the transformation of school education from knowledge delivery to knowledge construction, signaling the entry of China's curricular development into a new phase, which highlights the foundational purpose of school education and the direction for future curricular reform.

Finally, the integration of core competence into all subjects can help alleviate the eagerness to achieve short-term goals that has been rooted in traditional Chinese education, and get back to the right track where commonsense knowledge and core skills are most valued. It also helps to redefine the function of basic education in China and help to rectify the disturbances in the current school education and provide powerful theoretical support for the renovation of these disorders. Curriculum is a way of diffusing a country's educational and governmental will， and the details often reflect what is valued in a country's education. In describing the curricular goals of Physics Curriculum Standards for Senior High Schools (2017), the following values are introduced:

"(students should be able to) identify the nature of science; curate a sense of curiosity and thirst for knowledge and physics research; proactively collaborate with others, show respect, and voice their own opinions based on evidence and logic; pursue truth instead of authoritative opinions; care about worldwide statuses and trends in technology; be familiar with the code of ethics in physics research and results application; understand the relationship amongst science, technology, society and environment; take responsibility for environment protection, resource saving, and sustainability development" (p. 7).

First of all, there is a growing demand for individual values and beliefs. The frequency of this requirement has increased based on the analysis, and become more specific (e.g., voice their own opinions based on evidence and logic; pursue truth instead of authoritative opinions). Also, some researchers insist that "curricular goals should strive to minimize the negative impact of traditional culture, while also promoting its positive value with contemporary significance." As one of the most important virtues in Chinese history, respect is first set as a course goal, which transcends the moral values of the individual and is valued at any stage of history. Finally, Chinese students have been notoriously known as lacking critical thinking skills and spirit of individualism, tending to follow suits, and thinking without reasoning and argumentative ability. The purpose of the reform has clearly targeted at these problems, with a view to promoting the development of quality education and the cultivation of students' comprehensive quality.

According to the statistical classification and method in the first part of this article, the statistics are classified and compared with the statistical results in 2003. The results are shown in Table 3.

Table 3 Comparison and analysis of the value orientations of the two kinds of curriculum standards

Years	**Individual-being**			**Social-being**			**The ratio of Individual**
	Adaption	**Transcende**	**tot**	**Contro**	**Negotiation**	**total**	

			nce		al	l					-being %
	freq.	ratio %	freq.	ratio %		fre q.	ratio %	freq.	ratio %		
2003	3	50.0	3	50.0	6	2	40.0	3	60.0	5	54.5
2017	4	57.1	3	42.9	7	2	40.0	3	60.0	5	58.3

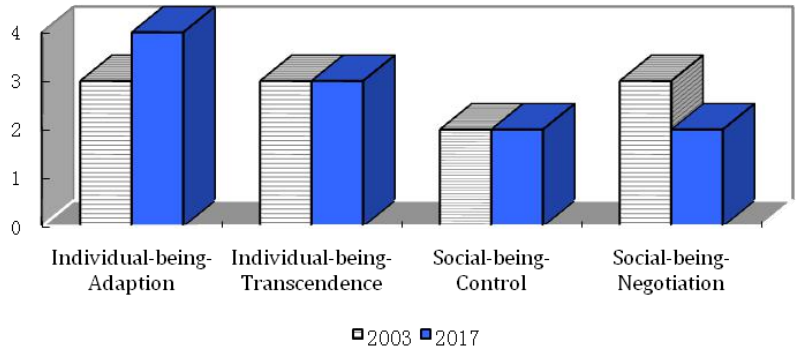

Figure 5 Histogram of Value in 2014 and 2017

Deal with the above data, the result is shown in Figure 5. From the statistics above, we can see that the 2017 draft has made some important changes in the following aspects:

Firstly, there is a growing demand for individual values and beliefs. (1) The frequency of this requirement has increased based on the analysis, and become more specific (e.g., voice their own opinions based on evidence and logic; pursue truth instead of authoritative opinions；respect for others, etc.). (2) Some researchers (Xue & Wang, 2013) stated that "curricular objectives should strive to minimize the negative impact of traditional culture, while also promoting its positive value that bear contemporary meaning." As one of the most important virtues in Chinese history, respect is first set as a course goal, which transcends the moral values of the individual and is valued at any stage of history. Although this is a welcome change, but, as you know, there are more excellent and realistic traditional values which have been mentioned above , such as Harmony Between the Heaven and Human，Dao Emulates Nature，People Live in Harmony with Nature，Respect for Nature and Humanity, are not emphasized. (3) Chinese students have been notoriously known as lacking critical thinking skills and spirit of individualism, tending to follow suits, and thinking without reasoning and argumentative ability. The purpose of the reform has clearly targeted at these problems, with a view to promoting the development of quality education and the cultivation of students' comprehensive quality.

Secondly, the great changes have taken place in Social-being-control orientation. (1) Patriotism, Collectivism, Internationalism and Dialectical Materialism which have always been emphasized in the past are no longer required, instead of fostering the students' international vision, "concerned about the present situation and development trend of science and technology development at home and abroad", It is a clear indication that the Chinese government and the Ministry of Education have changed their infiltration strategy on the value of Social-being's control orientation in curriculum. (2) A new control orientation, namely "scientific ethics and ethical norms", appears in curriculum goals historically. The reason may be that in recent years, China's research in biotechnology, genetic engineering, cloning technology, which is deeply involved with scientific and ethical aspects, has entered advanced ranks of the world. But at the same time, a large number of violations of academic ethics have frequently been exposed, such as plagiarism, data fraud, multiple publication etc.. Therefore, although scientific ethics and moral norms are essentially a control orientation, it is undoubtedly necessary because their nature is a universal value orientation. It is very timely and necessary to instill and reinforce basic scientific ethics and moral norms in advance for large numbers of students in Chinese

university as candidates for future scientists, and it will help promote the continued contribution of Chinese scientists to the development of world science in the future.

Thirdly, Social-being of transcendence orientation, for the first time, it emphasizes the Science - Technology - Society - Environment (STSE). Originally, it should be an inevitable trend to emphasize the Science -Technology -Society (STS), which is generally recognized by the academic circle. But in the curriculum goals of 2017, the Science - Technology - Society - Environment (STSE) was introduced directly, and if we do not consider the existence of the theoretical problem (For example, the S in STS actually contains the environment), environment and science, technology and society are given equal status, which reflects the environmental problems caused by science and technology all over the world. Especially in the current China, environmental problems have become an important factor that restricts the social and economic development. It fully shows that people pay more attention to the environmental problems brought about by science and technology. Therefore, it is of great practical significance to strengthen this goal in the physics curriculum. It will strengthen the relationship between science, technology and the environment from the school curriculum, so that students can form a good attitude and awareness towards the environment.

In short, in order to survive any society must focus on the center of keeping its system intact and instill its ideas and values into every member of the society. As long as social members are sufficiently consistent, society can survive steadily. It is in this sense that the school curriculum is the main way and means to achieve its goal successfully. Therefore, it is reasonable to strengthen the control of students in some aspects by physics curriculum. But at the same time, there are also some important questions we should to think about: in such a variety of social and cultural development, the gradual improvement of democracy, and the gradual opening of people's ideological consciousness, what proportion should the Individual-being value orientation and Social-being value orientation in the course coordinate? What are the basic details that should be included in the breakdown of adaptive and transcendental orientations in Individual-being, and control and negotiation orientations in Social-being? How can the excellent value orientation of national cultural tradition permeate the curriculum goals? All of these questions are worthy of further study.

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