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Contents

Research on Cultivation of Legal Service Talents on Foreign-Related Matters in China

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Abstract

Taking the re-trial application of Sun Yang's case in 2020 as the introduction, the paper raises a common problem, namely, the lack of Chinese voices in the field of rule of law in foreign-related matters, and the cause of this problem is the lack of high-level foreign-related legal service talents in China. The paper analyzes the core challenges facing the cultivation of foreign-related legal service talents in China in terms of foreign-related knowledge structure and ability in foreign language application, and examines the model of cultivating foreign-related legal service talents in top law schools in Japan, Europe and the United States, on which basis, it explores the path of cultivating foreign-related legal service talents in China.

Keywords: Rule of law in foreign-related matters; Cultivation of talents; Model; Path

1 Problem Statement

On February 28, 2020, the Court of Arbitration for Sport (CAS) has ruled that Sun Yang[1] has been banned from competition for eight years for his violation of relevant provisions as incorporated in *FINA Doping Control Rules*. After that, Sun Yang and his team appealed the verdict to the Swiss Federal Tribunal for the re-trial of the arbitration case. After the first arbitration award has been made, Sun Yang party found that Franco Frattini, the President of the Arbitral Panel, posted inappropriate comments on Chinese canine issues in his tweets in 2018 and 2019. Therefore, Sun Yang party alleged that the President of the Arbitral Panel had been biased and applied for the re-trial. The decision made by Swiss Federal Tribunal[2] listed seven tweets by the President of the Arbitral Panel, in which he made offensive comments towards China and Chinese people through the use of violent expressions, such as "sadic", "yellow-face" and "monster". Swiss Federal Tribunal finally held that it is objectively reasonable that Sun Yang was concerned about bias of the arbitrator involved, since the term "yellow face" was used against Chinese people. Therefore, on December 22, 2020, Swiss Federal Tribunal overturned the verdict and upheld a revision application filed by Sun Yang.

The above example exposed a common problem, namely, the lack of Chinese voices in the field of rule of law in foreign-related matters. CAS, which presided over the Sun Yang case, has a total of 348 arbitrators, only six (6) of whom are Chinese, while thirty (30) are American, twenty-four (24) are British, five (5) are Japanese and five (5) are Singaporean[3]. Compared with the total population in China, the number of Chinese arbitrators working for international arbitration authorities is relatively small, and in Sun Yang case, there were no Chinese arbitrators in the Arbitral Tribunals constituted in either arbitration. Beyond all question, exporting Chinese legal service talents is of great urgency and importance. However, at present, the lack of talents in the field of rule of law in foreign-related matters remains to be salient in China. The *Opinions on Developing the Foreign-Related Legal Service Industry* issued by the Ministry of Justice, the Ministry of Foreign Affairs, the Ministry of Commerce and the Legi-

slative Affairs Office of the State Council on December 30, 2016[4] has mentioned that there are still some challenges and difficulties faced by the foreign-related legal service industry, one of which is that high-quality foreign-related legal service talents are scarce in China. According to incomplete statistics, currently, only a few of legal service talents in China, about 1%, are able to engage in foreign-related legal practice[5]. Such talent scarcity is aggravated by the outbreak of Covid-19 Pandemic in January 2020.

Firstly, activities such as studying abroad have been shocked to some extent, which will have an impact on the supply of foreign-related legal service talents. Recently, QS (Quacquarelli Symonds) has issued the White Paper on How Covid-19 *Is Impacting Prospective International Students Across the Globe*. As major colleges and universities faced difficulties in recruiting international students during Covid-19, the QS global survey focused on more than 30,000 prospective international students from China, the European Union, India and North America worldwide. When being asked whether their plans about studying abroad were affected by Covid-19, more than half of them answered in the affirmative, with the highest percentage of Chinese students (66%) answering they were affected[6]. Although the pandemic has been controlled in most countries, since there is still the risk of recurrence, the policies of entry-exit management and studying abroad in each country may be tightened. The number of students going abroad also dropped in 2003 when SARS occurred, but two years later, the number of students studying abroad increased year by year. However, Covid-19 is much more serious than SARS in terms of both durability and controllability, so it cannot be simply assumed that the impact of Covid-19 on the number of students going abroad will only last for a short period of time. At present, many higher education institutions abroad support online teaching, but according to *How COVID-19 is Impacting Prospective International Students at Different Study Levels* issued by QS in October, 2020, 43% of 6958 students from 173 countries who plans to study abroad in the future hope to enjoy the face-to-face teaching[7]. Therefore, the proportion of students study aboard may further decline in connection with the concerns about unpredictable policies, travel restrictions and problems caused by online teaching under the pandemic in foreign countries.

Secondly, affected by Covid-19, international trade friction has been aggravated, while new opportunities have also been created, both of which increase the demand for foreign-related legal service talents. Since the outbreak of Covid-19, the probabilities of disputes have risen due to the gradually increasing uncertainties in international trade. For example, the price of international bulk goods, such as grain and crude oil, fluctuates drastically[8], increasing the risk of default; or ports in various countries are controlled and vessels are unable to dock, resulting in delayed delivery by the Seller. The participation of foreign-related lawyers, arbitrators and mediators is needed to avoid such risks and reduce the losses of imported and exported enterprises in China, so as to provide legal services for Chinese enterprises to go global under the pandemic. In addition, despite a series of trade protection measures taken by the United States and other countries during the pandemic, China-ASEAN trade continued to develop well. From January to August in 2020, China-ASEAN trade totaled US$416.55 billion, up by 3.8% year on year. ASEAN surpassed the United States and the EU to become China's largest trading partner[9]. China and ASEAN are geographically closer, and when the Covid-19 broke out, some goods could not be produced since the global supply chains of each country were greatly affected and failed to deliver goods in time. Therefore, in the post-pandemic era,

supply chain localization is inevitable. Meanwhile, owing to the signing of the *Regional Comprehensive Economic Partnership (RCEP)* on November 15, 2020, the closer trade tie between China and ASEAN, together with the Belt and Road Initiative, gives full play to geographical advantage and promotes the exchanges between China and its neighboring countries. Accordingly, the demand for foreign-related legal service talents who are familiar with the language, business, culture, society and law of ASEAN and other countries along the Belt and Road will further increase.

It shows that it is imperative to cultivate foreign-related legal service talents with Chinese background and knowledge of Chinese and international laws to raise China's voice and influence in international legal affairs and safeguard the rights and interests of Chinese citizens overseas.

2 Reasons for the Lack of Foreign-Related Legal Service Talents

The demand for foreign-related legal service talents in China is growing, but the supply is far from keeping up with it. Taking foreign lawyers as an example, by the end of 2020, there have been more than 522,000 legal practitioners in China[10], with Beijing and Shanghai accounting for the largest number of lawyers. In 2018, the Ministry of Justice issued a notice on the decision of establishing Foreign-Related Lawyer Talent Pools at national and provincial (regional, municipal) levels[11]. On 15 October 2020, the Beijing Lawyers Association announced the *List of Members of Foreign-related Lawyer Pool of Beijing Lawyers Association*, and 742 lawyers were successfully selected into the talent pool. While the *China Pilot Free Trade Zone Development Report (2020)* issued by Chinese Academy of International Trade and Economic Cooperation on December 14,2020 showed that about 319,000 enterprises were newly established in the eighteen (18) pilot free trade zones in 2019[12]. Not only the number of foreign-related lawyers is insufficient to support the volume of foreign trade development in China, but the proportion of people serving in international organizations is also far below expectations. For example, although China is now the second largest contributor to the UN regular budget and peacekeeping budget, according to statistics, Chinese employees currently accounts for only 1.12% of the employees in the UN system, ranking the 11th behind the Philippines, India, Russia and other countries[13].

Over the years, as China has carried out reform and opening-up policies, forged ahead the Belt and Road Initiative steadily and promoted the building of a community with a shared future for mankind, more and more Chinese citizens are able to go abroad to participate in international economic and cultural exchanges. Whether in providing legal services for Chinese citizens, reducing legal risks faced by Chinese enterprises in international trades, or enabling China to actively engage in the formulation of international rules, the cultivation of legal service talents is indispensable. In some influential cases that happened to Chinese citizens and against Chinese sovereignty in recent years, China's voice in international legal affairs is still not loud enough, the author believes that the following reasons can account for this phenomenon.

2.1 The Lack of Ability in Foreign Language Application

Although English education in China has developed considerably, students are rarely exposed to legal English in

primary and secondary education due to many special features of legal English compared with general English. Even if legal English courses are offered at the undergraduate level, the effect is not ideal on the grounds that the courses mostly last for one semester only and students are assessed by on-campus examinations without the opportunity for practical application.

In recent years, many colleges and universities have made beneficial attempts to combine translation with the discipline of law and offer legal translation major or translation major oriented in legal translation. According to the college enrollment information in 2021, eight (8) universities[14] in China have offered Master of Translation and Interpretation (MTI, specialized in legal translation), including a few colleges and universities of political science and law. However, the courses offered to MTI (oriented in legal translation) students are mainly related to translation and foreign languages, and most of the students enrolled do not major in law at the undergraduate level, lacking relevant background in law studies. Therefore, such courses are more likely to improve students' ability in foreign language. At the same time, most curricula of first-level disciplines of law offered to the students majoring in translation (oriented in legal translation) are domestic commercial law, criminal law and procedural law, with few courses on international law or national law. However, as a foreign-related legal service talent, it is far more enough to be only familiar with the relevant Chinese legal system.

It is not easy to apply English proficiently to the field of rule of law in foreign-related matters. However, as China gradually makes use of its geographical advantage in the post-pandemic era and its exchange with Southeast Asian countries and those along the routes of the Belt and Road Initiative has further deepened, greater demands on the mastery of languages other than English are made in China. According to the statistics released by the Ministry of Commerce in June this year, from January to April in 2021, non-financial direct investment by Chinese enterprises in 56 countries along the Belt and Road amounted to RMB38.7 billion, up by 5.7% year-on-year, 1.8 percentage points higher than last year. The investment mainly flowed to countries such as Singapore, Indonesia, Vietnam, Malaysia, Laos, United Arab Emirates, Kazakhstan, Pakistan, Cambodia and Bangladesh, etc[15]. It can be seen that despite the gloom of the pandemic, the economic exchanges between China and the countries along the Belt and Road remains very heated, and the official languages of these countries include Indonesian, Vietnamese, Laotian, Arabic, Russian, Kazakh and many other minority languages. However, at present, few colleges and universities in China offer majors in minority languages, even if they do, they fail to combine them with the discipline of law. Therefore, students only master the language ability but lack the law-related knowledge after all.

In addition to the field of foreign trade, many positions in international organizations require the ability to speak a language other than English. For example, many positions at the United Nations require the ability to have a good command of French, Arabic, Russian or Spanish as a working language apart from English.

It seems a good sign that many students with undergraduate degrees in foreign languages apply for the LL.M Program (non-law graduates)[16]. However, the courses of such Program are mainly about law, and almost no constructive plan for the improvement of foreign languages is made. In this way, students not only lack the time and

energy to exercise their language abilities at the graduate level, but also miss the opportunity to really apply their language advantages in the field of rule of law in foreign-related matters[17].

2.2 Unbalanced Foreign-Related Knowledge Structure

Knowledge mentioned here include both legal knowledge and other knowledge that affects the role of Chinese legal service talents in foreign-related matters. To safeguard the interests of China, Chinese enterprises and citizens in the international community or trade, foreign-related legal service talents should have an understanding of international relations and the politics, history and culture of different countries, in addition to laws and rules of other countries and the international community.

In terms of legal knowledge, rule of law in foreign-related matters always involves many aspects. Taking outbound investment as example, an outbound investment business involves knowledge of finance, intellectual property, labor relations, environmental protection, exchange rate, cross-border equity merger, formation of legal persons or branches abroad, anti-commercial bribery, anti-corruption; in the event of a dispute, the application of international conventions and treaties, authority having jurisdiction, the applicable law, arbitration regulations, foreign procedural law and other elements is also involved. In addition, when China negotiates multilateral agreements on economic and trade cooperation with other countries, even the procedural and substantive laws of several countries are concerned, which requires a more comprehensive knowledge of the relevant personnel. At present, when training foreign-related legal service talents at the undergraduate level in China, the main method is to offer courses related to international law for students, but the domestic legal system of a specific country is not taught in international law, i.e. no course related to national law is offered. In this way, talents in international law may be eligible to serve in dispute settlement between countries, such as WTO dispute settlement, anti-monopoly, anti-dumping, anti-subsidy and guarantee measures, but in international trade, especially in trade transactions that have reached an agreement on the application of the laws in other countries, there is still a lack of capability.

In terms of non-legal knowledge, countries are varied in politics, economy, society, and culture, and these factors also have an impact on rule of law in foreign-related matters. Mr. Yang Liangyi, once introduced an arbitration case where he and two retired London judges were the arbitrators. Two parties involved in the case were a Chinese representative, who went to a European country and signed a document during his stay and a European company. The issue in this dispute was whether the parties had agreed on the sale of six newly-built bulk carriers. The European party insisted that the parties had signed the document and had reached an agreement. In cross examination, the Chinese witness explained, "I had to sign a document to justify the trip to Europe to my superior and state authorities." Mr. Yang Liangyi could fully understand the Chinese representative's argument, but the other two arbitrators of the arbitral tribunal could not understand this statement at all. The award drafted by the arbitral tribunal decided that the Chinese party (or the shipyard) fails. After repeated deliberation, however, the three arbitrators agreed that the Chinese party prevails and the agreement is not established[18]. In this case, if none of the three arbitrators knows about the relationship between state-owned enterprises and the government in China and the their ways to conduct matters, possibility, the final award is made against the Chinese party, which is not arouse

from the diverge of the application of laws, but can be attributed to the problem of fact findings caused by different manners to conduct matters and social cultures between different countries. One of the important purposes of cultivating foreign-related legal service talents in China, settling legal disputes and raising China' voice in the international community is to promote the mutual understanding between China and other countries and avoid unnecessary misunderstandings in pursuit of cooperation and mutual benefits. At present, however, in cultivating foreign-related legal service talents in China, the lack of education in politics, economy, society and culture of other countries as well as practice opportunities remains to be a problem.

3 Foreign Experience in Cultivation of Foreign-Related Legal Service Talents

3.1 Japan

1) School of Law at Waseda University

Some Japanese universities place great emphasis on foreign language and culture education for law students at the undergraduate level. For example, the School of Law at Waseda University believes that learning a foreign language enables students to know about the diversity of cultures worldwide, gain insight into the differences between themselves and others, and understand each other. Since 2013, the School of Law has insisted on the principle that language education and legal education are the two cornerstones of the School, on which basis curricula have been set up in order to cultivate outstanding legal service talents who can understand cultures in other countries and adapt to the globalization.

In terms of the curriculum, first-year students must choose two foreign languages from English, French, German, Chinese, Spanish, Russian, and Korean, and are required to continue their studies for one to two academic years.

It is important to note that students are encouraged to make choices about their future careers from the time of their enrollment in the School of Law at Waseda University. In its *Academic Guide 2021*[19], students' future career paths are divided into three categories, and a curriculum selection model is designed for each path to guide students in selecting the curricula that will be of most benefit to them in pursuing their desired careers. The first category is for students who desire to become lawyers, judges, or prosecutors; the second category is for students who would like to work in companies or engage in foreign-related legal affairs; and the third category is for students who aim at serving as local, national, or international civil servants. After defining the main study field, the *Guide*, according to area studies and humanities, also divides several study fields of academic minors, including English-speaking Area Studies, German-speaking Area Studies, French-speaking Area Studies, Chinese-speaking Area Studies, Spanish-speaking Area Studies, Political Science Research, Economics Research and Commercial Studies. Students will be issued a "Certificate of Minor Major" on the completion of the required credits for an academic minor program[20].

For example, in German-Speaking Area Studies, curricula, including Introduction to German Criminal Law, Introduction to German Public Law, Introduction to German Private Law, Introduction to German Civil Law, Sociology, Western History, Philosophy, and Literature are offered by the School of Law, while the curricula offered by European Education Center include German Teleconferencing, Exploration of Environmental Awareness

in Germany, German Culture and Society, German Literature and Realism, and Studying History in German, etc.

Even for students who do not intend to gain a "Certificate of Minor Major", they are still required to study subjects in relation to global culture, art, philosophy, thought, history, etc., in addition to studying legal knowledge. According to the latest requirement in 2021, law students must choose at least seven of these curricula for 14 credits, while students who wish to gain a "Certificate of Completion of the Minor" are required to earn 16 credits. These courses, jointly created by the School of Humanities and Social Science, the School of Political Science and Economics, and the School of Business, help students gain an in-depth understanding of social systems and life in a certain linguistic circle, based on two compulsory foreign languages study other than legal knowledge[21].

2) Faculty of Law and Graduate School for Law and Politics at the University of Tokyo

Undergraduate education at the University of Tokyo is unique in that it adopts the strategy of "Late Specialization and Early Exposure Strategies"[22] for the purpose of cultivating students with broad horizons and comprehensive basic capabilities, on which basis, it fosters highly specialized talents. Undergraduates do not choose their majors during the first two years of their enrollment, but are integrated into the College of Arts and Sciences, and only in the third year do they choose their majors. Newly enrolled students are divided into Arts I, II, and III and Science I, II, and III, with Arts I students focusing on law and politics and Arts II students focusing on economics, learning about the relevant social sciences, humanities, and natural sciences.

The courses in the first two years of the College of Arts and Sciences are further divided into Junior Division and Senior Division. The University places great emphasis on foreign language education in Senior Division in order to improve the ability of the mentioned six categories of students to understand and assimilate foreign cultures. In addition to English, students of liberal arts and sciences must choose a second foreign language (German, French, Chinese, Russian, Spanish, Korean, or Italian) as a compulsory subject[23].

In terms of English study, the University attaches importance to academic reading, translation and communication skills in English. The ALESS (Active Learning of English for Science Students) Program - established in 2008 for first-year science students- and the ALESA (Active Learning of English for Students of the Arts) Program - launched in 2013 for first-year arts students - seek to realize the objective that students can develop essential skills for writing academic papers and participating in international conferences, including how to express opinions and engage in questions and answers in English, in addition to the ability to write and communicate in English. First-year students must choose one semester to complete the courses required by the program and receive credits. These classes are all taught in small groups (of about 15 students), and a collection is compiled of student papers written in English in each semester. FLOW (Fluency-Oriented Workshop) is another program created by the University of Tokyo to improve the English ability of first-year students, all of whom are required to attend all of the classes over a seven-week period. The class uses English as the language of instruction, and its main goal is to enable students to apply English in academic discussions and other oral expressions[24].

In addition to the emphasis on language learning, the University of Tokyo also places great importance on students' study of interdisciplinary and boundary-crossing knowledge.

Senior Division courses offered by the College of Arts and Sciences for arts students include three main themes, i.e. "Interdisciplinary Cultural Sciences", "Area Studies", and "Interdisciplinary Social Sciences". Students in senior division need to choose the topic they are interested in and different study paths are set under the topic. The University has designed eighteen (18) study paths for students, each of which requires different courses. The Department of Interdisciplinary Cultural Studies, which transcend boundaries, focuses on courses related to the dynamic interaction between human culture and language, including courses in Cultural Anthropology, Comparative Literature and Arts, Contemporary Thought and Philosophy and Interdisciplinary Language Sciences. The Department of Area Studies conducts researches on the several areas in the world, and introduces the current cutting-edge research achievements of multiple disciplines in each region, including Italian Area Studies, French Area Studies, North African Area Studies, and Latin American Area Studies, etc. The Department of Interdisciplinary Social Sciences accepts only about 35 students per year and consists of two courses: Interdisciplinary Social Sciences and International Relations. "Interdisciplinary Social Sciences" helps students unravel a variety of social phenomena in a comprehensive way through teaching students multiple fields of social sciences. Students who choose "International Relations" mainly study the complex relation between countries in the world, international law, international political science, international economy, and study international society from multiple perspectives under the background of globalization[25].

Upon the completion the first two years of study, students who choose law as their major are officially admitted to the Faculty of Law in the third academic year. From the beginning, the Faculty of Law has set up three courses in accordance with the students' future career path, i.e. General Legal Studies, Legal Profession, and Political Science. The course of General Legal Studies is for students who wish to pursue a comprehensive study of law; the course of Legal Profession is for students who aspire to work as judges, prosecutors and corporate lawyers; and the course of Political Science is for students who desire to join in the central government, local government and other administrative fields. The compulsory subjects and the optional subjects of the three courses are different. The University also offers the "International Trade Legal Affairs" program for students who choose the General Legal Studies. In addition to the compulsory subjects of Intellectual Property Law, International Private Law, Asian Business Law, and International Business Law, students participating in the program must take and complete at least two credits from courses related to English and American law, French law, Italian law, and Chinese law, and they will be awarded a certificate upon completion of the corresponding courses [26].

The cultivation model of the University of Tokyo is characterized by its emphasis on foreign language study, nation-specific education, liberal arts education, career-oriented curriculum, and subdivision of courses, which helps students acquire a comprehensive knowledge of humanities and social sciences, foreign language application skills, and country-specific knowledge, and cultivates foreign-related legal service talents who can adapt to the needs of different fields. For example, if a student wishes to engage in international trade between Japan and Italy,

he or she may choose to study Italian in the first and second academic years and choose the "Italian Area Studies" in the later years of the program. When entering the Faculty of Law in the third academic year, he or she may choose the integrated law route and participate in the "International Trade Legal Affairs" program.

In fact, in addition to Waseda University and the University of Tokyo, many law schools in Japanese universities, including Hosei University, Nihon University, Kyoto University and Meiji University, have adopted this structure of future career-oriented course selection, in which students choose different curricula to study depending on their career directions. These universities have witnessed the inexorable trend of globalization in the world and offered specialized courses in area studies for students to learn about the laws, cultures, and social systems of different countries. In addition to law, students have to learn a lot of other knowledge of humanities and social sciences, such as political science, linguistics, international relations, literature, philosophy, economics, etc. As the case cited by Mr. Yang Liangyi shows that these fields are closely related to law and should never be ignored in the cultivation of foreign-related legal service talents[27].

3.2 Europe

Leiden University in the Netherlands is one of the most prestigious universities in Europe, with its Law School ranked 24th in the 2020 Times Higher Education World University Rankings by subject of law[28]. In Leiden University, legal education at the undergraduate and master levels also reflects the same philosophy of curriculum division. The LL.B. (Bachelor of Laws) program at Leiden University offers a wide range of specializations, including Law-Economics, International Business Law, Entrepreneurship and Management, Tax law, etc. The LL.M. (Master of Laws) program offers a wide range of specializations, including a number of foreign-related areas, such as Air and Space Law, European and International Business Law, European and International Human Rights Law, International Children's Rights, International Dispute Settlement and Arbitration, International Criminal Law and Peace, Justice and Development (this specialization teaches students about the mechanisms for international social governance, the achievement of international social justice and human rights guarantees, including Human Rights Law, Investment Law, Dispute Settlement Law, Sustainable Development Law and other courses related to this area). Of the twenty-four (24) specializations set up by the Law School for the LL.M., eleven (11) of them focus on issues in the international field[29].

Other top law schools in Europe also pay great attention to the cultivation of foreign-related legal service talents. The LL.M. program at the University of Munich in Germany has only two specializations available, one in German Law and the other in European and International Economic Law, which requires students to take courses in Comparative law, Introduction to French Law and Introduction to Anglo-American Law in addition to Public International Law, Private International Law and European Law[30]. The LLM program at KU Leuven in Belgium also offers only two specializations, one in International and European Business Law and the other in International and European Public Law, with courses in China and International Political Science, Chinese Law in a European perspective, Advanced Negotiation, Introduction to Non-European Legal Systems, and Law and Anthropology, in addition to the traditional courses in Public International Law and International Economic Law[31]. It is thus clear that

law schools in European universities require students to study international laws as well as domestic laws of different countries.

3.3 The United States

While law schools in Japanese universities mainly teach students about the rule of law in foreign-related matters through lectures, universities in the U.S. seem to be more inclined to help students understand the rule of law, society, and customs of other countries through practice, thereby cultivating students with a global perspective.

1) Harvard Law School

Harvard Law School offers more than 100 courses, seminars and reading groups in which international, comparative, or foreign law plays an important role in the 2021-2022 academic year. Juris Doctor (J.D.) students studying at Harvard University are required to take at least one of these courses. In addition to the general curriculum, there are 23 In-House Clinics on Harvard University campus, where students work with professors or lecturers to help solve real cases and discuss topical events from around the world[32]. For example, the instructors and students of the International Human Rights Clinic conducted a study on the situation of Brazilian prisons. The instructors and students went to Anibal Bruno, one of the largest prisons in Brazil and interviewed incarcerated inmates[33]. Two students from the Harvard Negotiation and Mediation Clinical Program traveled to Bhutan in 2016 to survey and evaluate its traditional dispute resolution system. As of 2016, Bhutan does not have a law school, so most disputes are resolved by traditional dispute resolvers (often referred to as "mediators"), and with the upcoming opening of Bhutan's first law school in 2017, two students conducted research on how to combine legal approaches with traditional means to resolve disputes[34].

In addition to In-House Clinics on campus, Harvard University offers a number of special programs, including student exchange programs with foreign universities and other special programs, such as sponsoring a three-week research trip abroad during the winter semester to help students learn and experience first-hand the foreign legal culture. The Winter Term International Travel Grant Program, for instance, have enabled students to travel around the world to study local customs, policies, and institutions, such as conducting research on Japan's agricultural trade policy, examining antiquities trafficking in Guatemala, and evaluating Laos' environmental laws in relation to hydropower projects[35].

Harvard Law School is home to more than 25 research programs and centers, many of which aim to conduct researches on issues, events, legal systems and other aspects related to the world or a particular region or country, such as "East Asian Legal Studies", "Human Rights Program", "Program on Law and Society in the Muslim World", etc. Most research institutes, funded and run by grants from community stakeholders, organizations, or members of the institute itself, have their own research fields, and provide program funds for Harvard students to conduct relevant research. The Institute for Global Law & Policy at Harvard University, for example, is dedicated to the study of international policy and provides an innovative platform for addressing international issues such as inequality and poverty. Since 2011, the Institute has offered a "Collaborative Research Grant" program in which t-

wo or more students can form a team and apply for a program grant. The application package includes an introduction to the research project, a CV of the applicant, and a budget form. Upon approval, each team can receive a grant of $500-$5,000 per year for research on a topic related to global law and policy. Research topics funded in previous years include "Legal Education in Public International Law: Re-examining the Latin American Experience", "Critical Reflections on International Criminal Law", etc[36].

2) Yale Law School

Yale Law School also offers a number of hands-on opportunities for students interested in foreign-related legal systems and international issues. For example, students are sponsored to travel internationally for research purposes during winter or summer breaks (International Research Travel Policy), and once the application is approved, students travel to other countries with a faculty member to conduct research in the form of field interviews, surveys, and collection of local literature.

During 2019-2020, some students traveled to Addis Ababa, Ethiopia to conduct research on the enforcement of the New Refugee Law in Addis Ababa, which was adopted by Ethiopia on January 17, 2019; some students traveled to the Netherlands and Denmark to study the criminal justice reform systems in both countries; and some students traveled to Shanghai to study how Chinese lawyers participate in China's consistently expanding outbound investment and infrastructure projects under the Belt and Road Initiative[37].

In addition to the International Research Travel program, similar to Harvard University, Yale University is home to a number of research centers and programs that focus on international legal systems, regional differences, and other "Center for Global Legal Challenges", etc[38]. The Paul Tsai China Center, for example, was founded in 1999, dedicated to studying China's legal reforms and increasing understanding of China in the United States. The Center has offices at Yale University and Peking University. Students at Yale University can conduct research on related issues through participating in the programs launched by the Center, attend weekly seminars on legal issues in China and gain opportunities to conduct field research in China in summer break[39].

Besides, Yale University also provides funding to students who would like to participate in international legal competitions, such as Philip C. Jessup International Law Moot Court Competition hosted by the International Law Students Association, Willem C. Vis International Commercial Arbitration Moot Court Competition jointly hosted by United Nations Commission On International Trade Law(UNCITRAL) and the University of Vienna, World Human Rights Moot Court Competition and other international competitions[40].

4 Analysis on the Training Path of Foreign-Related Legal Service Talents

Affected by the epidemic, overseas exchanges have been hindered, and many students' plans to go abroad for further study have also been put on hold in China. Therefore, Chinese colleges and universities take on more responsibility at the cultivation of foreign-related legal service talents in China. At present, the curriculum and major division of law schools in Chinese colleges and universities still cannot satisfy the demand of cultivating for-

eign related legal service talents. Combining the overseas experience with the actual situation in China, the author puts forward the following suggestions:

4.1 Cultivating Students' Ability in Foreign Language Application

Language is the first step to "going global". Without language, in spite of rich knowledge in head, he or she cannot express it to others. At present, most law schools in China only offer English courses at the undergraduate level. However, there are several problems in English teaching at present. First, the English textbooks for different specializations are almost uniform, and the content is mainly related to daily communication; second, English teaching focuses on students' reading and vocabulary memorization ability, and fails to propose targeted strategies for the ability in speaking and academic writing which is generally weak among Chinese students; third, English teaching is confined to books and does not provide students with enough opportunities to apply language.

First of all, English teaching in law schools should be set in light of the characteristics of the specialization itself. It is impossible to combine legal knowledge with language if uniform textbooks are used in different specializations, and the learning result will still be that law is law and English is English, as if there is no intersection of two parallel lines. Therefore, law schools should offer courses in relation to legal English and specialization, such as English for Maritime Law and English for Intellectual Property Rights Law, etc.

Secondly, English learning mainly focuses on ability in application. That means, writing and communication skills are indispensable. Colleges and universities should offer courses to improve students' academic writing skills and their ability to conduct academic discussions and communication, and may include English essay writing as the final examination of the course.

In addition to English, students should take a minor in another foreign language. There are historical reasons for the long-standing focus on teaching English in China.

With the trend of globalization and the development of the Internet, however, the exchange of countries around the world is becoming more and more convenient and close. Moreover, it is important to learn other languages as China has established ties with more and more countries thanks to the progress in reform and opening up and the "One Belt, One Road" Initiative. For example, the official working languages of the United Nations include English, French, Spanish, Russian, Arabic, and Chinese. Although English is widely spoken, it is not a global language and, as evidenced by the signing of the Regional Comprehensive Economic Partnership Agreement (RCEP) and the tortuous development of the EU-China Comprehensive Agreement on Investment (CAI), China is and will be engaging in economic, political and cultural exchanges with more countries where English is not an official language. Therefore, if law schools offer a second foreign language in addition to English as a compulsory course for students, it will greatly contribute to the cultivation of foreign-related legal service talents in China.

4.2 Improving the Knowledge Structure and Developing Career-Oriented Curricula and Specializations

In terms of the current legal education at the undergraduate level in China, the curricula still mainly focus on domestic laws and international laws, while lack humanities and social science courses in other fields. At the same time, the focus is almost exclusively on the study of international law at the expense of country law, and the orientation of student cultivation is unclear. For example, a student majoring in international economic law is required to study International Organization Law, International Criminal Law, International Investment Law, International Human Rights Law, the Maritime Law, International Intellectual Property Law, etc., but in the end, he seems to understand everything, yet is not specialized in any subject. If the student aims to engage in foreign trade legal affairs in the future, he does know a little bit of maritime commerce, but maritime commerce involves letter of credit, shipping, Customs and Administration Law of various countries, etc. The International Criminal Law and International Human Rights Law he has learned before will not be of much use, while he only has a general understanding of Maritime Law; if the student wishes to enter a foreign company engaged in foreign trade, he is unfamiliar with the laws of the country where the enterprise is located because of the lack of education in national law. The problem here is that the courses offered to students neither take their future career plans into account nor follow the logic of these plans. At present, many colleges and universities have set more specializations for students at the postgraduate level. For example, the Law School of Renmin University of China has set the specialization of International Comparative Legal Talents and International Commercial Dispute Prevention and Settlement for LL.M. Program (non-law graduates); the Law School of Peking University has set the specialization of International Business Law and International Public Law for LL.M. Program (non-law graduates); and Zhejiang University Guanghua Law School has set the specialization of Foreign-related (International Organization) Legal Affairs for LL.M. Program (non-law graduates)[41]. This is laudable. However, at the postgraduate level, the number of students is not as large as that of undergraduates, and the length of study is not as long as that of undergraduates, and such a setting is made for the LL.M. program (non-law graduates), perhaps taking into account the fact that undergraduates majoring in language have an advantage in this area. Then it would be better to start developing the language skills of law students at the undergraduate level and to refine the curriculum in a career-oriented way, instead of studying international law and foreign languages in a "two-sided" way, regardless of national law. Meanwhile, at the postgraduate level, the current specialization is not detailed enough. The author believes, for example, that the scope of Foreign-related (International Organization) Legal Affairs is too broad for the reason that here is a wide variety of international organizations, which involves various fields, including criminal, business, arbitration, international space, etc. Therefore, it is necessary to make a more detailed and specialized division of students' major fields of study at the postgraduate level.

In view of the foreign experience, the optimal approach to cultivating different types of foreign-related legal service talents consists of professionalism, liberalization and regionalization at the undergraduate level and specialization at the postgraduate level. At the undergraduate level, combined with the training model of law schools in Japan, the undergraduate curriculum of law schools needs to focus on cultivating student' literacy in humanities and social sciences in addition to law, such as philosophy, literature, history, political science and economics, so as to address the unbalanced knowledge structure, and to refine the curriculum in line with the students' future career paths and

the demand for different types of foreign-related legal service talents in China. The Opinions on Developing the Foreign-Related Legal Service Industry put forward the demand for foreign-related legal service talents in four aspects: (1) Legal services shall be provided for the "Belt and Road" Initiative and the major national development strategies; (2) Legal services shall be provided for Chinese enterprises and citizens to "go global"; (3) Legal services shall be provided for the overall picture of China's diplomatic missions; and (4) Legal services shall be provided for the work to combat transnational crimes, track criminals at large and recover ill-gotten gains. Accordingly, the curriculum of law schools can be divided into several paths: (1) corporate foreign-related lawyers and legal councils; (2) national civil servants and international civil servants; and (3) positions related to the judicial authorities. For example, students who wish to work as foreign-related lawyers and legal councils in the future will choose courses that focus on civil law, commercial law, international arbitration, etc. In turn, courses can be subdivided according to geographic areas and the students' choice of a second foreign language. For instance, in addition to the compulsory domestic law and international law courses, colleges and universities can offer students who choose German as a second foreign language a complete and comprehensive set of courses related to German law, social system, culture and arts. By means of specialized curricula and fields, Highly-specialized foreign-related legal service talents are cultivated, who can better meet the demand of different positions.

At the same time, research fields at the postgraduate level should be further divided. It is important to understand that whether students want to work for international organizations, engage in trade with other countries or provide foreign-related legal services for Chinese enterprises and citizens, foreign-related legal service talents in China are competing with talents from other countries in the world. The United Nations, for example, has countless agencies with different areas of focus, such as the United Nations Environment Programme (UNEP), the United Nations Children's Fund (UNICEF), the International Maritime Organization (IMO) and the World Intellectual Property Organization(WIPO). If students compete for a position within UNICEF, there will be a certain gap between the competitiveness of a graduate in international public law from Chinese colleges and universities and an LL.M. graduate in international children's rights from Leiden University; while if applying to work for the International Criminal Court (ICC), students majoring in international criminal law may be more competitive than those in public international law in terms of probability. Therefore, in order to cultivate the foreign-related legal talents qualified to work for the United Nations, Chinese colleges and universities should offer courses in line with students' future careers and achieve a high degree of specialization. This is also true in other fields such as foreign trade and international arbitration.

4.3 Improving the Training Mechanism for Teaching Practice

To cultivate foreign-related legal talents with global vision and international thinking, in addition to improving the knowledge structure, practice is an indispensable part. The current teaching model in China is mainly textbook-base, with examination as the means of assessment. The drawback of this model is that students tend to memorize knowledge in books in order to pass exams, while ignoring to use the knowledge in addressing new issues that arise in China, other countries, and the world. Although most schools require students to graduate with a practicum, such practicums, which often involve a few months in a domestic law firm or court, are almost exclusively practical kno-

wledge of domestic law and have little to do with foreign-related factors. Of course, law schools in China and foreign institutions offer many exchange programs and joint degree programs for students, which serve as an important way to widen students' horizons and promote legal and cultural exchanges between China and other countries. However, it is far from meeting the increasing demand for foreign-related legal service talents in China since most of the programs are limited in number of participants.

Therefore, Chinese colleges and universities should provide more opportunities for students to understand, study, and investigate issues related to other countries and the international community, either on their own or in cooperation with social organizations, in order to promote students' understanding of differences among countries and develop a global perspective.

Chinese colleges and universities should make full use of their own resources to provide students with practice opportunities. Firstly, colleges and universities should encourage student associations to organize and participate in international youth events such as Model United Nations, and motivate, through providing funds and other ways, students to participate in National and International Model United Nations and other competitions related to laws, especially international law, such as Philip C. Jessup International Law Moot Court Competition, Willem C. Vis International Commercial Arbitration Moot Court Competition, World Human Rights Moot Court Competition, International Criminal Court Moot Court Competition (ICCMCC), International Commercial Mediation Competition, etc.; secondly, Secondly, colleges and universities should develop opportunities for recommending students to obtain internships in international organizations and should continuously broaden the resources of faculty, staff, partners and alumni within and outside the university to provide direct referral channels for students to be interns in international organizations. Thirdly, colleges and universities should develop student research programs abroad and set the relevant requirements. For example, students are required to write research proposals that meet the requirements. Upon the approval, students can receive grants to go abroad to conduct field researches on law, society, economy and other issues related to such place under the guidance of faculty and produce a research report.

Colleges and universities and social organizations should jointly provide practice opportunities for students and establish research centers and programs related to international law and national law. Research centers or programs at U.S. universities are partly funded by social organizations in support of students' innovative research and the cultivation of the ability to apply their knowledge to research and solve problems beyond textbooks. An example can be found in China is the "Smart Base Project", jointly established by the Department of Higher Education of Ministry of Education and Huawei Technologies Co., Ltd. (Huawei). It is a base project that colleges and universities co-educate students with enterprises and vocational schools. The first phase covers 72 leading colleges and universities in the information field nationwide, combining Huawei's knowledge in Huawei Cloud, Kunpeng and Huawei Ascend with the information courses in colleges and universities to cultivate top talents for new computing industry innovation. Huawei will join hands with Tsinghua University Press and academic leaders from various colleges and universities to launch the learning materials and reference books of Kunpeng and Huawei Asc-

end for teachers and students in colleges and universities and developers as well as carrying out corresponding learning and research activities, such as undertaking scientific research tasks[42]. Such kind of cooperation between enterprises and vocational schools and colleges and universities, taking colleges and universities as incubation to cultivate and deliver talents for enterprises and other social organizations in the future or undertake research programs for social organizations, should be attached great importance in the cultivation of foreign-related legal service talents. Universities can cooperate with law firms, Chinese enterprises engaged in foreign trade, international organizations, NGOs and other organizations which are in urgent need of talents in international law and national law, set up research centers or programs based on the talents of law schools in colleges and universities, and carry out activities such as compiling textbooks, offering courses, selecting students to join the research centers or programs, inviting personnel from the organizations to share their experiences, running round-table discussions, providing students with internship opportunities in the partner organizations, etc.

5 Conclusion

China's opening up is faced with new situations and tasks, making the role of foreign-related legal services more prominent in comprehensively promoting the rule of law, economic and social development and the establishment of a new type of relationship between major countries. The development of foreign-related legal services depends on the cultivation of foreign-related legal service talents. In the post-pandemic era, the demand for foreign-related legal service talents has increased and will remain so in the future. Therefore, Chinese colleges and universities should take corresponding measures as soon as possible to establish a scientific and professional education system and strengthen social and international cooperation in order to deliver specialized and internationally competitive foreign-related legal service talents to safeguard the security and stability in China, raise China's voice and influence in international legal affairs and safeguard the legitimate rights and interests of Chinese citizens and legal persons overseas and those of foreign nationals and legal persons in China.

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Research on the Dynamic Integration of Diversified Educational Model in Colleges and Universities under the Background of Informationization

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Abstract

The information technology revolution and economic globalization have had a wide influence on talent training[1]. Contemporary science and technology change rapidly, the computer, the Internet, the big data, mobile communication, social media, AI intelligence and other modern information technology deeply affect people's learning and life. In the field of education, especially higher education, modern information technology is widely used, spawned diversified education means, such as MOOC, wisdom cloud platform, Internet+, to SPOC, AI intelligence, virtual teaching, etc., these diversified education model combined with traditional teaching methods, effectively promote the reform and innovation of college education. Especially COVID-19 outbreaks, education department called for "suspension", a variety of diversified education model. However, under so rapid and urgent demand, which also produced the means of confusion, such as lack of system and continuity, lack of learning effect feedback,etc.. This article tries to analyze from dynamic aspects and integration of diversified education model, makes diversified education model can be orderly and effective, produce 1 + 1> 2 effect.

Keywords: Diversified Educational Methods; Informationnization Dynamic Aspect

1 Overview

1.1 The Concept of Diversified Educational Model

On the concept of diversified educational model, the author consulted a lot of literature and did not find an accuracy definition of the word. Therefore, the author tried to define the diversified educational model mentioned in this article according to the content mentioned in this article. In fact, the diversified educational methods mentioned in this paper mainly focus on teaching modes or teaching methods, which refers to the use of two or more teaching modes or teaching methods with the participation of modern information technology. Diversified educational model can promote students' personalized and independent learning, so as to meet the needs of modern education and teaching, and cultivate more outstanding talents.

1.2 Advantage of Diversified Educational Model

Diversified educational model have many advantages, this paper mainly lists the following points:

1) *Modern Educational Technologies are Diverse,Covering Text, Image, Video and other Multimedia Means.*

Which comprehensively expands the content category and expression form of knowledge and information, vividly explains theoretical knowledge for students, and helps them to improve their awareness of complex conceptual prin-

ciples[2]. It also provides a multi-directional perspective for teaching. Strong interaction ability can not only promote students' personalized learning, but also combine students and students with internet technology; on the other hand, the editor combines his own teaching experience with the field of educational technology, with novel perspectives and rich content, which provides multiple perspective for learners to understand information teaching.

2) Break through the Space Restrictions.

With the Internet, social media and other channels, regional restrictions can be broken, and you can participate in any corner of the world, such as you can watch the Yale University open class at home. This advantage is particularly prominent during the outbreak of the COVID-19.

3) Break through the Time Limit.

With the help of information processing and other means, you can share learning resources, break the time limit, you can learn and communicate anytime and anywhere, and you can even watch and learn repeatedly.

4) Strengthen Interaction Ability.

Compared with the traditional teaching mode, information technology can realize the "one-to-one" personalized teaching, realize the "one-to-one" interaction between students and educators, which has a stronger interaction ability, and can greatly improve students' enthusiasm and participation.

5) Enrich Educational Resources.

Narrow the gap between regional education level.Internet indiscriminate teaching resource sharing allows students around the world to share quality educational resources and break the differences in educational levels in different countries or regions.

6) Promote the Innovative Development of Higher Education.

The world's higher education institutions are exploring the innovation of higher education, and the application of information technology can undoubtedly promote the reform of higher education.

1.3 Existing Model of Diversified Educational Methods
1.3.1 Model One —— Open Education Resources, such as MOOC, Smart Tree Platform, etc.
Governments attach great importance to the construction of open education resources projects, such as the launch of the Open Education Action Plan; the Chinese Ministry brings Education into the Government Policy; the United States proposes the Affordable University Textbook Act; the Canadian National Research Council and the OECD Educational Research and Innovation Center propose several sustainable development models of open education resources, and the Horizon Report (Education 2018) also put forward "key trends to promote the application of higher education technology", which includes the "proliferation of open educational resources"[3].

In order to seek the international development of higher education, top foreign universities have successively launc-

hed MOOC courses suitable for the development of their own schools. Currently, Open up Ed is rapidly emerging in Europe, as well as Iversity in Germany, Futurelearn in UK (accessible from mobile phones, tablets and computers), Open2Study in Australia (free from registration, learning to information, no invisible spending), and the rapid rise of MOOC platforms such as Coursera, Udacity, and edX.2 Figure 1 is a screenshot of the official website of edX. Figure 2 is a screenshot of the smart tree platform of the course of Maritime Law, delivered by the author of this article.
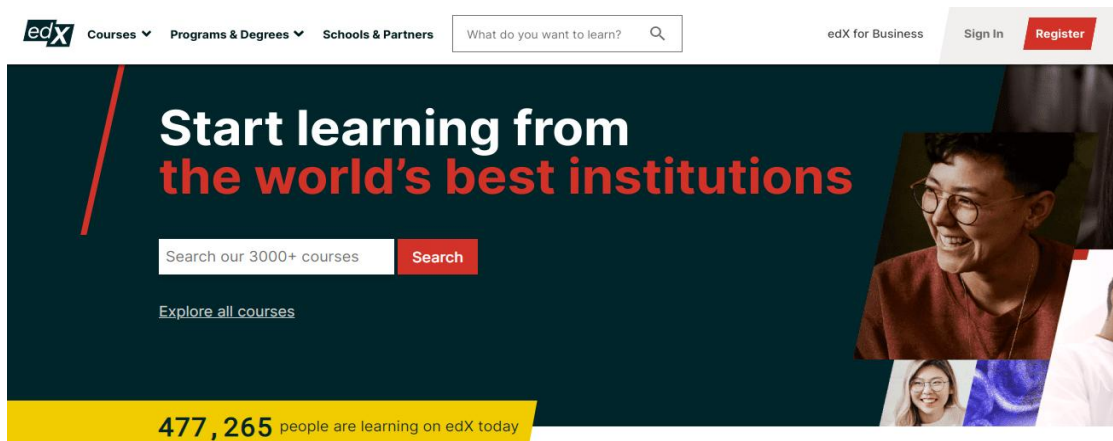
FIG 1:*The screenshot of the official website of edX(https://www.edx.org/)*

FIG 2: *A screenshot of the smart tree platform of the course of Marine Business and Marine Business Law, delivered by the author of this article. (http://coursehome.zhihuishu.com/courseHome/1000009705#teachTeam）*

On the issue of how open education resources and MOOC affect higher education all over the world, the Journal of Open Education Research has interviewed Professor Curtis Bunker in the Department of Teaching System Technology at Indiana University, who believes that "As a supplement to traditional classroom learning, learners have the experience of mixed learning. Stanford Institute meta-analysis studies on pure online learning, mixed learning, and face-to-face learning show that mixed learning is the most effective way of teaching"[5].

1.3.2 Mode Two —— Combination of Online and Offline Modes, such as Tencent Classroom, Rain Classroom, etc.

The simple online mode may make learners "confused", while the combination of online and offline mode can realize the complementary advantages of the two modes, which not only retain the traditional teaching mode of "face-to-face" teaching, but also use modern information technology to make up for the shortcomings of the traditional teaching mode. Especially COVID-19 outbreaks, schools face full closed, students cannot back to school, therefore, online teaching massive rise, teachers try various means, and adopt the way of live webcast "closed is not Suspended", when the advantage of online teaching is discovered, therefore, after the COVID-19 effectively controlled and the normal teaching gradually restored , instead of discarding the online teaching, many teachers still adopt the method of combination of online innovation his way of teaching, for example in the classroom can be released at any time through online exercises, let the students practice while learning, the background can count the results for the first time, the teacher can be a good monitor to see how this section the student master.This innovation has also achieved good teaching effects.

FIG 3   FIG 4

(Figure 3 and Figure 4 are the practice feedbacks published by the author in the course of Maritime Litigation and Arbitration in this semester.)

1.3.3 Mode Three ——Small-Scale Online Course Mode, such as SPOC, Micro-Course, etc.

The concept of Small Private Online Course (SPOC) is developed by the University of California, Berkeley. Professor Fox first put forward and used, some scholars believe that SPOC is the inheritance and development of MOOC, indeed, SPOC was the first attempt to make many problems of MOOC in practice, such as Harvard University, California, Berkeley, and even Robert Lu of Harvard University, believes that SPOC has replaced MOOC, is entering the post-MOOC era[6]. However, in fact, SPOC and MOOC are educational models of different levels. MOOC mainly focuses on the sharing of open resources, while SPOC focuses on personalized customization. SPOC is actually more similar to the "flipped classroom", that is, students take the initiative and teach students according to their aptitude.

Similar small-scale teaching is micro-courses, which are generally 5-8 minutes with teaching video, which is the co-

centration of the complete classroom. Meanwhile, some scholars have proposed SPOC+ on the basis of SPOC, which is not redundant here.

1.3.4 Mode Four ——Virtual Teaching Represented by AI Intelligence

At the 2017 UN AI Summit held in Geneva, the application of AI in the field of education can improve the quality of education and teaching and promote educational reform[7]. Because the current artificial intelligence technology is not mature, the application in the field of education is mainly auxiliary roles, such as intelligent teaching system, intelligent question and answer system, intelligent evaluation system, intelligent education decision support system, etc. But the function of artificial intelligence in education can be expected.

2 Problems Existing in the Diversified Education Model

Although diversified education model make up the lack of traditional education model, but diversified education model is not perfect. In the actual classroom teaching, there will be such problems problem: A teacher used to adopt rain classroom, B teacher like tencent meeting, C teacher and requires students to learn MOOC related courses, obviously this will cause confusion to the students' students. This paper summarizes the problems of diversified education model, mainly summarizes several aspects, elaborated in the following classification.

2.1 Pattern Selection Problem

First of all, the diversified education model lacks system and continuity. Whether MOOC or SPOC, compared with the complete course, it is always fragmented learning, many of which need to be completed in their spare time, which will lead to the lack of continuity of the course.Secondly, the platform is chaotic, and the curriculum resources lack a screening mechanism. For example, the online open courses in China, there are a total of 787 universities join in, and the platform provides thousands of courses, which puts teachers and students into confusion in the choice of work.

2.2 Mode Content Issues

Diversified education mode mainly focuses on the innovation of teaching means, and pays less attention to educational content. Therefore, the modes are diverse, but the content is always based on the theoretical learning stage, which greatly limits the application of diversified education mode.The goal of higher education is to cultivate compound talents, which should not only pay attention to the theoretical knowledge training, but also apply them to practice, and the diversified education mode lacks the attention and research on practice.

2.3 Mode Evaluation Problem

Whether it is MOOC or SPOC, there is a common problem, that is, the lack of teaching effect evaluation mechanism, such as MOOC, some courses will be issued at the end of the certificate, even if some courses will have class examination, but the examination form is simple, lack of credit management, lack of supervision mechanism, etc., can not do the real teaching effect evaluation.For another example, SPOC, even if there is teaching feedback, the feedback is also based on teachers 'subjective judgment of students' learning results, lacks a complete and dynamic feedback mechanism for teaching effects, and also lacks a feedback mechanism for this mode.

2.4 Funding Issues

Under the guidance of information technology, diversified education model can break the limit of time, space, public education resources sharing can greatly reduce the cost of education, however in the model itself requires funding, some government level, such as the EU, China, some local communities, such as the United States, but the government investment is always limited, facing so many universities, facing so many courses, government support alone is not enough, so how to solve the problem of funding, is also the problem of diversified model construction.

3 Idea of Dynamic Integration

Professor Armando Fox pointed out that MOOC impact on physical teaching in colleges and universities, and this should be the original[8]. diversified education model is released to reform college education and cultivate innovative talents, this is a good practice, but for the diversified education model problems need to be solved, this article tries to integrate diversified education model, make the diversified education model presents 1 + 1> 2 effect.

3.1 Traditional Teaching Methods should be Based On

Traditional teaching methods cannot be replaced, so the diversified education mode is based on the traditional teaching methods.

3.2 Screening Mechanism
3.2.1 Model Selection

How to choose the appropriate education model is what to be considered first. The author believes that choices should be made from class, under class, and practice. First, online teaching mode, online and offline mode, mainly for vivid display and classroom interaction of teaching resources, second, preview, review and practice, so online education mode or small-scale teaching, mainly for teaching resources sharing and discussion, and finally, the practical link of college education, including online guidance, AI simulation, etc.

3.2.2 Content Selection

On the choice of teaching content, need to combine the educators choice mode and further screening, such as online mode can choose the world excellent universities open class, if it is a micro class link, educators can independent construction content, if it is practical link, the need to educators joint enterprise to provide practical content. At the same time, because the diversified education mode advocates the continuity and lifetime of education, we should also maintain the updated and innovative education content.

3.2.3 Object Selection

Subject selection is mainly aimed at small-scale learning such as SPOC, and further screening needs to be made of educational objects, such as passing a certain kind of examination, or how many credits, and then conducting further learning after screening.

3.3 Effect Feedback Mechanism

No matter which model,content and object is been chosen, the former should eventually enter the effect feedback mechanism. If the effect does not reach the expectation, it needs to be selected or adjusted until the optimal learning

effect is achieved. This process is a dynamic and repeated process, which requires educators and learners to cooperate with each other and constantly adjust.

4 Conclusion

American psychologist Gardner in 1983 put forward the multiple intelligence theory, multiple intelligence theory clearly put forward the potential between people and diversity, multiple intelligence theory applied to teaching is pay attention to the impact of individual intelligence differences between learners on teaching, allow students to suit their own way of learning, and in their unique way to accept knowledge to form the right understanding of things.The channels and ways that people are learning knowledge and accepting new things are diverse, rather than a single model, so the way people solve problems should also be diversified.This provides a theoretical origin for the diversified education model. UNESCO headquarters in Paris through and issued the "education 2030 action framework" pointed out that "education quality, popularization, fairness, lifelong and innovation service ability", diversified education mode meets this requirement, so in the background of diversified education mode is a major trend in the world, effective dynamic integration of diversified education mode, can effectively promote the reform and innovation of college education, promote the international development of higher education.

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Textbook Evaluation and Teaching Practice under the Scope of Chinese Proficiency Grading Standards for International Chinese Language Education

——A Case Study on Integrated Chinese（4th edition）

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Abstract

This paper introduces the core contents and unique features of the newly issued Chinese Proficiency Grading Standards for International Chinese Education. To get a clearer understanding of the standard, this study evaluates Integrated Chinese (4th edition) to determine the adaptability of this textbook in terms of topics. Based on the grammar outline of this grading standard, this study also provides some possible suggestions on the teaching practice of complex grammar points. Therefore, the authors conclude that this Chinese proficiency grading standard can be regarded as guidance on the textbook compilation, teaching practice, and language proficiency tests.

Keywords: Chinese Proficiency Grading Standards; International Chinese Language Education; Textbook Evaluation; Teaching Practice; Integrated Chinese

1 Introduction

1.1 History of Chinese Proficiency Grading Standards

As the mother tongue country of the Chinese language, China started to research and formulate Chinese proficiency grading standards in the 1980s. The research process has undergone four main stages: (1)《汉语水平等级标准和等级大纲（试行）》(Chinese Proficiency Grading Standards and Outline (Trial), 1988); (2)《汉语水平等级标准与语法等级大纲》(Chinese Proficiency Grading Standards and Grammar Grading Outline, 1996); (3)《汉语国际教育用音节汉字词汇等级划分》(The Graded Chinese Syllables, Characters and Words for the Application of Teaching Chinese to the Speakers of Other Languages, 2007) (GF0015－2010); and (4)《国际中文教育中文水平等级标准》(Chinese Proficiency Grading Standards for International Chinese Language Education, 2021) (GF0025-2021). According to their publishing date, the above four grading standards are referred to as CPGS 1.0 to CPGS 4.0.

CPGS 1.0 was an important milestone in the research process of Chinese proficiency grading standards. It has established a three-dimensional system (structure-function-culture) and has formulated Chinese proficiency grading standards as well as the words and grammar contents for the first time. Based on the successful Chinese teaching experience, CPGS 2.0 set the basic proficiency grading structure of "three levels-five bands"（三级五等）: primary (band 1 and band 2), intermediate (band 3) and advanced (band 4 and band 5). The most significant impro-

vement of CPGS 2.0 was that it formulated a four-level grammar outline to make the grading standards more comprehensive and systematic. The grammar outline covered 1,168 grammar points and added three language elements as grading reference: language scope, language topic and verbal communication. In 2007, under the support of the Ministry of Education and Hanban (the Office of Chinese Language Council International), scholars had revised former grading standards and issued CPGS 3.0. The novel feature of CPGS 3.0 lies in the two aspects. First, "syllable" has been involved in the standards for the first time as a turning point of "Syllable-Chinese Character-Word" three-dimension benchmarks. Second, CPGS 3.0 has highlighted the distinguishing features of Chinese characters.

According to the data collected by the Ministry of Education in 2018, 492,185 people in 196 countries and regions studied Chinese[①]. It is noteworthy that more than half of them learn Chinese for academic purposes, with 258,122 learners accounting for 52.44% of total learners. With the development of international Chinese language education, the existing grading standards cannot meet current teaching requirements. An international guideline is needed not only in language education but also in Chinese proficiency tests. In the above context, CPGS 4.0 was formulated by the Ministry of Education and State Language Affairs Commission and officially implemented on July 1, 2021. It is the newest and most complete version of grading standards to describe and evaluate the Chinese proficiency of speakers of other foreign languages. This paper takes CPGS 4.0 as the research object. The contents and features will be listed and analyzed in the following sections.

1.2 Contents and Features of CPGS 4.0
1.2.1 Core Contents

The core content of CPGS 4.0 lies in two respects: (1) the "three levels and nine bands"（三等九级）international framework; and (2) the "four-dimension benchmarks"（四维基准）international systems and rules. First, it has divided Chinese proficiency into three levels: elementary, intermediate and advanced, and each level is further classified into three bands with specific quantitative criteria, verbal communication abilities and topics. Detailed descriptions of three levels are listed below (Liu Yinglin et al., 2021):

1) Elementary: Chinese language learners at the elementary level are able to understand simple language materials and carry out effective social communication. They can express opinions on limited topics, such as daily life, study, work and social communication, organize short paragraphs with common sentence patterns, and complete simple communication tasks. They also can use simple communication strategies to assist their daily expressions and have a preliminary understanding of Chinese culture and the essential intercultural communication competence. Primary-level learners need to learn and master 608 syllables, 900 Chinese characters (with 300 handwritten characters), 2245 words, and 210 grammar points.

2) Intermediate: Chinese language learners at the intermediate level are able to understand the general language materials of various topics and carry out social communication more smoothly. They are able to express the complex topics in daily life, work, occupation, social culture and other fields in paragraphs, use common communi-

cation strategies, and have a deeper understanding of Chinese culture and higher intercultural communication competence. Intermediate-level learners need to learn and master 908 syllables (300 new), 1,800 Chinese characters (900 new), 5,456 words (3,211 new) and 424 grammar points (214 new). The handwritten characters are 700 with 400 new.

3)Advanced: Chinese language learners at the advanced level can understand complex language materials of multiple themes and genres, conduct in-depth communication and discussion. They are able to use various communication strategies to conduct standardized and appropriate social communication on complex topics in social life and academic research with clear logic, rigid structure and coherent organization. They also have a deep understanding of Chinese culture and possess an international vision and intercultural communication competence. Advanced-level learners need to learn and master 1,110 syllables (202 new), 3,000 Chinese characters (1200 new), 11,092 words (5,636 new), 572 grammar points (148 new). The handwritten characters are 1,200 with 500 new.

Second, CPGS 4.0 describes Chinese proficiency with three evaluation dimensions: five verbal communication abilities, topics and tasks, and quantitative criteria. The quantitative criteria are formulated based on "four-dimension benchmarks."(see Table 1)

TABLE 1 QUANTITATIVE CRITERIA SUMMARY OF GRADING STANDARDS (UNIT: PCS)

Level	Band	Syllables	Characters	Words	Grammars
Elementary	Band I	269	300	500	48
	Band II	199/468	300/600	772/1272	81/129
	Band III	140/608	300/900	973/2245	81/210
Intermediate	Band IV	116/724	300/1200	1000/3245	76/286
	Band V	98/822	300/1500	1071/4316	71/357
	Band VI	86/908	300/1800	1140/5456	67/424
Advanced	Band VII-IX	202/1110	1200/3000	5356/11092	148/572
Total		**1110**	**3000**	**11092**	**572**

(Notes: In the above table, the first number indicates the addition over the previous level, and the second number represents the accumulated quantity.)

It is noteworthy that the quantitative criteria in CPGS 4.0, the "four-dimension benchmarks" of syllables, Chinese characters, words and grammars are interconnected: the syllables at each level in the syllable list can cover all the pronunciation of Chinese characters and words at the same level, and all the words in a certain level are composed

of Chinese characters of the same level. For example, there are 269 syllables, 300 characters and 500 words in the elementary level. These 500 words are all composed of these 300 characters, and these 269 syllables can pronounce all words.

Above all, the grading standard follows the principle of "sound follows the word" when formulating quantitative criteria. When grading characters, it considers the usage frequency of syllables and the distribution of phonological combinations. The grading of syllables also takes into account the usage frequency and word-formation ability of characters, which ensures that limited syllables can cover more commonly used characters as much as possible. Therefore, this connectivity within the "four-dimension benchmark" makes CPGS 4.0 more systematic and comprehensive.

1.2.2 Key Features

The most outstanding feature of CPGS 4.0 lies in constructing a new national system on Chinese proficiency, which places Chinese in the central and dominant position. Under the scope of this new framework, the "3+5" standardized approach has been proposed and settled down. "3" means verbal communication abilities, topics and tasks, and quantitative criteria. "5" means the five language skills (listening, speaking, reading, writing and translating). Chinese language learners' proficiency on the above language skills in each band is described separately. Translation skill first appears in the intermediate level, and the quantitative criteria for advanced level are not subdivided into bands. This multiple-integrated "3+5" approach is deeply rooted in the characteristics of the Chinese language and conforms to the development trend of international Chinese education.

Secondly, CPGS 4.0 has formed a close relationship with other international language proficiency standards, such as the ACTFL (*American Council on the Teaching of Foreign Languages*) Proficiency Guidelines and CEFR (*Common European Framework of References for Languages*). It has also further improved the grading standards of Chinese proficiency. In the fourth section, Integrated Chinese, a textbook compiled based on the guidance of ACTFL, will be analyzed elaborately from the perspective of CPGS 4.0.

Thirdly, among four essential language elements, grammar outline has been included in the proficiency standards and became one of the four-dimension benchmarks, which is definitely conducive to grammar teaching. Although grammar points are presented in the appendix, CPGS 4.0 attaches more importance to grammar than previous standards. Based on the frequency analysis of more than 4,000 textbooks, scholars and experts have chosen 572 core grammar points and separated them into 12 different groups, such as words, phrases, and sentence elements. The compiling principles of grammar outline are practicability and difficulty: the most practical and helpful grammar is in Level 1, and the easier ones are in lower levels. Besides, the outline also focuses on the correlation between different grammar points and puts the related ones in the same level or even the same band. The fifth section of this paper will discuss the instructional significance of this grammar grading outline for specific grammar points teaching. Some possible suggestions will also be provided for reference.

Fourthly, the separation between recognized Chinese characters and handwritten Chinese characters is groundbreaking in CPGS 4.0. One thousand and eight hundred characters are equally distributed into six bands in elementary and intermediate levels, considering the circulation of Chinese characters, writing difficulty, cultural connotation, and other factors. Additionally, 1,200 more characters are included in the advanced level without further distribution. CPGS 4.0 has proposed a new and inclusive approach that Chinese characters' recognition can be separated from its handwriting, and handwritten Chinese characters should be promoted orderly from less to more. The handwritten Chinese character list contains 1200 Chinese characters, including 900 elementary Chinese characters and 300 intermediate Chinese characters. According to the usage frequency, word-formation ability, structure characteristic and writing difficulty, these 1,200 characters are distributed into elementary, intermediate and advanced levels with 300,400, and 500 characters respectively. Therefore, it will definitely release foreign learners' study pressure, since writing Chinese characters is the biggest challenge to most of them.

Lastly, CPGS 4.0 puts forward the concept of "two 5% flexible control intervals", which are allowed at each level. Teachers can add, delete or even change 5% of the syllables, characters, words or grammar based on their teaching practice. For example, among the 300 characters in band 1 at the elementary level, teachers can replace 5% (15 characters) and keep the total number the same, or delete 5% and teach 285 characters in this band. The presence of two 5% gives teachers more flexibility, and they can redesign their teaching according to Chinese language learners' actual learning status and specific learning needs.

1.3 Integrated Chinese (IC)
1.3.1 An Introduction of IC

Integrated Chinese (IC) was first published in 1997, which taught novice and intermediate students focusing on the development and integration of the four language skills. It maintains the principle of integrating various teaching approaches, including the communicative approach, grammar-translation approach, and the direct method. Students usually complete Volumes 1 and 2 in their first year of Chinese study and Volumes 3 and 4 in the second year. The content of lessons shifts gradually from people's daily life to more abstract themes, such as up-to-date social issues. With a rapid and stable increase of users, IC has become the leading series of Chinese language learning resources in the United States and beyond. To further enrich the learning experience of IC users worldwide, Cheng & Tsui revised and updated the Fourth Edition of IC (Cheng & Tsui Editorial Board, 2018).

1.3.2 New Features of the 4th Edition

There is an 8-year gap between the publication of the third edition and the fourth one. The publisher consulted the ACTFL during its compilation of the fourth edition. Therefore, IC incorporated a variety of materials that address the 5Cs in foreign language education (communication, cultures, connections, comparisons, and communities). The adjustment of the 4th edition was also made based on the 5Cs. (Cheng & Tsui Editorial Board, 2018).

1) Communication: The 4th edition provides real-life contexts and authentic Chinese materials throughout each unit, from which contextualized teaching approach is highly valued. The context-based scenarios make it easier for students to analyze, predict and apply the language;

2) Communities: Along with the development of electronic communications, the 4th edition provides realistic social media scenarios to update students authentic e-communications among the Chinese younger generation;

3) Connection: To promote students' awareness of the linguistic interconnections among different vocabulary items and to develop their ability to expand vocabulary, the editors have designed a new exercise called A Way with Words, where students are encouraged to guess at the meaning of the new words or phrases based on the given context;

4) Comparison and Culture: The 4th edition included Compare & Contrast activities in the Cultural Literacy section to raise students' awareness of cultural diversity and intercultural competence;

5) The 4th edition continued to implement its communication-oriented approach. Furthermore, it stated clearly the purpose of each exercise according to the three modes of communication (interpersonal, interpretive, and presentational), while the previous three editions didn't do so.

2 Literature Review

Over the past few decades, Chinese has been increasingly taught and learned as a foreign or second language both in mainland China and the rest of the world. The growth of Chinese language teaching and learning has been closely related to intensive research on some critical issues concerning the teaching of Chinese to speakers of other languages (TCSOL). This section reviews important articles on Chinese language proficiency grading standards in the China National Knowledge Infrastructure (CNKI) database during the period 2017-2021. Meanwhile, two inclusion criteria were applied to select articles: (1) articles should be related to TCSOL, excluding ethnic minority education; and (2) articles should focus on Chinese language proficiency grading standards, and those related to Chinese ontology will not be reviewed.

By entering "Chinese language proficiency grading standards" in the subject box as a search string in the CNKI database, 33 articles were found, and 32 were published in 2021. It seems that the implementation of CPGS 4.0 in July, 2021 motivated many scholars to do research on this hot issue. Among these 32 papers, 20 were published on 国际汉语教学研究 (Journal of International Chinese Teaching), one of the most professional journals in the field of international Chinese language education. In the first three issues of 2021, this journal set up a special column to publish papers on CPGS 4.0. These 20 papers can be categorized into three themes: (1) introduction of the formulating process and significance of CPGS 4.0; (2) comparison between CPGS 4.0 with other language proficiency standards, namely the ACTFL Proficiency Guidelines and CEFR; and (3) detailed explanation of the content and "four-dimension benchmarks" of CPGS 4.0. Two out of the 20 articles were considered as irrelevant after reading their abstracts. Besides, only 5 of the rest 12 papers published in other journals can be included for the same reason. Thus, 23 articles were selected and analyzed.

The analysis found that Journal of International Chinese Teaching published a high proportion of introduction pap-

ers (11 out of 23, 47.8% in total) and a small number of comparison papers (5 out of 23, 21.7% in total) as well as some explanation ones (4 out of 23, 17.4% in total). Only 3 papers (13% in total) did some applied research based on CPGS 4.0. Zhang (2021) have discussed the value and the significance of CPGS 4.0 on undergraduate admission for international students in China. Kong (2021) studies distance learning on Chinese characters. Cao, Liang, and Xu (2021) conducted a study of lexical connectivity under the reference of CPGS 4.0. However, papers on how to combine CPGS 4.0 with specific textbooks, and how to apply it into teaching practice have not been discussed yet. Considering the uniqueness of CPGS 4.0, in this paper, we aim to address the following three research questions:

1) How to evaluate the difficulty and reasonability of existing textbooks (Integrated Chinese (4th edition)) based on CPGS 4.0?

2) What is the reference value of Language Quantitative Criteria of CPGS 4.0 on the teaching practice?

3) What further suggestions can be provided on the textbook compilation, Chinese language teaching, and Chinese language proficiency test?

3 Methodology

The present study has adopted a qualitative approach to investigate the correspondent level of textbooks from the perspective of CPGS 4.0 and the instructional significance of CPGS 4.0 on Chinese language teaching. The following research and analysis of IC (4th edition) are conducted as a case study.

In the fourth section, the topics and tasks in four volumes of IC have been evaluated and analyzed based on CPGS 4.0 to identify the exact level of IC. Volume 3 and Volume 4 are selected as the object of the case study to figure out whether these two volumes match the correspondent intermediate level in CPGS 4.0. In the first step, we have made a cross-comparison between IC and CPGS 4.0 and listed all the matching and mismatching topics. Then, we have further analyzed those mismatching topics referring to language quantitative criteria in CPGS 4.0. With a combination of both IC and CPGS 4.0, we try to accurately confirm the difficulty of these two volumes and make an objective evaluation of IC. Finally, suggestions are given on how to revise the current version to meet the criteria of CPGS 4.0.

In the fifth section, the teaching practice of grammar points has been discussed and the complicated ones and neglected ones have been selected as case studies. In the first step, we have calculated the words with grammatical meanings and other important grammar points and categorized them into different levels and bands. Then, we have divided the complex grammar points into three groups and have provided instructional suggestions on teaching practice.

4 Evaluation on Topics and Tasks of Integrated Chinese Based on CPGS 4.0

As all the volumes of the IC series contain a variety of topics and tasks, this section mainly focuses on the compari-

son and analysis of Volume 3 and Volume 4 (the intermediate level) based on the "three levels and nine bands" and "four-dimension benchmarks" of CPGS 4.0.

4.1 Comparison of Topics and Tasks between IC and CPGS 4.0

CPGS 4.0 has listed a series of topics under each level and band. Basic communication on topics of daily life, study, work, social interaction, etc. are categorized at the elementary level. More complex communication on topics of daily life, work, occupation, society, culture is categorized in the intermediate level. Standardized communication and further discussion on topics such as social life, academic research are categorized in the advanced level. Table 2 has listed the topics in Volumes 3 and 4 of IC (4th edition) and their corresponding levels and bands in CPGS 4.0：

Volume 3	Topic	Corresponding level and band in CPGS 4.0	Volume 4	Topic	Corresponding level and band in CPGS 4.0
Lesson 1	Starting a New Semester	Level 2 Band 4 - campus life	**Lesson 1**	China's Holidays	Level 1 Band 3 - festival and customs
Lesson 2	Dorm Life	Level 2 Band 4 - campus life	**Lesson 2**	Changes in China	Level 2 Band 6
Lesson 3	At a Restaurant	Level 1 Band 2 - dining	**Lesson 3**	A Trip to Yunnan	Level 1 Band 3 - travel experience
Lesson 4	Shopping	Level 1 Band 2 - shopping	**Lesson 4**	Lifestyle and Health	Level 2 Band 4 - health Level 2 Band 5 - lifestyle
Lesson 5	Choosing Classes	Level 1 Band 3 - courses	**Lesson 5**	Gender Equality	Level 2 Band 5 - social phenomena
Lesson 6	Dating	Level 2 Band 5 - interpersonal relationship	**Lesson 6**	Environmental Protection and Energy Conservation	Level 2 Band 5 - natural environment
Lesson 7	Computers and the Internet	Level 3 Band 7 - science and technology	**Lesson 7**	Wealth Management and Investing	Level 2 Band 5 - lifestyle
Lesson 8	Working Part-Time	Level 2 Band 4- daily work	**Lesson 8**	China's History	Level 3 Band 8 - history
Lesson 9	Education	Level 1 Band 3 - education	**Lesson 9**	Job Interview	Level 2 Band 4- daily work
Lesson 10	Geography of China	Level 2 Band 6	**Lesson 10**	The World Is Getting Smaller	Level 2 Band 6

According to the above table, 85% of the topics in IC can be placed in the corresponding level and band directly due to the similarities of topic names in IC and CPGS 4.0. However, Lesson 10 of Volume 3, Lesson 2 and 10 of Volume 4 cannot be placed directly, as the topic names don't fit into any of the bands in CPGS 4.0. Among these th-

ree lessons, two topics (Lesson 10 in Volume 3 and Lesson 2 in Volume 4) are related to China's national conditions, which are geography and the development of a city. One topic name is too vague and abstract that we need to refer to the content to further determine in which level and band the lesson should be placed. After analyzing the content, learning objectives of the lessons in IC and comparing them with the communication tasks in CPGS 4.0, Level 2 Band 6 would be the most appropriate placement for these three lessons.

After finalizing the topic level and band, two pie charts can be made to illustrate the distribution of topics in Volume 3 and 4.

FIG 1 DISTRIBUTION OF TOPIC BANDS IN VOLUMES 3 AND 4

According to the above pie charts, Volume 3 mainly focuses on topics from elementary and intermediate levels (70% of the topics belong to band 2, band 3 and band 4), and Volume 4 primarily focuses on the intermediate level (73% of the topics belong to band 3, band 4 and band 5). The degree of topic difficulty gradually increased from Volume 3 to Volume 4. Moreover, with the majority of topics being categorized in the intermediate level, Volume 3 and Volume 4 of IC comparatively align with the intermediate level of CPGS 4.0. Considering that there are still 29% of elementary-level topics and 10% of advanced-level topics in Volume 3 and Volume 4, which doesn't match the assumed intermediate level, these inconsistent topics will be further discussed to identify the reasonableness of topic selection and band distribution.

4.2 Further Discussion on Elementary and Advanced Topics of IC
4.2.1 Elementary Topics in Volume 3 and Volume 4 of IC

According to Table 2, six elementary topics appear in Volume 3 and Volume 4 of IC. Among which, two band 2 topics (dining, shopping) and two band 3 topics (courses, education) are selected in Volume 3, while two band 3 topics (festival, travel) are selected in Volume 4. The number of elementary topics decreases along with the increase of language proficiency.

Undoubtedly, the 40% maintenance of elementary topics in Volume 3 is acceptable, as these lessons with simple topics can be considered as a transition from elementary to intermediate level. For Volume 4, it's also reasonable to set two elementary topics (18% among all the topics) to reduce the difficulty at the beginning. These transitional chapters could provide students with psychological preparation for higher-level language learning and enhance their

learning adaptability to a large extent.

Moreover, some of the above elementary topics are not new to intermediate level students, as these topics, especially those related to students' daily life, study and work, have already appeared in Volume 1 or Volume 2. For example, the topics of shopping both appear in Volume 1 and Volume 3; the topic of dining both appears in Volume 2 and Volume 3 and the topic of travel both appear in Volume 2 and Volume 4. Table 3 is a comparison of dining, shopping and travel in different volumes of IC.

TABLE 3 COMPARISON OF DINING, SHOPPING AND TRAVEL IN VOLUMES 3 AND 4

	Shopping	**Dining**	**Travel**
Elementary Level (Volume 1 or Volume 2)	1. Describe the colour, 2. size, and price of purchase; 3. Recognize Chinese currency; 4. Pay in cash or with a credit card; 5. Determine the proper change you should receive; 6. Ask for merchandise in a different size or colour; 7. Exchange merchandise.	1. Ask if there are seats available at a restaurant; 2. Order some Chinese dishes; 3. Describe dietary preferences and restrictions; 4. Ask for recommendations; 5. Rush your order; 6. Pay for your meal and get change.	1. Talk about your plans for summer break; 2. Describe what kind of city Beijing is; 3. Describe your travel itinerary; 4. Ask for discounts, compare airfares and routes, and book airplane tickets; 5. Ask about seat assignments and request meal accommodations based on your dietary restrictions or preferences.
Intermediate Level (Volume 3 or Volume 4)	1. Name basic clothing, bedding, and bath items; 2. Describe your shopping preferences and criteria; 3. Express discounts; 4. Disagree with others tactfully.	1. Name four principal regional Chinese cuisines; 2. Order food and drinks; 3. Talk about what tastes you like and dislike; 4. Describe your dietary restrictions and preferences.	1. Describe what costs a package tour may cover; 2. Explain the differences between "soft" and "hard" sleeper cars; 3. Describe Yunnan's natural and cultural attractions; 4. Discuss the high and low points of a trip.

It can be seen from the table that the learning objectives and requirements of communication tasks differ from different levels despite the similarities on topics. For the topic of shopping, Volume 1 attaches more importance to some basic verbal skills on purchasing and exchanging clothes and shoes, while volume 3 expands the vocabulary of goods, and develops different communication skills of describing personal requests, bargaining, etc. In terms of dining, Volume 3 not only involves basic communication needs on ordering food as Volume 2 does, but it also adds some discussions on related knowledge about Chinese cuisines. As for the learning objectives of travel in both volumes, the elementary travel topic focuses more on asking, talking about and describing, while the intermediate one focuses more on description, explanation as well as discussion. The communication tasks increased apparently

from the table.

With regard to Lesson 1 in Volume , the topic of "festival and custom" belongs to band 3 in the elementary level. It seems that this topic is too simple to be placed in this volume. Besides, most of the topics belong to band 5 and band 6, so it is inappropriate to put lesson 1 here. In order to balance the difficulty of each volume and show a gradual improvement from the elementary topics to intermediate ones, moving this lesson to Volume 3 or changing this lesson with lesson 10 in volume 3 may be two possible solutions.

In conclusion, the reappearance of the same topics in Volume 3 or Volume 4 is relatively reasonable, for the reason that the communication tasks are more challenging and the contents are more complicated. It is conducive for IC to regard these similar lessons as an effective way to review important topics, teach new words and grammar, and develop more advanced verbal communication abilities.

4.2.2 Advanced Topics in Volume 3 and Volume 4 of IC

According to Table X, there are two advanced topics in the intermediate level (Volume 3 and Volume 4) of IC. Lesson 7 of Volume 3 is about science and technology, which is categorized in Level 3 Band 7. Lesson 8 of Volume 4 is about history, which is categorized in Level 3 Band 8. As these two topics are placed at the advanced level, we need to further explore the quantitative criteria in CPGS 4.0 to ensure whether these advanced topics are suitable for the intermediate level.

As mentioned before, the quantitative criteria in CPGS 4.0 take into consideration of the "four-dimension benchmarks" and those benchmarks are closely interconnected. Since words contain the basic features of syllables and characters, we will analyze these two topics based on words and grammar. Table 4 below shows the distribution of words and grammar of these two lessons according to CPGS 4.0.

TABLE 4 DISTRIBUTION OF WORDS AND GRAMMAR IN TWO LESSONS OF IC

	Elementary			Intermediate			Advanced
	Band 1	Band 2	Band 3	Band 4	Band 5	Band 6	Band 7-9
Words (Lesson 7 of Volume 3)	2	8	6	9	4	0	1
Words (Lesson 8 of Volume 4)	0	5	14	5	2	2	9
Grammar (Lesson 7 of Volume 3)	0	0	3	0	0	0	0
Grammar (Lesson 8 of Volume 4)	0	0	0	1	1	0	0

According to table 4, the words in Lesson 7 of Volume 3 are mainly elementary and intermediate ones, with 76%

more words belonging to band 2, band 3 and band 4. However, the words in Lesson 8 of Volume 4 are totally different. Nineteen words in Lesson 8 belong to the elementary level, the other 18 words belong to intermediate and advanced levels with 9 words in each group. In terms of grammar, three grammar points in Lesson 7 of Volume 3 are categorized in Level 1 Band 3, while the 2 grammar points in Lesson 8 of Volume 4 are grouped in the intermediate level. It seems that the language difficulty doesn't align well with the intermediate level in both lessons. Although the topic is about science and technology, which belongs to the advanced level, it may be a wiser choice to put Lesson 7 of Volume 3 in Volume 2 based on the distribution of words and grammar. As for Lesson 8 in Volume 4, it can be put in the original volume, since half of the words are selected from intermediate and advanced levels with two intermediate grammar points. Teachers can also take this lesson as preparation for future study and discussion on history in the advanced level.

5 Reference Value of *Language Quantitative Criteria on Chinese Language Teaching*: A Case Study on Grammar Points in Integrated Chinese

Promoted on the basis of "four-dimension benchmarks", language quantitative criteria are a unique feature of the "3+5" standardized approach in CPGS 4.0. It has formulated a systematic and interconnected evaluation standard on Chinese language proficiency referring to four basic language elements: syllables, characters, words and grammar. Among these four elements, grammar is quite a special one, since it is the first time to integrate grammar grading outline into Chinese language proficiency grading standards. Five hundred and twenty seven grammar points have been selected and graded into elementary, intermediate and advanced levels with 210,214 and 76 respectively. Elementary and intermediate levels in total contain more than 70% of all grammar points, which makes the teaching of grammar more important in these two levels.

Meanwhile, 572 grammar points are distributed into twelve different groups: Morpheme (语素), Part of Speech (词类), Phrase (短语), Fixed Format (固定格式), Sentence Component (句子成分), Sentence Type (句子的类型), Action State (动作的态), Special Expression (特殊表达法), Emphasis Method (强调的方法), Questioning Method (提问的方法), Oral Format (口语格式), Sentence Type (句子的类型). Based on the traditional grammar outline, this updated version establishes the system framework on morphemes, words, phrases, sentences and sentence groups. It also refines the small category of grammar and strives to present the comprehensiveness of grammar points in Chinese language teaching.

5.1 Classification and Level Determination of Grammar Points in IC

To provide instructors and students with a clearer picture of what language points should be strengthened, IC listed the most important language points and provided a detailed explanation, multiple examples of the usage, and various contextualized exercises to help students learn and practice. Volume 3 and Volume 4 divided the key important language points into two categories, Grammar and Words & Phrases, while Volume 1 and Volume 2 only has the Grammar category. IC emphasized that the Words & Phrases should be given the same weight as Grammar, especially for those with grammatical meaning. The selection of language items in Words & Phrases is made according to the degree of words' versatility, and most of them are verbs, adverbs, conjunctions and prepositions.

Therefore, in the determination of grammar points' level, we calculated language items in Grammar and Words & Phrases sections in all four volumes of IC and summarized its distribution in table 5:

TABLE 5 DISTRIBUTION OF WORDS AND GRAMMAR IN FOUR VOLUMES OF IC

	Elementary			Intermediate			Advanced
	Band 1	Band 2	Band 3	Band 4	Band 5	Band 6	Band 7-9
Volume 1	36	23	7	1	0	0	0
Volume 2	7	24	17	2	4	2	0
Volume 3	8	8	15	7	2	2	2
Volume 4	0	4	8	6	7	3	5

(Notes: Only the grammar points that appeared both in IC and CPGS 4.0 have been calculated in this table.)

It is clearly shown in the above table that the distribution of difficulties of grammar points is reasonable in the IC series since most of the elementary grammar points appear in the first two volumes and more intermediate and advanced grammars are included in the last two volumes. It is noteworthy that IC has labelled complex grammatical structures by adding continuous roman numerals, for example, five segments are devoted to the particle 了, three to directional complements. These complex grammatical structures are recycled for review purposes and are marked "revisited". For complex grammar items, if the level or band of each item is different in CPGS 4.0, all items are calculated; if different items of one grammar point belong to the same band in CPGS 4.0, it is counted as one time.

In the first two volumes, most grammar points belong to the elementary level in CPGS 4.0. In Volume 1, more than 80% of all grammar points are distributed in band 1 and band 2 in the elementary level; while in Volume 2, nearly 70% are distributed in band 2 and band 3. The proportion of grammar points' allocation explicitly presents the gradual progress from Volume 1 to Volume 2. Additionally, among the twelve groups of grammar points in CPGS 4.0, each volume has its focus. For example, although both volumes attach great importance to Part of Speech (词类), Volume 1 contains more verbs, measure words, and simple particles; while Volume 2 includes more adverbs, conjunctions and prepositions. In terms of the sentence, more complicated sentence complements as well as compound and special sentences are listed in Volume 2, such as descriptive complements, directional complements, potential complements, resultative complements, comparative sentences, the "把" construction and passive-voice sentences. The different emphasis between Volume 1 and Volume 2 provides a natural transition for students, and it also ensures the gradual improvement of IC series textbooks.

As Volume 3 is a transitional textbook from elementary to intermediate level, there are still 70% of grammar points belong to the elementary level in CPGS 4.0. However, half of them are categorized in band 3, which is the highest band in the elementary level. In Volume 4, the number of the intermediate level grammar points surpasses the ones

in the elementary level, with 16 (band 4, band5 and band 6) and 13 (band 2 and band 3) respectively. Besides, there are five grammar points in the advanced level, which accounts for nearly 20% of the total. Thus, the grammar difficulty has increased from Volume 3 to Volume 4, just like the first two volumes. In terms of the classification, Volume 3 and Volume 4 share a similar focus on Part of Speech (词类), Phrase (短语) and Sentence Type (句子类型). In terms of Part of Speech, Volume 3 focuses more on particles, adverbs and measure words, some of which are revisited grammar points from the first two volumes; while Volume 4 focuses on more formal and complicated particles, adverbs and conjunctions. As for Sentence Type, although Volume 3 contains more compound sentences than Volume 4, 25% of Volume 3 sentence patterns are repeated ones. In addition to the above features, Volume 3 also pays more attention to various kinds of complements, including descriptive complements, resultative complements, potential complements and directional complements. Volume 4 puts less emphasis on complements, but all the selected complements are more complicated ones with extended meanings.

In the analysis of IC grammar points, we can find that there are a certain number of important grammar points in CPGS 4.0 that are not covered in the textbook. In all four volumes, 28 grammar points appeared in texts but were not included in the grammar list. Moreover, 68% of those uncovered points belong to the elementary level, which should be regarded as the key teaching points due to their communicative functions. Besides, 85% of them are important words with grammatical meanings, such as measure words, adverbs, pronouns and particles, which should also be attached equal importance in teaching practice.

5.2 Suggestions on Grammar Teaching Practice

Based on the statistical analysis of 5.1, we will further discuss the teaching practice of some important grammar points, namely the complicated ones as well as the neglected and unvalued ones.

5.2.1 Part of Speech: Measure Words

Eighty measure words have been listed in the grammar outline in CPGS 4.0, and they are divided into several groups based on different dimensions. For example, there are 79 single measure words and 1 compound measure word; 54 measure words are used together with nouns, 13 with verbs, and 4 with time words. Besides, measure words can also be used in reduplication form, in phrases, in quantitative complements, in special expressions as well as sentence patterns. Given such a diverse and complex usage of measure words, it is supposed to be the key point of teaching. However, measure words are not given enough attention in IC.

In all four volumes of IC, 46 measure words have been included in the word list or grammar points. Volume 1&2 contains 31 measure words and Volume 3&4 contains 14 ones. Most of them can be found in CPGS 4.0, ranging from band 1 to band 7-9. Some of them are not contained in CPGS 4.0, such as 度 (measure word for the degree of temperature, heat, hardness, humidity, etc.), 段 (measure word for section, segment, or part), 座 (measure word for buildings and mountains), 句 (measure word for sentences), 站 (measure word for bus stops, train stops). However, according to the word list, these five words are measure words as well. Therefore, we can conclude that only frequently used measure words are especially included and mentioned in the grammar outline of CPGS 4.0.

It is undeniable that all 46 measure words are indeed correct measure words and are closely related to each text. Thus, they should be taught to help students better understand the texts. Meanwhile, IC should add more measure words in volume 3 and volume 4 as well, since some frequently used ones are not mentioned at all. What calls for special attention is that measure words are not only used by themselves, they are also used together with other words or phrases. In the grammar outline of CPGS 4.0, measure words are important components in some phrases, complements, special expressions and sentences patterns. Teachers should emphasize the significance of measure words when teaching such grammar points, or at least further introduce or explain the measure words used in some sample sentences. For example, measure words are also used in quantitative reduplication phrases ("numeral + measure word + numeral + measure word"), in fixed sentence format ("一 + measure word + 比 + 一 + measure word"), in quantitative complements. In the teaching of the above grammar points, it may be a wiser choice to add measure words or emphasize the accurate use of them.

5.2.2 Special Sentence Patterns

Special sentence pattern is one of the most distinguishing features of Chinese, making it a difficult teaching point as well. When learning these special patterns, students are easily confused, since the sentence patterns are quite different from the ones in their mother tongue. Moreover, some sentence patterns are unique to Chinese, such as the 把 construction. They should be taught with elaborate teaching design, not only on in-class teaching practice but on after-class exercises and tests.

The presentation of some special sentence patterns in IC is not well-organized, easy to cause misunderstanding. Take the comparative sentence as an example: in Lesson 11 of Volume 2, the comparative sentence is regarded as a key grammar point. In dialogue 1, there are two comparative sentences: "今天天气比昨天好" and "明天天气比 今天更好", indicating two sentence patterns: "X + 比 + Y + adjective" (hereafter referred as SP1) and " X + 比 + Y + 更/还 + adjective" (SP2). While in the grammar section, IC has listed four sentence patterns. Two of them are based on the above sentences, and the other two are more complicated ones: "X + 比 + Y + adjective + 一点 儿/得多/多了" (SP3) and "X + 跟/和 + Y + (不)一样 + adjective" (SP4). Lesson 13 and 19 each introduces a new pattern: "X + 比 + Y + adjective = Y + 没有 + X + adjective" (SP5) and "X + 比 + Y + adjective + numeral + measure word + noun" (SP6). SP5 is the negative form of SP1, and SP6 is similar to SP3. Generally speaking, IC keeps a continuity of comparative sentences in Volume 2. However, students may still get confused on SP3 and SP4 due to the lack of context, since neither of these two patterns is presented in previous dialogues. Besides, it is a little hard to understand and master four different patterns at one time. More detailed suggestions on teaching practice can be proposed if we take CPGS 4.0 as a reference.

In CPGS 4.0, comparative sentences are divided into 17 sentence patterns and six sections. Specifically, there are twelve patterns in elementary level (2 in band 1, 6 in band 2 and 4 in band 3), two in intermediate level (2 in band 5), and three in advanced level (band 7 to 9). The cross-referenced result of comparative sentence patterns between IC and CPGS 4.0 is shown in table 6:

TABLE 6 CROSS-REFERENCED RESULT OF COMPARATIVE SENTENCE PATTERNS

IC	CPGS 4.0
SP1	band 1 pattern 1
SP2	band 2 pattern 1
SP3	band 2 pattern 2
SP4	band 2 pattern 6
SP5	band 1 pattern 2
SP6	band 2 pattern 1

It can be found in the table that, all six patterns in IC belong to the first two bands of elementary level in CPGS 4.0. SP1 (Lesson 11) and SP5 (Lesson 19) match with two patterns in band 1, but they are in different lessons; the other four patterns all belong to patterns in band 2, but they are divided into two groups. The comparative relationship is shown in one group with "比" or "没有" (SP1, SP2, SP3, SP5 and SP6), and in the other group with "跟/和……（不）一样" (SP5). If we teach this grammar based on CPGS 4.0, three possible changes can be made. First, SP1 and SP5 should be taught together due to their close relationship. Second, SP2, SP6 and SP3 can be arranged in one lesson due to the similarity of sentence patterns. Third, SP4 should be taught alone, since its pattern is quite different from the other five patterns. Considering the limitation of textbooks, teachers may supplement SP5, the negative form, in the teaching of SP1. They can also combine sentences SP3 and SP6 due to their similarities. As for SP4, teachers should add one more pattern ("X + 跟/和 + Y + (不)一样") as a preliminary, which is also included in CPGS 4.0 together with SP4.

5.2.3 Compound Sentences

CPGS 4.0 divided all the compound sentences into twelve relationships, including parallel (并列复句), continual (承接复句), progressive (递进复句), selective (选择复句), transitional (转折复句), hypothetical (假设复句), conditional (条件复句), causal (因果复句), compact (紧缩复句), purposeful (目的复句), concessive (让步复句) and multiple repetitive (多重复句). Multiple repetitive compound sentences are more advanced grammar points that include at least two different compound relationships. As IC is designed for elementary and intermediate level learners, the multiple compound sentence will not be discussed here. In addition to the twelve categories, CPGS 4.0 also placed compound sentences into different levels and bands according to their difficulties and functions. Among all compound sentences in CPGS 4.0, there are 23 in the elementary level, 43 in the intermediate level, and 37 in the advanced level. In terms of the distribution across bands, the majority of the compound sentences belong to band 3 (14%), band 4 (17%), band 5 (12%) and band 6 (13%).

There are 22 compound sentences in the IC series, with 7 sentences in Volume 1, 3 in Volume 2, 8 in Volume 3 and

4 in Volume 4. Volume 1 and Volume 3, obviously, attach more importance to compound sentences. Besides, all the 11 basic compound sentence types appear in IC, however, according to the statistics, IC tends to focus more on parallel, selective, conditional and causal compound sentences. In terms of the distribution of compound sentences in IC, 72% of the compound sentences are categorized in the elementary level, 23% are in intermediate level and only 5% are in advanced level. Ninety percent of the sentences in Volume 1 and Volume 2 are from band 2 and band 3. In the last two volumes, Volume 3 contains most compound sentences among four volumes, ranging from band 2 to band 7~9. On the contrary, sentences in Volume 4 are relatively simple, and they are equally distributed from band 2 to band 5 (one sentence in each band). Therefore, as the IC series only includes 22 out of 103 compound sentences from CPGS 4.0, the editors of IC should consider adding more compound sentences. According to the analysis, the difficulty and quantity of compound sentences in Volume 1, Volume 2 and Volume 3 are all comparatively reasonable. However, Volume 4 does not contain enough compound sentences and the existing ones have not reached the correspondent difficulty level, so we could consider incorporating more compound sentences in band 4, band 5 and band 6 to fit the language difficulty into the intermediate level.

CPGS 4.0 not only functions as a guideline for categorizing compound sentences into different bands, but it also reflects some inappropriate designs of compound sentences in IC. First, some conjunctions in IC are not presented with completed sentence patterns. For example, 要是 is listed as a word in the vocabulary list of IC; however, it is considered as a band-3 grammar point and placed into the category of a hypothetical compound sentence in CPGS 4.0. As it is considered as a word in IC, the complete sentence pattern is not given, which raises the possibility of students making mistakes. However, CPGS 4.0 not only indicates the relationship between clauses in compound sentences clearly but also provides the complete sentence pattern (要是…，就…). Therefore, IC should provide a more complete form as CPGS 4.0 does. Second, some of the examples provided in IC are not well-designed and may cause confusion. For example, 既然 is placed in Lesson 9 of Volume 4 and is listed as a band-4 grammar point in CPGS 4.0. The complete sentence provided in CPGS 4.0 is 既然…，就..., while the examples under 既然 in IC show three different usages, including 既然…，….；既然…，就…; and 既然…，那么…. All three ways are usable in daily communication or formal discussion, but regarding CPGS 4.0, instructors could focus on the teaching and practicing of the key sentence pattern 既然…，就…, and supplement the other two patterns if students already acquire the key sentence pattern.

6 Conclusion

6.1 Suggestions on Textbook Compilation

The compilation of Chinese language textbooks has been discussed frequently among scholars and researchers. However, these textbooks were compiled under different guidelines. Take Integrated Chinese as an example, this series textbook was edited and revised based on 5Cs of ACTFL, and its latest 4th version was published in 2019. As we have mentioned in the fourth section, CPGS 4.0 can be regarded as an authoritative guideline and the evaluation benchmark on the compilation and revision of textbooks. According to our analysis, we concluded the following suggestions: (1) IC and other textbooks can make further adjustments on the selection and arrangement of topics al-

ong with the description on topics in CPGS 4.0; and (2) editors also need to add lists on syllables and Chinese characters and revise the original lists on words and grammar points with a reference of language quantitative criteria in CPGS 4.0.

6.2 Suggestions on Teaching Practice

In addition to the important reference value on the textbook compilation, CPGS 4.0 can also function as a guideline on the instructor's teaching. First, instructors can check the classification of words and grammar points in each volume and pay more attention to the language items that fit into correspondent levels in CPGS 4.0. For language items that exceed the current level, instructors can either make simple explanations without further practice or supplement them based on students' learning needs. Second, CPGS 4.0 can provide instructors with a clearer mind in the teaching of complicated language items. With the guidance of this grading standard, instructors will be able to decide whether a sentence pattern should be taught or not; or which pattern should be taught first. Last, the four-dimension benchmarks of CPGS 4.0 remind instructors to teach Chinese more comprehensively and systematically, by which the teaching of syllables and Chinese characters should receive equal attention as words and grammar points.

6.3 Suggestions on Language Proficiency Test

It is necessary to test students' language proficiency through various tests. Thus, an official criterion is urgently needed. With the implementation of CPGS 4.0, instructors can create the tests and grading rubrics according to the four-dimension benchmarks. For example, in regular tests, instructors can classify the vocabulary into active and passive words according to CPGS 4.0 and require students to write the active ones and recognize the passive ones. In oral tests, instructors can grade students' pronunciation with a focus on the required syllables in the correspondent level of CPGS 4.0. Moreover, there are a variety of language proficiency tests provided by Chinese Testing International Co., Ltd. (CTI), a professional international Chinese education and examination service company throughout the world, including the Chinese Proficiency Test (HSK), HSK Speaking Test (HSKK), Youth Chinese Test (YCT), Business Chinese Test (BCT). All tests have different classification of levels. As CPGS 4.0 will be applied widely in the following years, it may be a wiser option to unify all tests into three levels and nine bands according to CPGS 4.0.

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① A data collected by the Ministry of Education of China in April, 4th, 2019.
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Design and Implementation of Ship Collision Teaching Case Bases

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Abstract

In view of the requirement of case library of ship collision accident for teaching of sea-related majors, this paper studies the standardized expression of collision cases, puts forward a more complete idea of case bases structure construction and designs and implements the ship collision avoidance case database system with the help of computer database technology.

Keywords: case teaching; ship collision; case database

1 Introduction

In the context of the current national strategy of becoming a maritime power, there is a lot of room for development in the fields of green ships, far-reaching sea exploration and development, polar development, and intelligent manufacturing. Building a sea-related talent echelon and doing a good job in the reserve of sea-related talents has become a top priority. Taking students as the center, constructing ship collision teaching case bases, and improving teaching quality are necessary to achieve the teaching objectives of sea-related majors and meet the graduation requirements. However, the existing ship collision cases have not been fully and systematically collected and standardized. There are some scattered cases or special case setting in the form of written or electronic documents, which can not be processed by information and can not fully meet the needs of professional courses such as ship watch and collision avoidance[1]. It is very necessary to build a standardized, effectively organized, and extensive ship collision case bases to promote research and applications in the field of navigation technology. According to the information requirements of ship collision case database in case teaching, this paper puts forward the construction ideas and methods of ship collision case database and designs and implements the ship collision case database system with the help of computer database technology.

2 Functional Requirement of Ship Collision Case Database

The case bases of this paper will be mainly used in the field of collision avoidance teaching, so the cases should meet the following requirements[2]:

1）The language is easy to understand and concise

2）The environmental data of the accident in the case are complete;

3）The accident process in the case is detailed and the logic is clear;

4) The case shall have the analysis and evaluation of the accident, such as the investigation report of maritime accident and court judgment;

5) The case should include the use of methods, precautions, and suggestions in teaching.Therefore, the following aspects should be paid attention to when designing the case bases:

①Reasonably classify the collision cases to facilitate storage and retrieval;

②The design of case data is complete. Unified standards are used for data structure and terminology, and normative description is adopted in the library to ensure that it can be well applied to teaching.

③The system has a friendly interface, convenient operation, certain stability, and strong expansibility.

3 Model Design of Ship Collision Case Database

The data of the case bases is huge. To facilitate computer storage and retrieval, a reasonable structure must be adopted. According to the teaching objectives of the course "ship watch and collision avoidance" and graduation requirements, combined with the habit of case division in the maritime industry and the different representative eigenvalues in the cases, this paper classifies the case bases level in detail and makes a normative description and research. Combined with the functional requirements described above, in the conceptual structure design stage, the E-R model of the relational model is adopted, which is optimized and then transformed into the relational model.

3.1 Case Dases Hierarchy

The ship collision case bases is divided into four levels according to the four characteristic items of accident water area, visibility, collision ship type, and encounter situation classification. As shown in Figure 1.
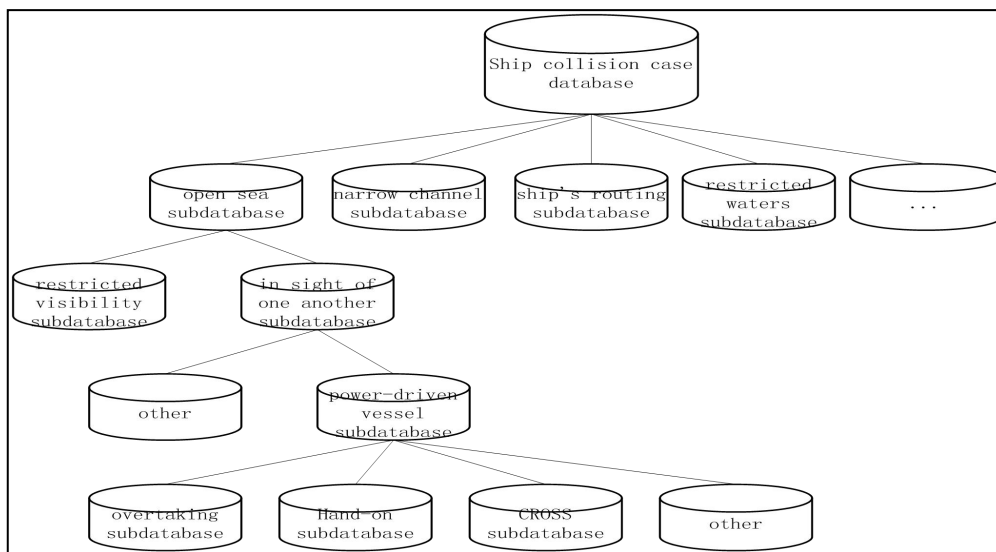

FIG. 1 CASE BASES STRUCTURE DIAGRAM

3.2 Case Description

Starting from the application of theoretical research and practical guidance, the description of collision cases should include environmental information such as time, place, traffic environment, hydro-meteorology, and so on. This information is used to study the relationship between collision accidents and environmental problems. The case description should also include various characteristic information about the ship, including the type, scale, and handling performance of the ship. This information is used to study whether the collision avoidance behavior at that

time is in line with the objective reality. These two parts are unchanged in the whole collision process and are described as static information. The description of the collision case also includes the ship encounter process, the judgment, decision-making, and manipulation behavior of the driver under the current situation. This information is used for the study of collision avoidance behavior and is described as dynamic information. From the reference of collision cases to maritime trial, the case description should also include the description of the consequences of a collision, the trial results and interpretation of the court, and the summary of case lessons. These three aspects can provide a reference for the trial of similar collision cases, which can be summarized into the conclusion information part of the collision case description[3].

Through analysis, the standardized information description covered by our collision case should include three parts, namely case static information(Si), case dynamic information(DI), and case conclusion information(CI), as shown in Figure 2.
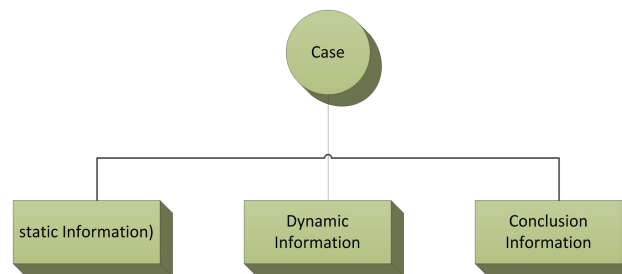

FIG.2 COLLISION CASE INFORMATION

1) *Description of static information of standardized cases*

Static information mainly includes ship information (SI) and environment information (EI), as shown in Figure 3. Static information is the part that has nothing to do with people's will in the case, and it is the part of things in the case. Ship information describes the relevant characteristic information of the ship[4]. The number of relevant ships in each case is different. The description is represented by ship 1, ship 2.

Ship name: identification number or text describing ship name, port of registry, IMO number, etc.

According to the general definition of the 1972 international rules for preventing collisions at sea, the types of ships are divided into motor ships, ships with limited maneuverability, ships out of control, ships limited to draft, fishing ships, anchor ships, etc.

Traffic density describes the number, size, and other obstructions of ships near the water surface at that time.

Traffic rules refer to the relevant navigation rules and avoidance responsibilities that the ship should abide by at the time of the meeting.

The meeting water area refers to the sea area where the case occurs, which can be divided into open sea area,narrow waterway or river channel, traffic separation system area, etc., according to the provisions of the 1972 international rules for preventing collisions at sea.

Encounter situation refers to the basic situation of ship encounters involved in the 1972 international rules for preventing collisions at sea, such as encounter, cross encounter, overtaking, etc.
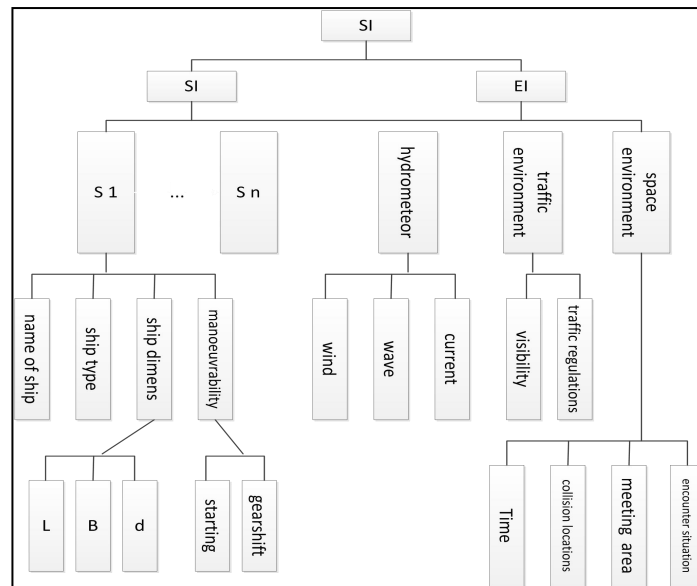

FIG.3 STATIC INFORMATION

2) Description of dynamic information

The dynamic information of the ship collision case is the collision process information, which is closely related to human will in the case, reflects the software information of the case, and can be regarded as the human part of the case. The dynamic information includes the changing motion elements, encounter status, collision avoidance actions, and other relevant information in the process of ship encounter.

Dynamic information is the key to reproducing the case process[5]. The development process of the case is the collection of a series of actions between ships involved in the case. These actions can be expressed as a collection of several collision avoidance time points, ship encounter status, and collision avoidance actions according to the three stages of collision (collision danger stage, urgent situation stage, and urgent danger stage), that is, dynamic information= {collision avoidance time point, encounter status of this ship, encounter status of incoming ship 1,..., encounter status of incoming ship, collision avoidance action}.

Encounter status (ES): describe the course, speed, relative orientation, distance, DCPA, TCPA, and MSPD (minimum safe encounter distance between two ships) of each ship at the collision avoidance time point according to the number of ships related to the case.

3) Description of case conclusion information

The conclusion information of collision cases refers to the information on the consequences of ship collision, judicial judgment results, and lessons learned. It can be described in three parts: collision consequence (CC), court judgment (JM), and experience lesson (EL)[6]. The specific description is shown in Figure 4:
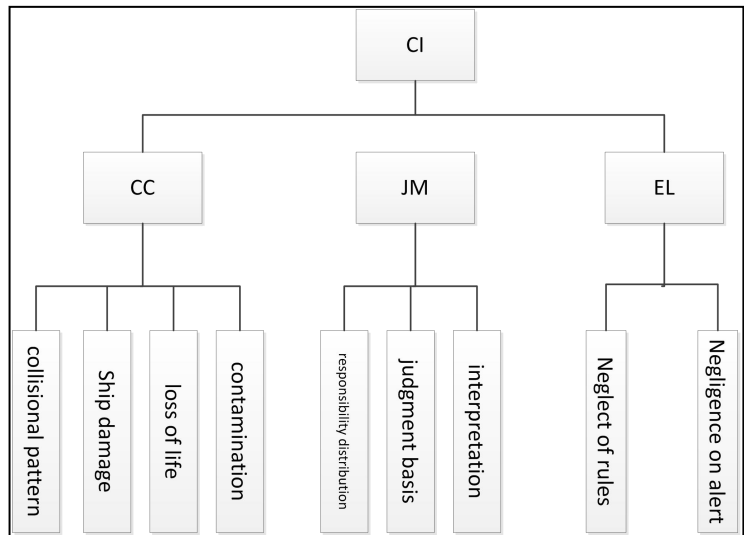
FIG.4 DYNAMIC INFORMATION

3.3 Relationship Model

Combined with the normative description of the case, the E-R model of the case bases structure is established[7]. As shown in Figure 5.
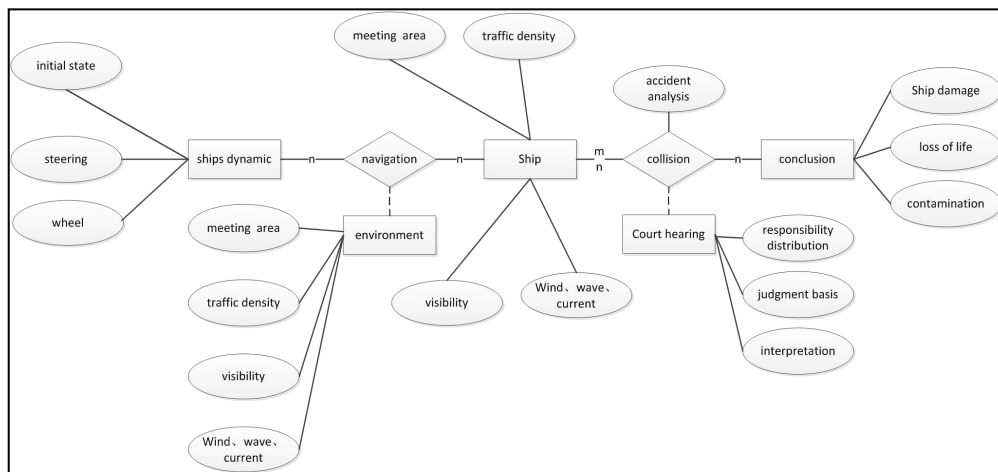

FIG.5 E-R MODEL

1) Transformation from E-R diagram to the relational data model.

The logical structure of a relational model is a set of relational models. E-R diagram is composed of three elements: entity, entity attribute, and the relationship between entities. Transforming E-R diagram into the relational model is transforming entities, entity attributes, and relationships between entities into relational patterns, and determine the attribute and code of the relationship pattern[7].

2) Optimization of the data model.

To improve the performance of the database, after completing the transformation from the model of E-R diagram relational data, the data model will be optimized, the structure of the data model will be modified and adjusted.

4 functions of Ship Collision Case Database

4.1 User Management

To control the data flow, data security, authenticity, and resource sharing of the whole case-based system, the system adopts membership management, which is divided into three levels: general user, general administrator, and system administrator. Users at different levels have different permissions, and administrators directly manage members.

4.2 Case Information Management

Case information management includes case addition, deletion, editing, retrieval, and other functions. The following process is adopted for case addition: first, add the contents including case number, ship name, case type, etc. After that, it is entered in sequence according to seven modules: accident overview, ship information, environmental information, accident process, accident analysis, accident consequences, court judgment, and safety suggestions.

Case retrieval realizes the advanced retrieval function of keywords and case types. The keyword search name is ship name, accident party, the trial court, etc. You can query the corresponding case. Users can use the advanced search dialog box according to their needs. Select different types of cases, such as "open water", "good visibility", "facing situation" and "fault of both parties". Select level by level to find a series of cases. In the case display interface, you can view and download the papers and PPT teaching courseware related to the case through the control.

The case deletion and editing function is based on the retrieval function to modify and update the data information. At the same time, the system provides a case printing function, which is convenient for users.

4.3 Relevant Knowledge

The relevant knowledge of ship navigation and collision avoidance rules, crew, and port VI management regulations involved in ship collision shall be stored in the system. It is convenient for users to consult. Such as (1972) international rules for preventing collisions at sea, etc. At the same time, it also includes case-related papers, PPT teaching courseware, etc.

4.4 Data Statistics

To facilitate administrators and users to have an overall grasp of the number and types of system cases, the system will automatically count cases and realize the report output function according to the selection of case type and trial court when adding cases.

4.5 Data Statistics

To facilitate administrators and users to have an overall grasp of the number and types of system cases, the system will automatically count cases and realize the report output function according to the selection of case type and trial court when adding cases.

5 Case Database Time Application

The ship's dynamic data information includes: accident scene pictures, accident analysis pictures, accident reprodu-

ction dynamic toilet demonstration, etc. The accident analysis pictures and accident reproduction animation demonstration can clearly and vividly reproduce each stage of the ship involving from causing collision risk to the occurrence of the accident. Guide teachers and students to analyze and think about what collision avoidance measures should be taken.

The accident analysis part integrates the analysis of the accident made by the investigation report of the maritime accident investigation unit and the accident-related papers. The detailed contents of the corresponding legal provisions are attached to the analysis, which realizes the interactive function of regulations and cases, and can promote students to further study and understand the rules of collision avoidance at sea.

6 Conclusion

The ship collision case bases system designed and implemented in this paper can meet the needs of case teaching and judicial practice. If we further enrich the cases on this basis, refine and improve the relevant functions, this case bases system will have greater practical value for crew education, collision avoidance research, judicial practice, and so on.

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Seamless Chinese Learning: A Mobile-Assisted Model for Online Chinese Learning

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Abstract

The primary aim of this paper is to propose a conceptual framework based on the previous studies (Chan et al. 2006; Wong 2013; Wong et al.2015; 2017), with a particular focus on the language imitation, input and interaction theory in second language acquisition. This theoretical model consists of two components: one is focuses on developing Chinese listening and speaking skills; the other one is concerned with the Chinese comprehension and writing skills.

Keywords: Seamless learning; mobile-assisted ; online Chinese learning

1 Introduction

Chan et al. (2006) firstly introduced the notion of seamless learning, pointing out that personal, portable, wireless-networked technologies will become ubiquitous in the following ten years. With the development of mobile technology, seamless learning based on technology-enhanced learning (TEL) can be easily realized in many countries nowadays. Wong et al. (2015) noticed that most related studies are technology-oriented. Therefore the essentials of seamless learning, especially seamless language learning (SLL), are not fully revealed. In addition, seamless language learning is also not conceptualized as an effective tool in the learners' daily learning environment (Wong et al. 2015: 296). To solve these problems, Wong et al. (2015) proposed a new theoretical model for a mobile-assisted seamless learning process, exploring the characteristics of seamless language learning by integrating the language learning theories and practice. This SLL model focuses particularly on integrating language learning theories and the concept of seamless learning (Chan et al. 2006), with the ultimate purpose of reshaping the learning culture in the schools and individual learners (Wong et al. 2015:301). In addition, special attention on sociocultural interaction in second language acquisition is given to Wong et al. (2015)'s SLL model, but the features of different elements of language learning(i.e., lexical, grammar, and phonetics learning) are not fully discussed in it. Therefore, this conceptual paper will elaborate on Wong et al. (2015)'s SLL model, focusing on the different input and interactional patterns discussed in second language acquisition (SLA). Moreover, this paper will propose a seamless Chinese learning model for adults based on the previous studies, paying particular attention to the critical role that imitation plays in second language learning.

2 Framework

The theoretical model proposed in this paper is based on the SSL model built by the previous studies (Chan et al. 2006; Wong et al.2015;2017). This model will also draw nutrients from the input and interaction theory (Van Patten and Sanz, 1995; Long 1996; Gass 2003) and the language imitation theory (Adank et al. 2010; Yan et al. 2016; Robin 2021)in the field of second language acquisition.

2.1 Seamless Language Learning Framework
2.1.1 Salient Features of Seamless Language Learning Framework

Wong and Looi (2011) proposed the six features of mobile seamless learning (MSL) and they are as follows (Wong and Looi 2011; Wong et al.: 2015: 302):

(**SL1**) Across time

(**SL2**) Across locations

(**SL3**) Encompassing formal and informal learning

(**SL4**) Encompassing physical and digital worlds

(**SL5**) Encompassing individual and social learning

(**SL6**) Knowledge synthesis (combining prior and new knowledge and multiple levels of thinking skills - i.e., from abstract to concrete knowledge; the exercise of lower-order to higher-order thinking skills)

Wong et al. (2015) incorporated these features into language learning practice, proposing the following six principles (Wong et al. 2015:302):

(**SLL1**) Creating opportunities for situationally/ interactionally authentic activities among learners (and perhaps among learners, their family members or other community members, etc.), within and beyond the classroom.

(**SLL2**) Interweaving language input and output activities.

(**SLL3**) Interweaving learning of linguistic knowledge, application and reflection process-learning by doing and learning by reflection and the process should be non-linear and recursive.

(**SLL4**) Simultaneously drawing learners' attention to form and meaning, or even being meaning-focused (to achieve linguistic fluency) before being both form and meaning focused (to achieve linguistic accuracy, contextual [meaning] appropriateness and both contextual and linguistic complexity).

(**SLL5**) Engaging learners in activities that apply multiple language skills in different combinations.

(**SLL6**) Promoting learner (or learners, their family members, etc.) co-construction of linguistic knowledge and perhaps even learning activities (congruent to the notion of 'learner context generation' (Luckin 2008; Wong 2013).

Since this learning model is applied to the Chinese learning activities for K-12 students in Singapore, to nurture the students' comprehensive language abilities instead of discrete abilities in different perspectives, an additional characteristic is depicted as SSL7(Wong et al. 2015: 304):

(**SLL7**) Emphases formative assessment and peer evaluation on learners, holistic language development or literacy level.

In summary, these seven principles are mainly aimed at creating an authentic language environment for second language learners, with a particular focus on the non-linear, recursive learning process. Besides, these principles also concentrate on holistic language development instead of particular language skill. Therefore, formative assessment and peer evaluation are essential in these principles.

2.1.2 MyCLOUD: The Instantiation of the SLL Framework

Wong et al. (2015:310) further illustrated the nature of their SLL framework by introducing the MyCLOUD (My Chinese Language ubiquitOUs learning Days) project, which includes a learning design framework and a technological platform. The key ingredients of MyCLOUD platform are briefly summarized as follows (see also Wong et al. 2015:310-311):

My Mictionary (我的C动词典): Mictionary refers to mobile dictionary. In this space, students can tag all the new words they encounter in and out the class and increase their vocabulary storage capacity anytime and anywhere.

My E-Textbook (电子课本): The textbooks are digitized with a text-to-speech service powered by Microsoft Bing for the system to read the articles to the students.

CoMictionary (词语讨论区/'同学们怎么用'): CoMictionary refers to 'Community Mictionary'. The vocabulary added by each student will be recorded as one 'vocabulary page', and the artefacts created by diffident students will be encompassed into one page, which enables the students to discuss with each other on the new words they encounter.

My CLOUD Net (我的主页): This is the space for students to share and communicate with each other, and they can tweet or update their daily life and status on it in Chinese.

My Teaching Pal (教师主页): This is the space for teachers to manage the class, create the teaching sessions and communicate with all or selected students.

Meanwhile, the learning design for this platform is described in Fig 1 (Wong et al. 2015:311):
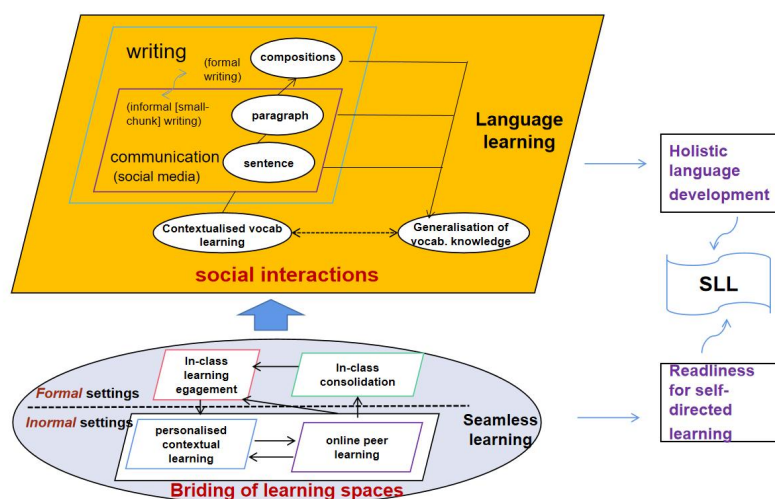

FIG. 1 THE LEARNING DESIGN OF MYCLOUD

Wong et al. (2015:311-312) further clarified that My Mictionary would bridge formal and informal learning. If a student creates an artefact in My Mictionary, this artefact will be updated to CoMictionary (social, formal space) and MyCLOUDNet (social, informal space) simultaneously.

This learning framework is exceptionally instructive and inspiring, which offers a feasible method that can remove the seams between formal and informal learning and the physical and learning environments. However, this framework is designed for K-12 students to learn Chinese, which is not applicable for adults language learning. The reason is that the primary purpose of this learning framework is to nurture the students' holistic language skills, but this relatively long-term purpose is not suitable for adult students who usually do not have enough time to go through a long-term learning process. Adults may need a more effective and efficient learning process to improve their language proficiency in a limited period. Besides, this learning process can hardly satisfy the learning needs of students majoring in the Chinese language because these undergraduates may need to develop different language skills separately according to their learning progresses. Furthermore, the role that teachers need to play is unclear in this framework, which may affect the feasibility of this model in applications. Consequently, this paper will propose a seamless Chinese learning model based on the learning needs of adult students, focusing on the different patterns of input and interaction, as well as the different teaching and learning methods.

2.2 Input and Interaction

In both first and second language acquisition, input forms the foundation of language imitation and is the basis of language habits (Gass 2003:229). Specifically, the modified input plays a pivotal role in SLA. Previous studies frequently discussed two types of input processing (VanPatten, 1995, 1996; VanPatten and Cadierno, 1993a, 1993b; VanPatten and Sanz, 1995, see also Gass 2003). The first type is to present the input to the learners and then practice it; the second type is to present the input before the development of the internalized system, which is to influence the development of the internalized system by affecting the input processing, and the result shows that the latter model is more effective than the first one (Gass 2003:231). Therefore, the modified input is of paramount significance in SLA, and the input that allows the corrective feedback is more effective than the input that prevents the errors from occurring, which means allowing a natural process to occur and then modifying it is more effective in language learning (Gass 2003:232). Based on this concept, researchers pay more attention to the role of conversational interaction in SLA (Long 1981). Long (1996:451-452) proposed the Interactional Hypothesis, arguing that negotiation work that triggers interactional adjustments of native speakers (NS) or other competent speakers will effectively facilitate language acquisition.

Moreover, the significance of conversational interaction varies in developing different language skills. For instance, Loschky (1994) argued that interactive negotiation positively influenced vocabulary comprehension but had no such influence on vocabulary retention. Ellis et al. (1994) indicated that interactively modified input produced better comprehension rates and acquired more new words.

The framework proposed in this study will adopt the concepts of modified input and conversational interaction, emphasizing the development of the different perspectives of language skills instead of the holistic development of language.

2.3 Language Imitation

As a powerful tool for learning activities, imitation is frequently discussed in the field of psychology and linguistics

(Kymissis and Poulson1990; Adank et al. 2010). For instance, elicited imitation (EI) is widely used to test language proficiency by asking students to listen to the stimulus sentences or other language forms and then repeat the sentences verbatim (Underhill 1987; Yan et al. 2016). Adank et al. (2010) argued that the imitation of an action would promote the understanding of that action, pointing that the imitation of accents can enhance the learners' comprehension of that accent. Robin (2021) indicated that a simulated environment could assist the development of the second language in preschools.

Imitation is the ability to understand the intentions behind others' utterances, instead of a simple copy of an action, which forms the foundation of second language development (Tomasello 2003; Lantolf and Thorne 2006; Robin 2021). Therefore, imitation is not limited to words and phrases, but also the capacity to understand the intention of human movement and behaviors in the activities and contexts (Robin 2021).　In other words, the imitation of utterances also involves the understanding on the intentions of speakers. This definition of imitation proposed by the previous studies is of fundamental significance, which will become a vital component in the seamless learning model proposed by this study.

3 Seamless Chinese Learning Model
3.1 The Principles of Seamless Chinese Learning Model for Adult Students
Based on the previous studies, this concept paper aims at building a seamless Chinese learning model (SCLM) for adult students. Three of the principles of seamless language learning(SSL1-SSL3) from Wong et al.(2015) will be adopted in this work. They are repeated as follows:

(**SLL1**) Creating opportunities for situationally/interactionally authentic activities among learners (and perhaps among learners, their family members or other community members, etc.), within and beyond the classroom.

(**SLL2**) Interweaving language input and output activities.

(**SLL3**) Interweaving learning of linguistic knowledge, application and reflection process-learning by doing and learning by reflection - and the process should be non-linear and recursive.

Furthermore, in order to achieve the research goal, this study will add three other principles, they are as follows:

(**SCL1**) Interweaving real-life and learning activities .

(**SCL2**) Dividing the language abilities into comprehension-writing (literacy) and listening-speaking skills. Different learning and teaching methods are applied to develop these two types of skills.

(**SCL3**) Focusing on the modified input and different patterns of interactions.

(**SCL4**) Nurturing the learning habits of language imitation.

Together with the SLL1-SLL3, these four principles play a fundamental role in the design of SCLM, especially SCL1, which is the most significant one among these principles. Removing the seam between real-life activities and learning activities is the core ingredient of SCLM. In this model, the seam between real-life activities and learning activities will be removed by creating an intermediate scene, where the students need to imitate the conversations

that happen in real-life and create the dialogues in the informal learning space. Furthermore, integrating formal and informal learning is also of great importance in SCLM; the seam between formal and informal learning will be removed by conducting the learning activities in some social activities.

3.2 The Learning Design of the Seamless Chinese Learning Model(SCLM)

The Seamless Chinese Learning Model consists of two components. One focuses on the development of Chinese listening and speaking skills; the other one is mainly concerned with the development of Chinese literacy, which includes the ability of comprehension and writing. The model designed for listening and oral skills is represented as SCLM 1, and the model for literacy is represented as SCLM 2.

3.2.1 The Learning Design for SCLM 1

SCLM1 is a scene-centered model, which means all the teaching and learning activities are organized according to the different scenes. In this model, an intermediate scene or a parallel scene will be created to combine the learning activity and the real-life activity. In this parallel scene, students are asked to imitate the conversations in daily life and then practice these conversations with their classmates or teachers.

Firstly, in the learning scene, students will learn the text and watch the videos, and they are asked to collect the new words and sentences that they find helpful. Then, in the intermediate scene, students will practice conservations with their classmates by using the words and sentences they have learned in the learning activity, which forms conversational interactions between non-native speakers (NNS). In this process, students are asked to correct the mistakes that his/her partners made or point out their confusions during the conversations. Therefore, the negation of meaning will occur in these NNS conversations, further promoting the development of the students' listening and oral skills (Long 1996). Teachers will not correct the students' mistakes during this period, but they will highlight the students' mistakes and then use the correct sentences to communicate with the students when they are practicing the conversations, which aligns with the concepts of modified input. In this process, the teachers tend to modify their language input to enable the students to understand all the key points and be aware of the mistakes they made before. In addition, the activity that happens in the parallel scene will be recorded for students to review their work. Teachers can also adjust the teaching pace according to the students' performance in this intermediate scene. Lastly, students are encouraged to apply the knowledge and skills they have learned to their daily life. For instance, they can have conversations with other native speakers in their daily life if possible.

Two platforms are involved in SCLM1. Platform 1 is used to conduct both the formal and informal learning activities, and platform 2 is only used to conduct the informal learning activities in the intermediate scene.

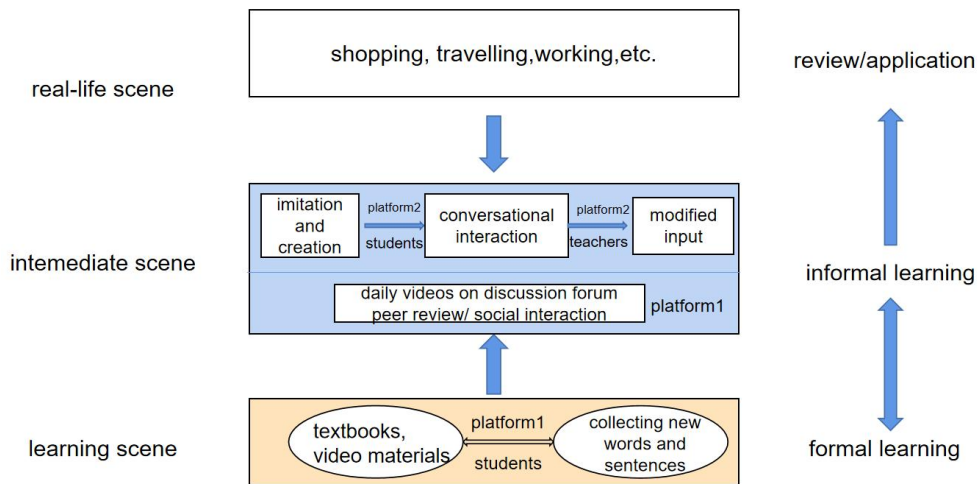The learning design for SCLM 1 is illustrated in Fig 2:

FIG. 2 THE LEARNING DESIGN OF SCLM1

3.2.2 The Learning Design for SCLM 2

SCLM 2 is a task-centered model that mainly focuses on developing comprehension and writing skills. All the learning activities are organized by the different tasks. In this model, the teacher will assign different tasks to the students, and the students need to follow the instruction to complete the tasks. This model is divided into two parts. The first part is related to formal learning, and the second one is about the informal learning part.

During formal learning, students will be assigned different tasks and texts. They need to read the texts, mark down all the new words that they have met, and then write down some sentences using particular patterns or words. After that, the students will enter the informal learning space. They need to complete the tasks assigned by the teachers and have discussions with their classmates regarding their writings. Similarly, the students are required to comment on their classmates' exercises. Furthermore, there is an online vocabulary dictionary in this model, which is built by all students. Every student needs to contribute at least three new words to this dictionary in each task, and the new words added into this dictionary will be open to all students at the end of every task. The sequence of these new words in the online dictionary is based on frequency, which means that the more students add the word to the dictionary, the higher this word will be listed in this dictionary. In addition, there is a discussion forum in the online dictionary so that students can share their opinions with their classmates regarding these new words. After that, the learning process will return to formal learning. The teacher will conduct an exercise according to the vocabulary in the online dictionary and the students' writing performance. Students need to complete this exercise, and the teachers will evaluate the learning effect according to the students' performance on this exercise. The formal learning is conducted on platform1, while the informal learning is completed on platform 2.

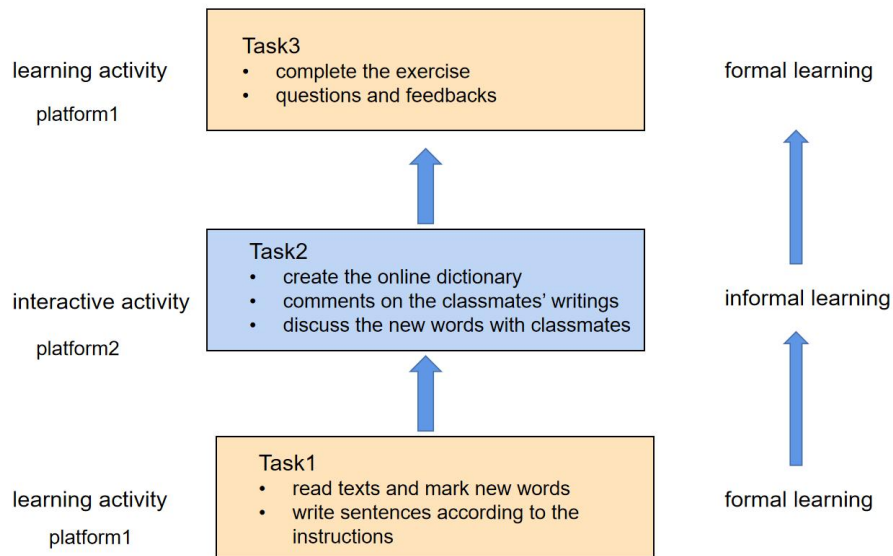The learning design for SCLM 2 is illustrated in Fig 3:

FIG. 3 THE LEARNING DESIGN OF SCLM2

In sum, the SCLM 1 mainly focuses on different scenes. In this model, students play an essential role in learning activities, while teachers play a secondary role. Teachers will design the contents according to the different scenes, but the students decide the critical points of the different scenes. In this learning model, an intermediate scene is created to bridge the formal and informal learning. Students need to apply what they have learned in formal learning activities to informal learning activities. There are two types of acquisition processes occurring in the informal learning activities. The first is the conversational interaction and modified input, which happens in platform1. The other is peer review or social interaction, which occurs in platform 2. After completing the formal and informal learning, the students are encouraged to apply their knowledge to real life to consolidate it.

The SCLM 2 emphasizes the different tasks. Teachers play a relatively significant role in this model, and they will lead the learning activities in this model. Teachers will give tasks and instructions to the students at the beginning, and the students need to follow all the instructions and complete the tasks. In the formal learning process, students need to read the texts carefully, mark the new words by themselves, and write some sentences according to the instructions. In the informal learning space, the students need to review others' work and build up an online dictionary together. After completing these two processes, teachers need to conduct an exercise according to the students' performance, and this exercise is used to evaluate the learning effect on vocabulary and comprehension.

3.3 The Application of Seamless Chinese Learning Model (SCLM)

Three cases will be discussed in this paper to illustrate the characteristics of SCLM. Case 1 and Case 2 are related to SCLM 1, focusing on the development of listening and speaking skills, while Case 3 is used to describe the feature of SCLM 2, which aims at developing comprehension and writing skills. As mentioned earlier, platform1 is used in both formal and informal learning, while platform 2 is only used in informal learning. In this study, Fanya platform (泛雅平台) developed by Chaoxing company(超星公司) is utilized as platform1. And the platform 2 contains VOOV meeting(腾讯会议) and Tencent text(腾讯文档), which are powered by Tencent company(腾讯公司).

3.3.1 The Characteristics of Platform 1 and Platform 2

Fanya platform is a professional online learning platform, and many universities in China use this platform for online teaching. In this platform, teachers can upload the videos and documents involved in the formal learning activities. In addition, this platform also contains a discussion forum to enable the students to discuss with each other. Therefore, this platform can conduct informal learning activities as well. The features of the Fanya platform are described in Fig 4:
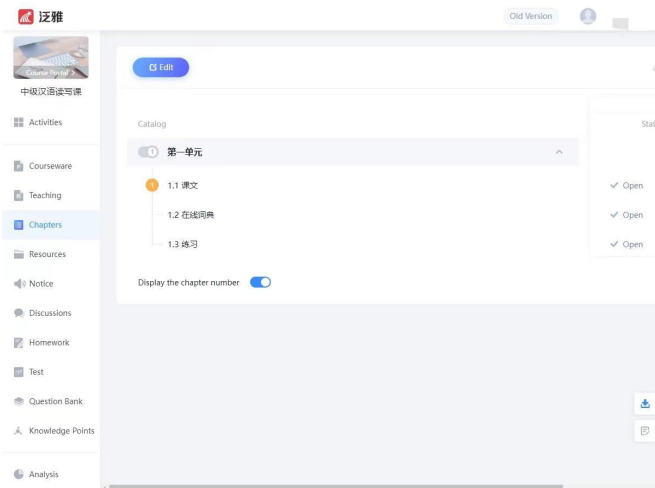

FIG.4 THE FEATURES OF FANYA PLATFORM

As shown in Fig 4, the Fanya platform consists of twelve different spaces, including Activities, Courseware, Teaching, Chapters, etc. The formal learning will occur in Chapters space, which usually contains some sub-chapters. Furthermore, there is a Discussion space in this platform, where informal learning occurs. In addition, the yellow dot in section 1.1 is the task point, which is the critical content of this section. Students need to complete all the task points given by the teachers, and the data on their learning performance will be recorded in the Analysis space, as described in Fig 5:
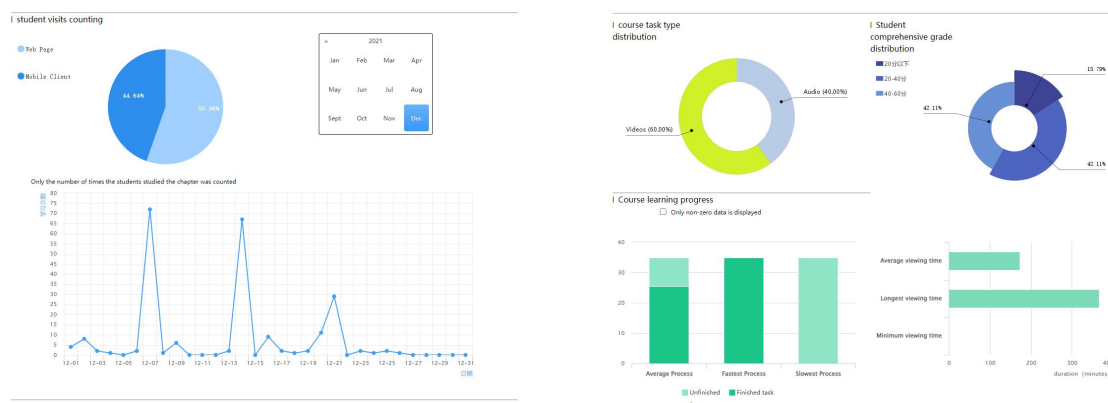

FIG. 5 THE DATA IN ANALYSIS SPACE

Students' learning performances will be depicted in the Analysis space, including the data on students' visits counting, comprehensive grade distribution, course learning progress, etc.

Teachers will use VOOV meeting as platform 2 to conduct the informal learning. Students can practice conversatio-

ns with their classmates and their teachers in VOOV meeting room. The details of this online meeting room are described in Fig 6:
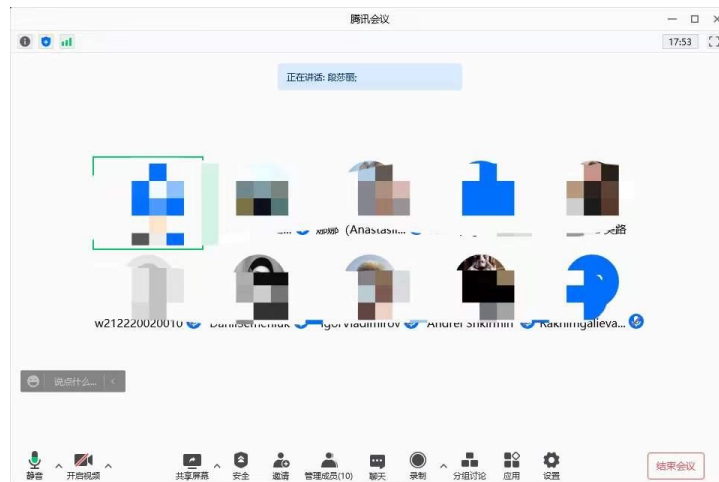
FIG.6 VOOV MEETING

In addition, Tencent text is also used in platform 2 to carry out informal learning activities. During informal learning, the teachers will create a form in Tencent text, and all students need to fill out this form according to the instructions. This form will be synced to the Fanya platform directly, which effectively bridges formal and informal learning spaces. The format of Tencent text is shown in Fig 7:
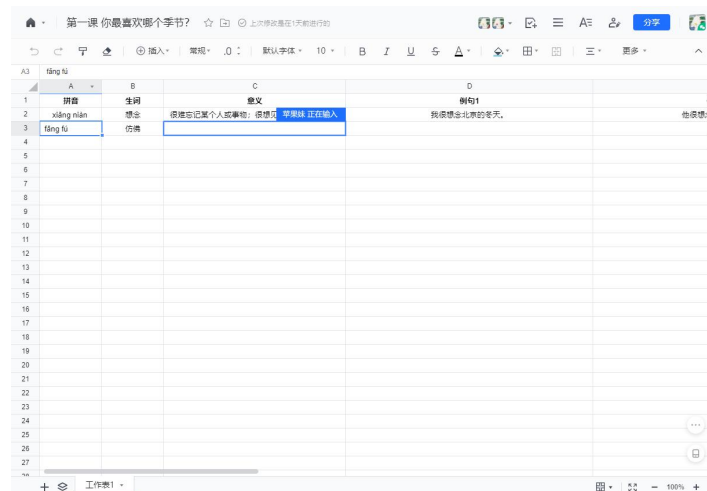
FIG. 7   THE FORMAT OF TENCENT TEXT

3.3.2 The Instantiation of SCLM 1

Case 1：买东西(Shopping)

This case is the example of SCLM 1, focusing on the development of speaking and listening. In this case, only platform 2 (VOOV meeting) is involved in the informal learning, and the main procedures are as follows:

Formal learning: Take place in platform 1 (Fanya platform), use videos and texts as learning materials.

Informal learning: Take place in platform 2 (VOOV meeting), including interaction between non-native speakers

(practice with classmates) and interaction between a native speaker and non-native speaker (practice with teachers).

Application: Practice the conversations in real-life scenes, using the sentences learned from formal and informal learning activities

Case1 is about shopping. In formal learning, students are asked to watch the video on shopping and read the text in platform1 and then collect the sentences used in the video and the text. The details of this formal learning activity are described in Fig 8:

FIG.8　CASE1:买东西(SHOPPING)

After that, students will enter the VOOV meeting room (platform 2) to participate in the informal learning activities. Students will be divided into many small groups, and they will use the sentences from the video and texts to have conversations on shopping with their classmates. In this parallel scene, some students will play the role of sellers, while others will play the role of buyers. Some necessary details for this scene, such as the information of goods, are also provided. In this process, students are asked to imitate the speakers' pronunciations and intonations in the video from formal learning space, and this action of imitation will promote the students' understanding of pronunciations, intonations, word structures, and other elements of Chinese (Robin 2021). For instance, Chinese is a tonal language, which means tones are paramount in the pronunciation of Chinese. Imitation of utterances will help students understand the features of different tones and tell the differences between tones and intonations. Besides, they must also correct others' mistakes immediately during the conversations to complete the peer review, enhancing their comprehension of grammar and vocabulary.

Moreover, students need to practice the conversations with teachers, and the teachers will adjust the contents of the dialogues according to the students' mistakes. This modified input will effectively make students aware of the mistakes they had made before (Long 1996). The features of the VOOV meeting room for the shopping scene are described in Fig 9:
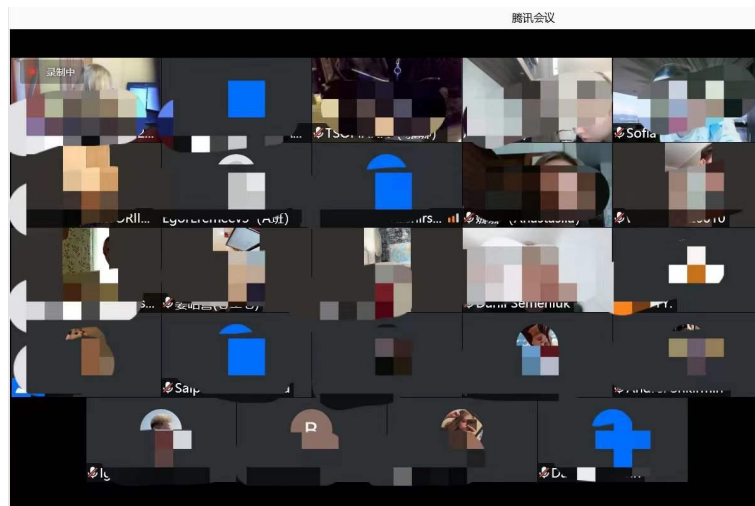
FIG. 9 VOOV MEETING FOR CASE 1

Furthermore, in this learning model, students are encouraged to apply the knowledge to their daily life. For instance, students can go to shopping malls to practice the conversations if they are in China, and they can also go to the Chinatown in their home countries to buy stuff from a native Chinese speaker if possible.

Case 2：我的视频日记(My Video Diary)

Only platform 1 is involved in this case, and the main procedures are as follows:

Formal learning: Take place in platform 1 (Fanya platform), use videos as learning materials.

Informal learning: Take place in platform 1, including social interaction and   peer review.

Review and feedback: Take place in platform 1, teachers will comment on the revised video.

Video diary refers to the video that shows what a person does in one day, including social habits and learning activities. In this case, students will watch a video diary first and mark all the sentences used in this video. Then, the students are required to record a short video diary by themselves to show what they have done in one day. Similarly, in the students' video, they need to strictly imitate the sentences, intonations, and other significant components used in the video diary from the formal learning space. Similarly, this imitation is not a simple copy of an utterance or action but a capacity to understand that video diary's structure and meaning. Students will understand the ways of thinking of a native Chinese by imitating his/ her video diary, which is crucial for developing Chinese ability. In addition, students need to upload their videos to the discussion forum, discussing with their classmates the form and contents of their videos. Furthermore, they are asked to comment on the videos of other students. Then they need to revise their videos and upload them again to the platform. Teachers will comment on the final version and give feedback on their video diaries.

This case aims at building a social network for students, bridging the formal and informal learning spaces. Asking students to upload the video diary to platform1 and share their opinions with their classmates will make them treat

this learning space (platform 1) as a social platform, which will promote the integration of formal and informal learning spaces.

3.3.3 The Instantiation of SCLM 2

Case 3 《北京的四季》 -- 中级汉语读写课 (The Four Seasons in Beijing ---Intermediate Chinese Comprehension and Writing)

This case is an instantiation of SCLM 2, which develops Chinese comprehension and writing skills. This case is a module designed for Intermediate Chinese Comprehension and writing. Unlike the previous tasks, this case is centered on tasks given by the teachers, which means teachers instead of students decide the core contents. However, it is worth pointing out that this case is also in line with the notion of combining formal learning and informal learning activities. Likewise, both platform 1 and platform 2 are involved in this case. The procedures of this case are described as follows:

Formal learning: Take place in platform 1 (Fanya platform), use texts as learning materials.

Informal learning: Take place in platform 1 and platform 2, students need to complete the tasks and peer review.

Exercise: Take place in platform 1, use exercises to evaluate the students' performance and learning effects.

During the formal learning, students need to read the texts: The Four Seasons in Beijing (北京的四季) and watch the related videos. In informal learning space, teachers will assign two different tasks, and the students are asked to complete these tasks under the instructions. The details of these tasks are shown in Fig 10:
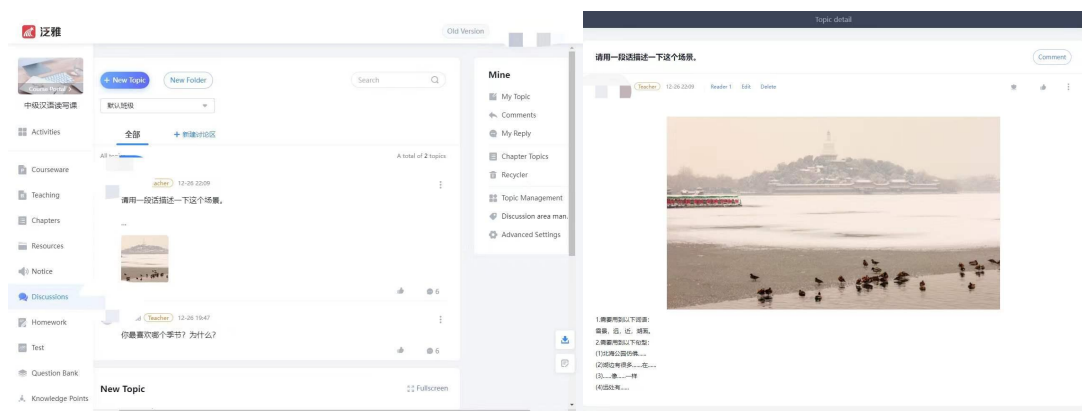
FIG. 10 TASKS IN CASE 3

In informal learning activities, students are required to review others' answers in the discussion forum. Additionally, they need to build an online dictionary in Tencent text , and contribute at least three new words to this dictionary. This online dictionary will update to platform 1 simultaneously, so that students can check the new words when they are in formal learning space. Besides, teachers will prepare an exercise based on the new words in the online dictionary and the mistakes students made in the previous tasks, and this exercise is used for teachers to evaluate the learning effect and adjust the teaching pace.

In summary, the three cases discussed in this paper satisfy the seven principles of the Seamless Chinese Learning

Model (SSL1-SSL3 and SCL1-SCL4). Case 1 and Case 2 are designed to develop Chinese listening and oral skills, while Case 3 mainly concentrates on literacy (SCL2). The intermediate scenes in Case 1 and Case 2 integrate formal and informal learning (SSL1, SCL1). Students need to imitate the native speakers' language action in this parallel scene, including their pronunciations, choices of words, and intonations (SCL4). Moreover, language input and output are also emphasized in these three cases, and the modified input and conversational interaction play a vital role in the learning activities in case1 (SLL2, SCL3). These three cases form a cycle of learning-reflection-application, and the students are encouraged to apply what they have learned about language in everyday life (SLL3, SCL1).

4 Conclusion and Recommendations

This study proposes a theoretical framework based on the previous studies(Chan et al. 2006; Wong et al. 2015), focusing specifically on the seamless Chinese learning activities for adult students. The overall aim of this framework is to utilize mobile technology to facilitate Chinese learning in different spaces, using the theories of modified input, conversational interaction, and language imitation. The Seamless Chinese Learning Model comprises two components. The first one emphasizes the skills of listening and oral skills (SCLM 1), while the other one focuses on Chinese literacy (SCLM 2). Furthermore, three representative cases are discussed in this paper to investigate the essentials of the SCLM, focusing on the characteristics of the intermediate scene. It is worth pointing out that a new definition of language imitation is adopted in this study, which becomes a fundamental ingredient of the SCLM. Although this study mainly focuses on second language acquisition, the theoretical foundations of the SCLM, such as language imitation and interactional input, are also applicable to first language learning. Thus, this study may shed some light on L1 language learning. A discussion of the effectiveness of this theoretical model lies beyond the scope of this study. Therefore, more research is needed to account for the long-term effects of this theoretical model.

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Implementation Strategy of School Martial Arts Teaching Reform

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Abstract

With "one school one boxing" as the new idea for martial arts teaching reform, this paper, adopting literature research method, conducts a research on the implementation strategy of school martial arts teaching. It concludes three strategies from three levels. Firstly, from the perspective of the whole nation, with "Martial Arts Federation" as the lead, relevant authorities should optimize the management structure of marital arts and strengthen its theoretical construction. Secondly, in terms of district, the hometown of martial arts should build up integrated management structure, strengthen the training of teachers and organize school martial arts teaching demonstration activities with local boxing characteristics. Thirdly, at the level of designated school, they should cultivate students' interest in martial arts and shape students' scientific value system.

Key words: Martial arts; One school one boxing; Strategy; Martial Arts Federation

1 Introduction

Professor Zhao Guangsheng of Shanghai University of Sport, after studying the teaching history of school martial arts and its status quo, raises his thinking of martial arts teaching, with "one school one boxing, practicing combined with actual combat, art fusion, equal emphasis on both moral education and martial skills" as the new ideas for teaching reform and "emphasizing martial arts actions, strengthening skills, quality refinement, lifelong benefit" as its operating mode and basic principles.

Given the requirements of operating ideas of martial arts teaching reform as well as the regional disequilibrium in school martial arts development in current China, Professor Zhao puts forward the specific implementation strategies for school martial arts teaching reform from the perspectives of the country, the hometown of martial arts, the designated schools and the martial arts teaching, aiming to achieve "physical fitness, self-defense, self-cultivation, moral standard promotion through education"[1].

2 Core Concepts

"Strategy" refers to a set of plans to achieve an objective or a course of action or a method that is designed according to the current situation. In Records of Personages Jieshi, Liu Shao, a writer of the Three Kingdoms Period (specifically Wei), once said "A crafty man, who is good at planning and scheming, can work out wonderful strategies, but does not know the benefits of obeying the law". Therefore, "strategy" refers to the process of designing a number of corresponding plans to deal with the problems that may arise so as to achieve the preset goals. It also refers to the following-up process of working out new plans to the changes of the situation to finally achieve the goal.

3 National Level: Optimizing the Management Structure of Marital Arts and Strengthening the Theoretical Construction

3.1 Re-Examining the Teaching Policies and Teaching Contents of School Martial Arts in Current China

The current school teaching should adhere to the principles in "Opinions of the CPC Central Committee and The State Council on Strengthening Youth Sports and Enhancing Youth Physique", "National Medium- and Long-term Education Reform and Development Plan Outline (2010-2020)", the "Resolution" passed by Third Plenary Session of the 18th Central Committee of the CPC, "Educational Guidelines of Improving the Excellent Traditional Chinese Culture" and other documents. This is, on the one hand, to ensure that the school martial arts teaching can complete the national task of "moral education", and on the other hand, to ensure that the implementation strategies are in line with the basic national policies and requirements.

In addition, Supportive policies should be formulated, which is to ensure that the implementation of martial arts teaching is in accordance with educational concepts proposed by National School Sports Federation (Wushu Project), which is also to ensure that martial arts teaching in developed cities, where the teaching is carried out well, can be scientifically and rationally popularized nationwide. Meanwhile, the evaluation mechanism of the aforementioned cities and designated schools should also be established and improved. And the evaluation mechanism of Wushu hometown and underdeveloped areas should be different. Meanwhile, "teaching materials of various grades should be developed and broadened to increase knowledge of Chinese traditional health preservation, health care and effective body-building exercise"[2].

3.2 Improving the Management Structure of School Martial Arts

National School Sports Federation (Wushu Project) is a nationwide organization of school martial arts which plays a leading role in promoting martial arts teaching in the whole country. The construction of the management structure in the Federation should give full play to the strengths of Communist Youth League, Education and Sports Department and various social forces in both prefectural and municipal areas, so the construction task can be set, objectives clarified, different departments coordinated and the construction can be efficiently and flexibly completed. "The simple thinking mode of educational research should be of more complexity. Researches on educational theory should pay more attention to its theoretical originality"[3]. Not only should Physical education institutes and normal universities give support to the training of martial arts teachers, consultation of students' physical and mental health and the guidance of martial arts skills, but they should also offer their guidance and assistance to martial arts teaching in schools. The organization departments of the Communist Youth League should be responsible for the job of publicity and education, guiding young people to hold the belief of "Fitness is the first step to patriotism."

4 District Level: Building up the Integrated Management Structure and Strengthening the Training of Teachers

4.1 Clarifying the Implementation Requirements of Wushu Teaching in Hometown of Martial Arts

"The real school reform lies not in the innovation in a certain aspect, but in the cultural change to ensure the devel-

opment of the whole school"[4]. According to the proposal of improving the Chinese traditional culture education and strengthening physical education and extracurricular exercise offered by the State Council and Ministry of Education, and taking into consideration the status quo of martial arts teaching in the hometown, the regional characteristics and development of martial art boxing, local economic and environmental conditions as well as our country's current and long-term needs of improving traditional Chinese culture education, schools at all levels and of all types throughout the country should, by resorting to the advantages in martial arts hometown, study and formulate specific implementation steps of martial arts teaching activities in this area, and then, step by step, put them into practice in local schools.

4.2 Building up the Integrated Management Structure of Martial Arts in Hometown Schools

With Marital Arts Federation as the lead, the teaching institutions of martial arts in the hometown schools should set up their own management organizations by taking the leading group of National School Sports Federation (Wushu Project) as an example; and relevant departments in local government, education and sports bureau, the Communist Youth League and in other sectors should work together to constitute a powerful and efficient organization, so as to ensure the successful implementation of martial arts teaching in hometown schools.

4.3 Strengthening the Introduction and Training of Martial Art Teachers in the Hometown

"Researchers' thinking pattern not only reflects their stance and view from which he or she perceives teaching problems, but also determines their fundamental way of solving the problems"[5]. With Marital Arts Federation as the lead and the joint participation of local physical education institutes and normal universities, education authorities in martial art hometown, after detailed study of the local situation, can make use of summer and winter vacation and invite famous local traditional boxers, experts in martial arts and education as well as retired martial art athletes to give lectures on martial art teaching to Wushu teachers or teachers of other majors but with Wushu skills in schools and other organizations. Besides, applicants from different disciplines with martial art expertise and teaching abilities can be given priority in the recruitment and appointment of school teachers.

5 School Level: Cultivating Students' Interest in Martial Arts, Shaping Students' Scientific Value System

For designated schools of traditional martial art sports, martial arts education includes the following connotations: In terms of function, martial arts teaching is to cultivate students' skills of fighting and practicing, develop their ability to respond to and defend themselves in a crisis, and meanwhile, stimulate their interest in martial arts. In terms of value, martial arts teaching reform plays an important role in the program of improving the excellent traditional Chinese culture education. So martial arts teaching should take the responsibility of improving students' physical and mental health, help students develop the values of patriotism and loyalty, harmony and friendship, courage and self-confidence, honesty, and righteousness, in this way making itself a part of the great rejuvenation of the Chinese nation.

5.1 Expanding Classroom Teaching and Enriching Martial Arts Activities inside and outside the Campus

The teaching content in schools of traditional martial art sports should be related to real life situation and students' living environment. Besides, it should also include the popular martial arts skills and film and television martial arts skills to closely associate itself with modern social life and at the same time, expand students' learning scope. As the continuation of the classroom activities, extracurricular activities of martial arts include martial arts group activities on the scale of school, grade and class, inter-school martial arts group activities, martial arts group activities jointly formed by society and school, social martial arts group performance in school, martial arts teaching and communication and so on. Through participation in these extracurricular activities, students can truly get to know martial arts, deeply understand and experience wushu and increase their enthusiasm for wushu, which not only enriches students' after-school cultural life, but also improves their quality of life. In this way, the educational effect of wushu is thus extended.

5.2 Strengthening the Construction of Campus Culture while Developing School-Based Martial Arts Curriculum

"School is an important front for spreading martial art. Thus, incorporating Taekwondo into school curriculum ensures its stable and long-term propagation objects[6]. Campus martial arts culture is the link between physical education and the excellent traditional Chinese culture education. As the extension and development of teaching practices in classes, campus martial arts culture aims to attract students to actively experience martial arts activities, which can naturally introduce martial arts into real life and which can transform the single technical teaching of martial arts into the combination of technical teaching and written culture education. This will definitely expand students' vision of martial arts. There are some activities of developing campus martial arts culture. The first is activities of martial arts skills display and martial arts pictures appreciation, which can improve students' interest in martial arts and enrich their school life. The second is activity of "one week one boxing" in the class, which is easy to carry out especially when students' are doing extracurricular activities or class-break setting-up exercise. The third is the martial arts cultural activities, like pasting indoor and outdoor martial arts posters and martial arts celebrity quotes, designing blackboard newspaper and publicity window, etc. The purpose is to promote students' physical and mental development through the cultural atmosphere of martial arts in the campus.

6 Conclusion

Due to the unbalanced development of martial education in China, the implementation of martial arts teaching reform is feasible only by adhering to the idea of "one school one boxing". To be specific, with Martial Arts Federation as the lead, it is essential to build complete organization structure of school martial arts, and then sum up the successful experience of martial arts teaching gained from cities or designated schools. By adhering to the principle of promoting work in all areas to promote school martial arts education to the whole country, the teaching aims of school martial arts, which are to build the body and to defend oneself as well as cultivate people's morality and character, can thus be successfully achieved.

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An Impact Analysis on Integrity Education of Student Associations
——*Case Study of Qingfeng Club of Shandong Jiaotong University*

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Abstract

Student associations play an important role among college students. How to give full play to the influence of the community and the self-education function among students is the focus of the article discussion and practice, especially in promoting the campus clean culture, improving the sense of mission, sense of justice and integrity of college students. This article attempts to use integrity education to embed the work of associations into the campus integrity culture, so as to achieve the goal of educating people on the campus integrity culture and to promote the sustainable development of the construction of college students' associations.

Keywords:student association; campus integrity culture; integrity education

1 Community Work and Campus Integrity Culture

1.1 The Significance of Student associations on The Campus Integrity Culture

There are frequent incidents of corruption on campus among college students. Due to the weak awareness of students' integrity, the mental corruption of students caused by personal behavior and habits occurs repeatedly. In the construction of a clean culture in colleges and universities, we must face up to the problems existing in the current society and cannot avoid the status quo. Some bad habits in the society should be explained to college students rather than avoided. The current market economy of "benefit", the western interests of decadent values, network culture negative thoughts impact the college students values, morality, which put forward higher requirements for college administrators, teachers, college students' outlook on life, values, degeneration characteristics, such as scholarships, grants, advanced evaluation excellent student work, must pay attention to honesty problem is easy to produce "domino effect", make college students during the ideological "learning corruption"[1]. Some teachers appealed: "College students will be the pillars of the country in the future. If daily behaviors and living habits cannot be cultivated, how can they take greater responsibility" ? The seemingly simple common sense of life has become a reality in campus life and group life. In addition to the factors of personal behavior, the life culture of mutual assistance, care and support in the group needs to be further promoted and guided. Therefore, it is a meaningful self-education to let more students pay attention to campus incorruptibility and advocate campus incorruptibility culture through the guidance of student associations on campus incorruptibility culture and the influence of associations.

1.2 The Three Major Classrooms of Honest Culture Education with Student Associations as the Backbone

Student associations are self-organized by students, approved by the school, and selected through large-scale training. They have the advantages of incorruptibility education. They take advantage of the characteristics of mutual learning and influence in the establishment of an incorruptible culture by associations. Through the sharing of incorruptibility knowledge and experience between associations, discussion and mutual influence, college students can gradually improve their individual integrity behaviors in a subtle way, and transmit a campus life culture of mutual assistance, care and support[2]. From 2017 to the present, in order to give full play to the supervisory role of the clean integrity culture on the students, actively promote the innovative publicity and clean education forms,innovative education carriers and other aspects have carried out various explorations, and achieved remarkable results. Qingfeng Club of Shandong Jiaotong University uses the online public account to publicize the knowledge of incorruptibility culture, and at the same time, it makes full efforts to make full efforts, such as hanging propaganda banners on the campus living area, organizing the publicity of incorruptibility cultural knowledge, signing the proposal letter, and gradually forming a comprehensive three-dimensional public opinion education of integrity, which makes the culture of integrity gradually internalize and externalize. For a long time, college students have been educated ideologically and politically, and integrity culture have been highly valued by colleges and universities. Accurately understanding the significance of ideological and political education and in corrupt culture in colleges and universities, and accurately grasping the connection between the two are the keys to integrating ideological and political education of college students into the incorruptible culture of colleges and universities.

Incorruptible culture is an important part of campus culture in colleges and universities, and it is also a valuable resource and ideological basis for college students' ideological and political education. In the era of all media, strengthening the integration of integrity culture into the ideological and political education of college students can enrich the curriculum resources, enhance the interaction and improve the effectiveness of ideological and political education. Therefore, it is particularly important to carry out clean integrity cultural activities, such as: college students' integrity culture theme debate, integrity culture knowledge competition, integrity culture theme lectures, etc. On December 1, 2021, the launching ceremony and the swearing in ceremony of the 4th 12.9 College Student Integrity Education Activity Month for the 100th anniversary of the founding of the party, "Breath of the Party, Integrity and Integrity", kicked off by the leaders of the school's Disciplinary Committee. The monthly participation rate of the 12.9 college students' integrity education activity reached 5,000 person-times significantly. Obtained high evaluation and affirmation, the students learned and understood the culture of clean government through careful thinking and deeds, so that the spirit of clean government has been carried forward continuously[3]. On this basis, the "Integrity Station" was established in our school in 2010. Through the "Integrity Station", we established a school spirit of integrity, and brought in the distance between students and the culture of integrity. We can feel the integrity culture of the campus at close range. On the other hand, the community class paid attention to a series of problems caused by the living habits and lifestyles of the students in the dormitory, especially the integrity of the freshmen's campus adaptation[4]. Since 2017, the community classroom of the integrity education of the community, there are 60 good friend volunteers, a total of 300 volunteers, each year, enter the freshman dormitory, or share the campus life, learn the knowledge of integrity, share the experience and experience of excel-

lent community deeds, and pass on mutual help Mutual aid, integrity, and supportive campus culture of integrity.

After preliminary research and a series of thoughtful plans, since 2017, the student rights and service associations have been the organizers and advocates of the student community class, and have gradually promoted the development and construction of the student community class[5].

2 The Practice and Effect of Student Associations in Building a Clean and Honest Culture on Campus

Since the establishment of Qingfeng Club of Shandong Jiaotong University in 2017, as the first incorruptible cultural education association of Shandong Jiaotong University, it has achieved remarkable results in promoting incorruptibility education through various forms. The impact of the practice effect is analyzed and studied. The student association conducted a survey and paid a return visit to the graduates from 2017 in the form of a questionnaire, to find out "what you would do if you found that people around you had incorrupt behavior, what aspects of integrity education can be reformed for college students, what the current situation is, what is the most important thing in the work of integrity education for college students, what can college students get from participating in integrity education, etc." as the core, the investigation and analysis on the theme of "giving full play to the integrity education of students' associations and promoting the campus integrity culture and educating people". A total of 1,000 questionnaires were sent and 865 were returned, of which 865 were valid responses and were invalid. The following is the chart and the data analysis of the students' questionnaires, which shows that honest education plays an important role in educating people.

As shown in Figure 1, what would you do if you found that the people around you had incorrupt behavior? Figure 2. What aspects of integrity education for college students do you think can be reformed? Figure 3. What do you think is the most important thing in the current work of integrity education for college students? Figure 4. What can college students get from participating in integrity education?
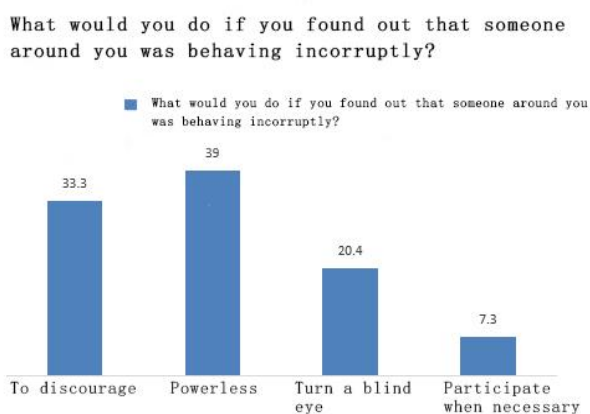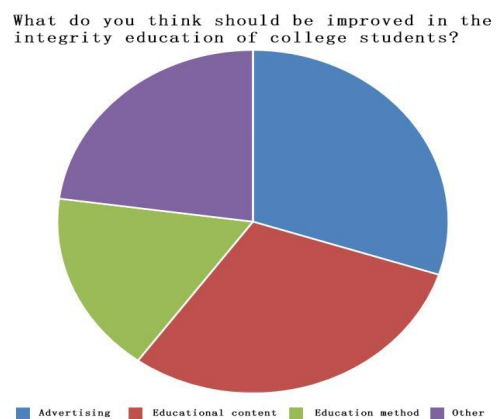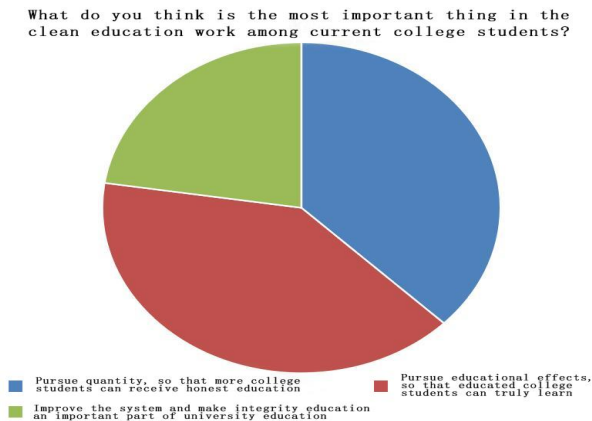

FIG 1.

FIG 2.

What do you think is the most important thing in the clean education work among current college students?

Pursue quantity, so that more college students can receive honest education

Pursue educational effects, so that educated college students can truly learn

Improve the system and make integrity education an important part of university education

FIG 3.

A Enrich your extracurricular life and add fun to your university — 442

B Instill a culture of integrity and enhance awareness of integrity — 382

C Learn relevant skills and exercise professional ability — 338

D Meet like-minded people and expand university communication — 286

E Get the certificate of participation and improve the score of the comprehensive test — 384
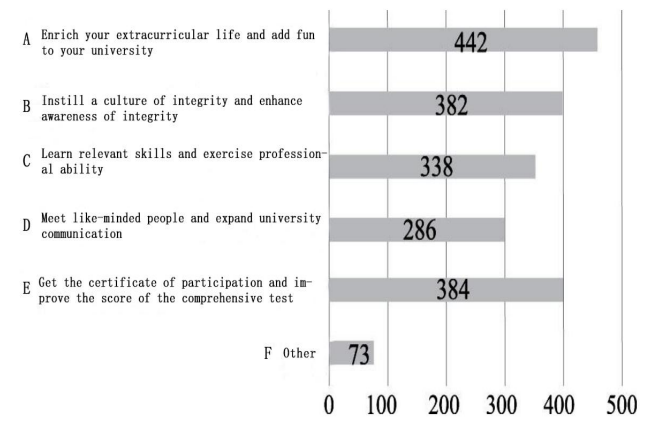
F Other — 73

FIG 4.

According to the survey results, 33.3% of people choose to dissuade incorrupt behaviors; 39% of them say they could not do anything about it; 20.4% of them choose to turn a blind eye, and only 7.3% of them choose to participate together when necessary. In terms of integrity education reform, 29.6% of people choose publicity work; 30.4% of people choose education content; 16.5% of people choose education method; 23.5% of people choose others. In terms of the most important thing in integrity education work, 37.7% of people think that the pursuit of quantity can let more college students receive integrity education; 35.4% of people believe that the pursuit of educational effects is the most important, because it can help the educated college students truly learn: 26.9% of people believe that improving the system and making integrity education is an important part of university education. In terms of the benefits of participating in integrity education, 22.7% college students think it can enrich after-school life and increase interest to university; 20.1% think it can cultivate clean culture and improve the awareness of integrity; 17.3% think it can help them learn relevant skills and exercise professional abilities; 15.0% think it can meet like-minded people and expand university communication; 20.2% thought that they could obtain certificates of participation and increase their scores in comprehensive tests, and 4.7% choose other.

Shandong Jiaotong University, as a characteristic transportation institution, has a long history and an excellent style of work and study. Students shoulder the important mission of the development of the motherland's transportation cause. In order to meet the needs of their own professional and physical development, students should adhere to the concept of social honor and disgrace, which is a specific motivating indicator for the campus culture of integrity education. Such ethics education efforts are gradually being combined with public service, self-discipline and integrity. For those who have been engaged in transportation for a long time, honesty and trustworthiness are the most basic professional moral quality. Whether on duty or off duty, they must always remind themselves to make correct judgments, and they must not indulge in temptations or falter in their reactions. The promotion of integrity culture and activities enables students to strengthen their own missions and responsibilities, keep pace with the times, work solidly, strengthen knowledge accumulation, and seek truth and be pragmatic. awareness of honesty and trustworthiness, establish a good style of study, and enhance the sense of responsibility to serve the whole industry and the whole society.

After club students enter the society, the employers have a good response to the club graduates, and the club graduates can clearly understand that the improvement of ideological and moral and legal quality is equally important. In the process of accepting integrity culture education, students must strengthen the instillation of legal rules in the main body of the norm, and if necessary, they can display anti-corruption treaties in accordance with the legal derivative process and supporting system to reduce the risk of going astray. In the process of marine voyages, the students majoring in maritime affairs have reduced the incidents of oil stealing and oil spills in the past, reduced the accidents in the shipping industry, promoted the healthy development of the shipping industry, and improved the school's reputation. At the same time, it has promoted the construction of a strong country in transportation.

3 Prospects of Student Associations in Practical Education

Since 2017, the student associations of Shandong Jiaotong University that have participated in clean culture education include Qingfeng Club, Red Boat Research Club, and Weilan Qiushi Club. Through the learning and spreading of their own integrity, honesty, volunteering deeds, skills, and colorful integrity cultural themes in the sharing sessions, the student associations allow each student and each group to have their own theme of integrity culture education. As a mature educational method and tool, the integrity culture education led by student associations has been widely implemented on campus, and has been continuously improved through practice. It will play a greater role in the construction of integrity culture. The student community classroom, guided by teachers and created and organized by students, will cultivate the campus incorruptibility culture of "integrity, integrity, self-discipline, and discipline", cultivate a new generation of "honest people, clean things" and bring the theme to a more professional level. Let the cultural education of college students' integrity clubs goes deeper into the families of college students, and improve the awareness of college students' family members on the integrity. The concept of "integrity and shame of corruption" advocated by universities can be incorporated into family education, which can be further extended to all aspects of social education and make college students become advocates of integrity culture. One of the key tasks advocated in integrity education is to make young people the main force of family anti-corruption propaganda through moral education in schools.

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Research on the Development of Library Cultural and Creative Products Based on Traditional Culture

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Abstract

Culture is the spiritual lifeline of a nation. Inheriting and innovating traditional culture is one of the important functions of the library. The library cultural and creative products (LCCP) are important carriers for inheriting excellent culture. Based on traditional culture, developing cultural and creative products (CCP) has become a new way for libraries to expand their functions and spread traditional culture. The development of LCCP in China is still in its infancy, and there are many problems in both theoretical research and development practice. Starting with the introduction of Chinese traditional culture, this paper probes into the definition, characteristics and value of LCCP, and clarifies the feasibility and necessity of developing LCCP. On this basis, through in-depth analysis and summary of the current situation and existing problems of LCCP development, combined with the actual situation and characteristics of the library, this paper puts forward ideas and suggestions suitable for the development of LCCP.

Key Words: Traditional Culture, Library Cultural and Creative Product (LCCP), Development

1 Introduction

In the long history of human development, Chinese traditional culture is one of the oldest cultures in the world. With the upgrading of China's cultural industry and the progress of social spiritual civilization, the library industry continues to expand its functions and service scope, and begins to assume more social responsibilities. LCCP is the modern form of historical and cultural products, which can carry traditional culture in the library collections. In this way, traditional culture can be easily understood and touched by the public.

On the basis of clarifying the concept of CCP and LCCP, this paper expounds the role and value of LCCP. Then the feasibility and necessity of developing LCCP is analyzed from the aspects of cultural heritage, policy support, resource characteristics and reader resources. The next part discusses the current situation of the development of Chinese LCCP, taking the development of LCCP in the National Library of China and the Shandong Province as an example, looking for product development and promotion models, and analyzing their advantages and disadvantages.

The sixth and seventh chapters are the key parts of this paper. The sixth chapter analyzes the problems existing in the development of Chinese LCCP from seven aspects: policy mechanism, innovation consciousness, fund guarantee, market positioning, professional personnel, development depth and promotion scope. On the above basis, the seventh chapter draws on the successful experience of excellent cases in China and abroad, combining the characteristics of the library, to put forward the ideas and suggestions for the development and promotion of LCCP,

and to provide the specific design and development methods.

2 Chinese Traditional Culture

China is a country with 5000 years of excellent cultural heritage. Chinese excellent traditional culture is accumulated in the historical process of civilization evolution.

2.1 Definition of Chinese Traditional Culture

Tradition refers to past forms of knowledge, competencies, materials, manufacturing processes, signs, values, and beliefs[1]. Broadly speaking, culture refers to the sum of material wealth and spiritual wealth created by human beings in the historical development of production practice and social practice. In a narrow sense, culture refers to ideology of society, including literature, art, science and education, morality, customs and habits etc. It is the sum total of spiritual achievements such as thinking mode, value orientation, ideal personality and ethical concepts that can affect the whole society. Recently, tradition has been highlighted as a potential resource that can be used to provide competitive advantage[2].

2.2 Chinese Traditional Culture Represented by Confucianism

The core of Chinese traditional culture is Confucianism, which has a far-reaching impact on Chinese traditional political culture, ethics, cultural education, customs and national spirit. Confucius is the representative of Confucian culture and thought. His great wisdom has also been praised by the world. Confucian culture and thought is also China's outstanding contribution to world culture. Confucian culture advocates self-cultivation, family harmony, governing the country and peace in the world. It is the master key to solve world problems. Confucian cultural thoughts advocate benevolence, righteousness, propriety, wisdom, faith, forgiveness, loyalty, filial piety and fraternity. The Confucian cultural thought advocates that politics should be based on morality, and stresses the golden mean, balance and Appropriateness. It advocates being kind to neighbors, being kind and benevolent, repaying grievances with virtue, and advocating harmony but difference and harmonious coexistence. Chinese traditional culture is the crystallization of the precious wisdom of the Chinese nation. It provides valuable spiritual wealth for the Chinese people and the people of the world.

3 Cultural and Creative Industry and Cultural Creative Products

Cultural and creative industry is a new industry produced under the background of economic globalization. Creative industries experience a variety of changes, which are driven by differing forces[3]. CCP are artistic derivatives formed through the creative process of interpreting and reconstructing cultural resources.

3.1 Cultural and Creative Industry

The definition of cultural and creative industry varys in different countries. In a book published in 1998, the concept of cultural creative industry is proposed as: an industry with the potential to create wealth and employment opportunities through the generation and utilization of intellectual property rights that originates from individual concepts, skills and talents. The Chinese domestic definition of it is that cultural and creative industry is an internal connection cluster that takes creativity and culture as the foundation of the industry, takes creation as the means of

industrial development, and takes intellectual property rights as the characteristics of industrial transactions. The aim of it is to provide the public with high-quality cultural enjoyment.

3.2 Cultural Creative Products

CCP are a new type of cultural products, which can be interpreted by the symbolic significance, humanistic spirit, aesthetic characteristics and cultural elements of cultural resources. Through the designer's own understanding of culture, the cultural elements of original works of art are combined with the creativity of the product itself. CCP are valuable works of art that originate from cultural themes and are transformed through creativity. They can be both concrete physical products and intangible services, which can meet people's material needs and enrich people's spiritual needs. The value of cultural and creative products includes three aspects: the value of cultural content, the value of creative content, and the cost of the carrier, that is, the product. The cultural and commercial value of CCP is high because the creative design of cultural content increases its added value.

3.3 Library Cultural Creative Products

LCCP are physical products and non physical services with library characteristics, cultural connotation and intellectual property rights developed by the library, relying on the collection resources such as library special collections and ancient books, as well as library services, library buildings, local regional culture and other elements. LCCP can make traditional culture easy to be understood. LCCP can also narrow the distance between traditional culture and modern civilization, stimulate the public's thirst for knowledge and desire for exploration, and meet their cultural and entertainment needs. The creative materials of the LCCP come from the cultural resources in the library. The CCP have unique cultural, innovative and high value because they contain culture and creativity. These "culturally-oriented products" let common people enjoy the glamour of culture and art[4].

4 The Feasibility and Necessity of Developing LCCP

As an important resource support center, the library has the functions of inheriting human cultural heritage, developing information resources and participating in social education. The feasibility and necessity of developing LCCP can be divided into the following four points.

4.1 Inheritance of Chinese Traditional Culture

Culture is the soul of a nation, and it is also the spiritual wealth and cultural heritage naturally bred by a country and a nation. Inheriting and innovating traditional culture is one of the important functions of the library, and the LCCP are the important carriers of traditional culture. Through the development of CCP and the in-depth excavation of the library's collection resources, the cultural connotation of the library's collection resources can enter the public's life through the form of CCP.

### 4.2 Support of National Policies

In recent years, China has issued many guiding documents and policies to ensure and promote the development of CCP. In May 2017, the general office of the CPC Central Committee and the general office of the State Council issued "the Outline of the National Cultural Development and Reform Plan", which requires promoting the develo-

pment of CCP and popularizing Chinese traditional culture. Although the scale of China's cultural industry is still small, the prospect is very broad.

4.3 Rich Creative Resources

It is self-evident that all kinds of libraries at all levels, have rich collection resources. They all take the responsibility of inheriting civilization and serving the society. Since the Ministry of Culture and Tourism of the People's Republic of China launched the "Chinese Ancient Books Protection Project" in 2007, up to now, there has been six batches and 13026 sets of National Precious Ancient Books have been selected and published, See Table 1 and Figure 1 for details.

TABLE 1 STATISTICS OF CHINESE NATIONAL PRECIOUS ANCIENT BOOKS		
lot	year	set
1	2008	2392
2	2009	4478
3	2010	2989
4	2013	1516
5	2016	899
6	2020	752

FIGURE 1 CHINESE NATIONAL PRECIOUS ANCIENT BOOKS
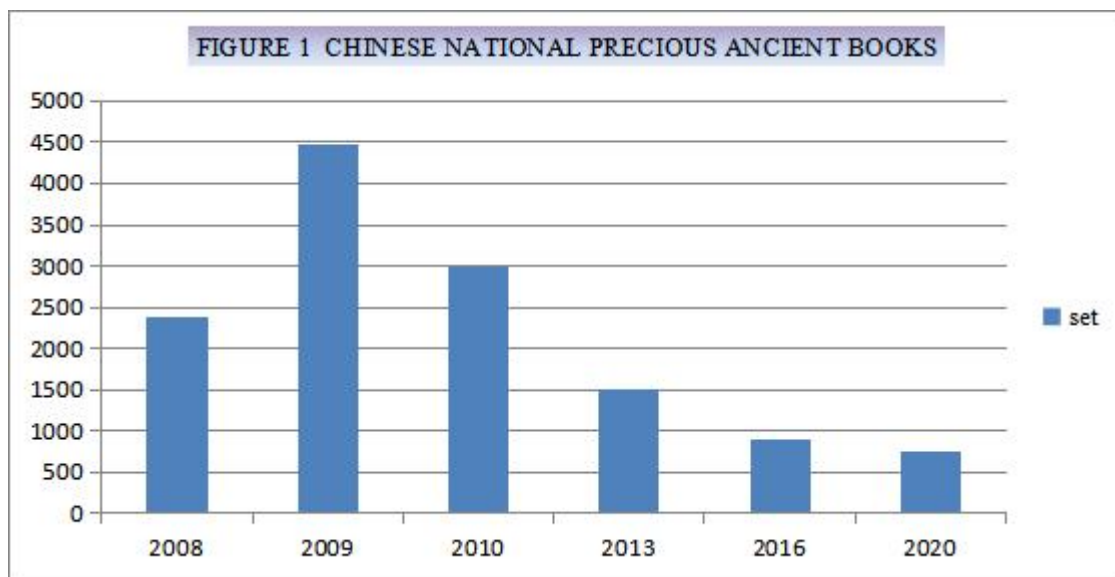
The vast collection of ancient books, rare books, manuscripts, paintings and other precious resources in various libraries are the creative source and foundation of CCP. In 2020 alone, the National Library of China collected 43075 kinds of special collections and 55479 volumes, including rare books, gold and stone documents, manuscripts, maps, pictures, photos, Dunhuang materials, local documents, United Nations materials and other special collections. Countless CCP development elements can be extracted from these resources. Therefore, the development space of CCP is huge.

In addition to the physical resources such as special collections, ancient books, paintings and calligraphy, the digital construction of various libraries across China has also been continuously promoted. The digital collection resources such as various ancient books databases and special collections databases are becoming more and more abundant. The massive digital resources not only make it convenient for readers to read and browse at any time and anywhere, but also can effectively save the time for extracting cultural and creative design elements, shorten the development cycle of CCP, and improve the development efficiency of CCP. By the end of 2020, the total digital resources of the National Library of China had reached 2274.5tb, of which 1710.54tb were characteristic digital resources.

4.4 Huge Reader Resources

Reader resource is another valuable resource of the library, which is very important to the development and promotion of LCCP. Every day, a large number of readers pour into libraries around the country to study, read and participate in various activities. The National Library of China opens 365 days a year, with an average of 12000 readers per day. In 2019, the total number of visitors to the library of Shandong Province was 1.814 million, and the average daily reader flow reached 4969. On August 6, 2022, according to the "real-time data of public library" in Jiangsu Province, the statistics of 42 libraries showed that the number of readers in Jiangsu Province was 39973, and the number of readers in Nanjing City of Jiangsu Province exceeded 8200.

Readers who use the library are potential consumers and promoters of LCCP. As an important place for people's spiritual and cultural life, the library can lead people to feel aesthetic culture to a certain extent. As a new way of cultural communication, CCP can help readers to be influenced by the aesthetics of traditional culture while reading and learning, and improve their cultural accomplishment and aesthetic ability.

5 The Development of LCCP in Some Regions of China

At present, in China, museums are the pioneers of CCP development. Except for the National Library of China, most Chinese libraries are still in the exploration and initial stage of LCCP development.

5.1 LCCP Development Status of National Library of China

The National Library of China is the first Chinese library to develop LCCP, and its LCCP development is in the leading position in the Chinese library industry. At present, its LCCP development work can be said to be on the right track. There are many kinds of products and the social response to its products is relatively good.

The National Library of China is China's general library. By the end of 2020, the total collection of it was 41.079 million books/piece, increasing at the rate of one million books/piece per year. The total collection of the National Library of China ranks seventh in the world. The collection of the national library has inherited the royal collection of all dynasties since the Southern Song Dynasty and the private collection of many famous scholars since the Ming and Qing Dynasties. The earliest collection can be traced back to the oracle bones of Yin Ruins more than 3000 years ago. The treasure collection includes more than 2.8 million copies of Dunhuang relics, rare ancient books, western region documents, gold and stone rubbings, ancient maps, famous manuscripts, and ancient books written by ethnic minorities.

5.2 Development and Promotion of LCCP of the National Library of China

The National Library of China has a rich collection, The precious collection resources are a huge treasure house for

the development of LCCP. In recent years, the National Library of China has been continuously excavating the characteristic collection and its cultural connotation, and conducting exploration and development of various LCCP.

The LCCP series developed by the National Library of China mainly include: Shanhaijing series, oracle bone inscriptions series, Lu Xun series, high-end imitation series, Yuanmingyuan twelve animal heads series, Dunhuang relics series etc. The main products are as follows: Creative kitchen tool, household items, clothing, books, office/learning accessories, collectibles, blind boxes/lucky bags, etc.

The LCCP developed by the national library of China have rich cultural heritage and variety, and pay attention to the integration of scientific and technological elements, which are deeply welcomed by the public. For example, the "'calligraphy fragrance' intelligent calligraphy stationery box" adopts high technologies such as identification technology of everything, AI and AR tracking technology. This product combines Chinese traditional calligraphy culture with artificial intelligence technology to provide users with a brand-new calligraphy learning experience. The National Library of China also pays attention to the brand building of LCCP. "Yongle Dadian" series, "Dunhuang" series and "Oracle bone" series have become famous brands of LCCP.

The sales channels of LCCP of the National Library of China are also relatively diverse. The LCCP are sold through the physical store of "Guotu wenchuang", the official microblog of "Guotu wenchuang", the Wechat official account of "Guotu wenchuang", the "flagship store of National Library" on tmall, the "flagship store of national library" on Jingdong Mall, Tiktok, and the bookshop etc. The brand-new promotion and marketing mode not only improves the sales volume of LCCP, but also shares the cultural connotation behind the products with the public, popularizes traditional cultural education and brings good economic benefits.

5.3 Development Status of LCCP in Shandong Province

In recent years, in addition to the National Library of China, other provincial and municipal libraries in China have also launched the development of LCCP. In Shandong Province, where the author is located, only one library of Jinan City has been listed as one of "China's 154 national LCCP development pilot units". Jinan library cooperates with the publishing house to develop LCCP through the restoration and reconstruction of ancient books, documents, inscriptions and paintings etc. But the products are relatively single and not well-known.

6 Problems in the Development of LCCP in China

At present, all aspects of LCCP development in China are in the stage of continuous exploration and gradual development. There are more or less problems in many aspects.

6.1 Unclear Policies and Lack of Incentive Mechanism

Most Chinese libraries regard collection, exhibition, cultural inheritance and public education as their main functions. They are subject to many restrictions in personnel setting, talent introduction, fund use and performance award etc. The function orientation of the library in the development of LCCP is not very clear, and it is difficult for the job of developing LCCP to be included in the scope of work evaluation and performance assessment. Under these circumstances, the real progress of LCCP development is slow.

6.2 Lack of innovation and Limited Product Types

Chinese libraries have long relied on state financial allocations to provide public cultural resources and services to the public. In the development of CCP, many libraries lack innovation and development foundation. In contemporary society, information, knowledge, innovation and competitiveness are critical factors of organizational survival[5]. On the whole, the development of LCCP has limited product types, high degree of homogeneity and lack of characteristics. Many CCP are similar in variety and form. Some products are even disconnected from the collection culture and flow into general commodities without characteristics.

6.3 Lack of Fund Guarantee

The development of CCP requires a large amount of investment. Take the Palace Museum as an example. Its annual cultural and creative income is 1 billion yuan, and its CCP research and development investment is nearly 200 million yuan. Due to the short overall time for the development of LCCP in China, relatively complete policies and funding sources have not been formed, and the funding for the development of LCCP is relatively scarce. The operating funds of the library are allocated by the country, and it will take some time for the development of CCP to obtain special funds. The lack of funds has become a prominent problem hindering the development of CCP.

6.4 Lack of Market Positioning and Consumer Analysis

In recent years, the consumer group of domestic LCCP has gradually expanded from readers, library practitioners and researchers to people in all walks of life, tourists, cultural and creative enthusiasts, online shopping enthusiasts etc. These consumers are from all ages and different backgrounds. However, the market positioning of the LCCP is lacking, and the analysis of the product consumer and their needs are lacking. The development of CCP lacks research and positioning of the target audience on the identity, age, gender, experience, income, educational level, occupation, interests etc. Different consumer groups have different demands for the products' prices and contents. Libraries should actively develop CCP with accurate market positioning.

6.5 Lack of Professionals

The lack of professionals is the root of the lack of innovation in the development of CCP. The library is a public cultural institution with service as its purpose. It has a solid foundation in traditional business, but it is still a novice in the development of CCP. At present, the ability and quality of LCCP development personnel in China are far from meeting the needs of the industry development. There are very few compound talents who understand both the library collection culture and the market law of CCP, and understand both the product process design and the product operation management. In the design of CCP, there is a shortage of professionals.

6.6 Infringement Risk and Insufficient Deep Development

As the whole society pays more and more attention to intellectual property, the library should pay attention to the protection of intellectual property and the risk of intellectual property infringement when developing CCP. The library has high-quality and rich cultural resources. It is a unit characterized by knowledge, culture and resources. It should not only protect its own intellectual property rights from infringement, but also protect the intellectual property rights of others. In addition, in the development of CCP, the resources integration and development depth of CCP are not enough. In the cooperative development, the cultural elements, symbols and contents of the characteristic resources of the collection cannot be simply copied. The cultural connotation of CCP should be fully explored.

6.7 Increased Promotion Forms and Insufficient Promotion Scope

In terms of promotion of CCP, Chinese libraries initially focused on the combination of exhibition and shop sales. With the development of domestic economy and Internet, they gradually transitioned to the combination of shop sales, participation in cultural and creative products fairs and internet promotion. Product promotion and marketing is an important way to realize product value. Although the promotion forms of LCCP are increasing, the scope of promotion is not wide enough. Many people do not know that there are LCCP. Although there are pioneers in the promotion of LCCP such as the National Library of China, there are few libraries that comprehensively carry out the in-depth promotion of CCP.

7 Thoughts and Suggestions on the Development and Promotion of LCCP

Based on the analysis of the problems existing in the development of LCCP in China, the following development ideas and suggestions are put forward.

7.1 Strive for Policy Support and Build Innovation Mechanism

In recent years, the Chinese government has issued a number of policies and documents to encourage and support the development of LCCP, providing opportunities and guarantees for the development of LCCP. The library should strengthen the top-level design planning, innovate the management system, cultivate compound talents, and develop scientific research capability. The library can consider the following policy support.

Integrate the development of LCCP into the normal business. The library cooperates with social forces to develop LCCP by means of cultural resources, intellectual resources or intellectual property participation. Bring the development of LCCP into the normal library business and establish a long-term mechanism for sustainable development. Striving to establish special posts for the development of LCCP, and allowing librarians who are familiar with the characteristics of the collection and have professional backgrounds knowledge to compete for the special posts.

Set up special funds for LCCP development and special incentive funds. Social capital and private capital can also be encouraged to establish cultural and creative funds and participate in the development of LCCP. Some organizations, enterprises and institutions or individuals are also welcomed to donate for the development of LCCP.

Establish high-level government awards for LCCP design, and give priority support to award-winning projects. The development and award of LCCP will be included in the grading evaluation and service assessment of the library to fully mobilize the enthusiasm of cultural and creative personnel.

Establish and improve the management mechanism of the income of LCCP, establish a special fund for the income of LCCP, and use it to carry out library public cultural services, social education, resource collection, reinvestment of LCCP.

7.2 Cultivate and Explore Talents and Build Professional Teams

The development of LCCP in the new era needs high-quality professionals, such as art designers, scientific and technological personnel, business planners and cultural management personnel. At present, many libraries are facing the shortage of talents. To solve this problem, we need to cultivate talents and build professional teams.

1) Cultivate Talents

Libraries can establish cultural and creative teams according to their own conditions. Libraries can arrange librarians who are familiar with the book resources and have product design abilities to take part in the job of LCCP development. Developing designers' ideas and product design ability through professional training, industry exchange, successful experience learning etc. At the same time, the designers should actively participated in LCCP fairs and design competitions to broaden their horizons and improve their capabilities.

2) Discover Talents

For Discovering talents, there are 3 common channels:

Explore the public

Libraries can solicit creative ideas from the public by holding creative design competitions. The collective wisdom is huge. Many art lovers, design experts, enthusiastic readers and other ordinary people may be creative design masters hidden in the folk.

Discover folk artists

Folk artists are a kind of talents that are worth digging. Folk artists go deep into life all the year round. They express life, have fresh ideas, own flexible creation, and are more grounded, which can meet the aesthetic interests of the public. Many folk artists are not ordinary craftsmen, and many of them are inheritors of China's intangible cultural heritage. Libraries can learn from the manifestation of intangible cultural heritage and develop innovative LCCP.

Tap volunteers

There are volunteers from all walks of life in the library. Their age span is relatively large, they are full of sunshine, love and positive energy, which inject fresh blood and power into the library work. The volunteers of the library have multiple identities. They are not only readers, but also volunteers, and potential designers and consumers of LCCP. The identity of "three in one" enables them to experience, observe and innovate the library's resources, services, management and LCCP development from different perspectives. They often find the real needs of users and the details that need to be noticed in LCCP innovation.

7.3 Conducting In-depth Cooperative Development and Inheriting Traditional Culture

The development mode of LCCP can be divided into three types: independent development, authorized development or cooperative development. The advantages of independent development are as follows: librarians who are familiar with the collection can fully explore the artistic value, historical value, cultural value and scientific value of the collection resources. The disadvantages of independent development are as follows: products designed by less professional designers often lack artistic beauty, and the designers lack control over the product audience and target market. If a third party is fully authorized to develop LCCP, they may design featureless products due to lack of understanding of the collection resources.

In this case, the library can adopt the third way to cooperate with other units or social forces to develop LCCP. The so-called deep development is to develop LCCP with collection characteristics, regional characteristics, urban cult-

ural characteristics and connotations in combination with the exploration of collection resources and regional culture. On the one hand, libraries have abundant LCCP development resources and librarians are familiar with the library resources. On the other hand, scientific research units, design studios, film and television animation and other production and design enterprises have mature design teams and design experience. The brands and promotion channels of the potential cooperative units have good reputation and promotion effects. Cross-functional team working provides not only the immediate knowledge of the team assembled, but also direct channels to each member's personal network of contacts[6.] So libraries should conduct in-depth cooperation with other units or social forces to develop LCCP.

In addition to social forces, libraries can also cooperate with public welfare institutions such as museums and art galleries. The service objects and service purposes of these units overlap with those of the library. The successful development mode and research experience of their CCP are of great learning and reference value. If the development capacity of a single library is limited, library can also participate in an alliance, such as the "National Library Cultural and Creative Product Development Alliance" to develop LCCP.

7.4 Strengthen Market Research and Study Consumers' Psychology

Before carrying out cultural and creative development, it is necessary for the library to conduct surveys and statistics on the needs of consumers. Learning from the experience of personalized customized service of foreign libraries, it is important to properly carry out the interaction with the public, and deeply study the consumers' psychology. It not only helps to understand and meet the needs of consumers, but also broadens the service scope of the library. Market research is helpful to improve the popularity of LCCP.

To study the consumers' psychology, we need to conduct professional learning. According to consumer psychology, stimulus is one of the main factors that affect consumers' purchasing decisions. Stimulus factors are mainly brought by commodities, including the attributes, appearance, price, trademark, service etc. The purpose for consumers to buy goods is to meet certain needs, which may be physical or psychological.

In the design, development and promotion of LCCP, we should study different consumers' psychology. LCCP should be able to meet both the material and psychological needs of consumers. Common consumer psychology includes: seeking truth, seeking speed, seeking novelty, seeking fame, seeking honesty, seeking profit, seeking beauty, and following the crowd etc. The main purpose of the library to develop LCCP is to spread excellent culture. Therefore, in the development of LCCP, attention should be paid to meeting the cultural needs of consumers. At the same time, the historical and cultural features of ancient books, paintings and other collections should be preserved and integrated into LCCP as much as possible.

7.5 Design and Development of LCCP

Cultural product design, a process of rethinking or reviewing the features of "ancient cultural artifacts", can fit into society and can satisfy consumers culturally and aesthetically by integrating cultural features into the product design[7]. The following three aspects in the design and development of LCCP should be noticed: conduct theme design, strengthen brand construction; meet users' needs and highlight cultural characteristics; develop new products by scientific and technological means.

1) Conduct Theme Design and Strengthen Brand Construction

The collection resources are the material treasure house for the development of LCCP. The distinctive and creative LCCP can reflect the collection value. The development of LCCP should focus on traditional culture, adhere to the deep excavation of the connotation of the collection resources, select the distinctive collection cultural resources for cultural analysis, and then conduct theme design. After overall analysis of the scattered cultural resources, we can dig out the cultural value points in the collection resources and sort out the valuable cultural and creative themes, such as celebrities, paintings, folk customs and skills in ancient books. Determining the theme of LCCP development is convenient for designers to accurately grasp the positioning, content, standard and function of the design. Designers can design unique cultural products by integrating the abstract cultural information and creative thinking according to different themes. The cultural connotation of the product determines the value of the product, and the LCCP endowed with the cultural soul can move consumers most.

Brand awareness is the awareness that the library should have in the development of LCCP. It is very important to strengthen the brand construction for the promotion of LCCP. Brand building can enhance the intrinsic value of LCCP, better play the role of cultural communication of LCCP, and promote the inheritance and development of culture. Based on the characteristics and advantages of the collection, the library can actively create its own brand of LCCP. Brand positioning should serve all the public. Brand design should be combined with the characteristics of the collection to reflect the cultural connotation and essence contained in the collection. We can learn from the successful experience of other libraries, such as the British Library in the customization of LCCP on demand. For developing LCCP, it is essential to increase brand awareness and create brand boutiques through various ways.

2) Meet Users' Needs and Highlight Cultural Characteristics

Good CCP usually follow certain principles and foundations in the design and development stage. In terms of product design and development, rules such as cost limitation, material limitation and manufacturing process limitation etc. should be considered. In terms of commercial operation, the target audience, product positioning, users' core requirements, promotion and operation rules of the product etc. should be considered. At the beginning of the development of LCCP, the designer should consider whether the selected cultural theme is well-known and whether the cultural theme product is conducive to rapid eye-catching and wide dissemination. It should also consider who the target audience of the product is and who will be interested in the cultural theme product. Third, we should consider whether the selected cultural theme has rich content and rich inside information that can be deeply and continuously excavated.

The development of LCCP should meet users' needs. LCCP should ultimately face consumers, so product development should be consumer oriented and meet consumers' cultural needs and cultural experiences. Cultural taste and consumption have shifted, and cultural production is being redesigned[8]. Moalosi et al. (2007) proposes how designers can integrate sociol culture factors by "conscious design efforts" rather than by "accident" to create innovative, culturally-oriented and cherishable products with wider product acceptance[9]. A good designer needs to have strong perception and empathy, have unique creativity, can combine cultural elements and presentation methods, can express cultural content in an irreplaceable way, can constantly improve the users' experience of products, and can meet the material and spiritual needs of users.

LCCP should highlight the cultural characteristics. It is difficult to obtain a successful product design. There is always room for continuous improvement of product design. LCCP are based on culture, with relevant ancient books, humanities, history, legends, manuscripts and paintings as creative elements. Cultural characteristics and cultural connotation are the selling points of LCCP that can best reflect the added value of products. This greater understanding of innovation derived from arts and design has occurred alongside the widening horizons of innovation research and policy[10]. For design, culture adds core value of products to inspire a new thinking for product innovation; for culture, design is the motivation for promoting cultural development[11]. Creative industries extract economic value and social benefit from art and cultural products[12]. The "culture" of LCCP is the connotation and core of products, and "creativity" is the soul of products. Designers should make great efforts to highlight the cultural characteristics of products and make them cultural, practical and commercial. The design of LCCP should be able to stimulate the public's attention to culture, generate cultural resonance, stimulate the public's interest and love for LCCP, and ultimately guide the public to carry out positive and healthy cultural consumption.

3) Develop New Products by Scientific and Technological Mean

With the wide application of artificial intelligence technology and network information technology, libraries have entered the era of intelligence, digitization and interconnection. Every leap in science and technology has provided a powerful driving force and tool for the inheritance, development and prosperity of culture. The library should conform to the development of the digital era, explore the innovation path of LCCP development led by science and technology, promote the integration of science and technology and culture, and constantly optimize the depth and content of research and development of LCCP. The impacts of digitization on the Cultural and creative industries are an important testing ground for its impact in other industries: "Previously thought of as frivolous and an expensive luxury, the creative industries are now considered an industrial priority and a 'laboratory' for studying the transformation of modern economies and societies"[13].

The development of LCCP should notice how to bring the long history and culture to the modern people, how to express the intangible cultural connotation with the tangible product carrier. The modern scientific and technological methods, such as artificial intelligence technology, information recognition technology, virtual reality technology, augmented reality technology, VR technology, 3D technology, wearable technology, intelligent terminal system, high-precision scanning technology, computer modeling technology etc. should be applied to develop LCCP. How to break through the bondage of traditional ideas, improve the creativity, appeal, expression and dissemination of LCCP, and make the library resources live is the exploration focus of LCCP development in the digital era. The author believes that the following aspects can be considered:

Develop products in combination with mature new media programs. For example, documentaries and programs such as the "Palace Museum 100", "the Chinese poetry conference", "the national treasure" launched by China Central Television and other media have recorded or disseminated Chinese traditional culture, which has drawn the public's attention to national, regional and historical culture. In combination with mature new media programs, collections with characteristics, the regional culture, and the cultural enthusiasm brought by the programs, the digital LCCP can be vigorously developed.

Develop digital book products and guide micro reading. The digital age has produced many new things, such as wechat, wechat store, wechat video, and micro reading etc. Micro reading is what some people call fragmented reading. It is a way for readers to obtain information and knowledge by using fragmented time. It has distinct characteristics of the times. For the general public, it is relatively difficult to read and appreciate the valuable and characteristic collections of many libraries. In order to enable the public to understand and experience the traditional culture contained in the collection more conveniently and quickly, the electronic books, audio books, video books and virtual books of the collection can be developed through scientific and technological means to guide the public to conduct micro reading.

Develop a variety of innovative digital LCCP. The library maintains a large number of valuable collections and physical resources. The designers of LCCP can adapt and make digital LCCP in the form of micro movies, micro videos, micro animation and so on according to the contents of library collections. Designers can also develop small programs or games. For example, designers can combine the cultural map with the game, integrating the poetry, celebrities folk customs, regional culture and other contents in the collection resources into the game, attracting readers to participate in the game. With the development of artificial intelligence, VR technology, information recognition technology and wearable technology, designers can also give play to creative inspiration and design more digital LCCP.

7.6 Expand the Promotion Mode and Combine Offline and Online Channels

In the new era, the promotion methods and channels of LCCP should be innovated and expanded. On the basis of the existing library promotion and marketing channels, the comprehensive promotion of LCCP should be promoted by making full use of the combination of offline and online channels.

1) Offline Promotion

The offline promotion of LCCP includes: physical store promotion, activity promotion and exhibition promotion etc.Physical store promotion is the most common promotion mode of LCCP. In addition to the attractiveness of the products themselves, the environment and layout of physical stores will also affect the sales of products. The physical stores of LCCP should be set in a more prominent position in the library, as far as possible on the only way for readers. The space design should be warm, the decoration style should be distinctive, and the product layout can be divided according to the various price.

According to the current situation of LCCP sold by libraries, the number of spontaneous purchases by consumers is still relatively small. The author believes that consumers do not pay attention to the LCCP because they do not understand the cultural connotation of them. If the public does not understand the cultural value of LCCP, they will not buy them at a price higher than that of ordinary commodities. The library can attract the public to the library by holding various activities, and combine LCCP with different promotion activities. The focus is to improve the participants' physical perception of the quality and influence of the experience of the cultural connotations through the design activities[14].

By holding various theme exhibitions, such as reading competitions, manual DIY, sharing meetings, lectures and other activities, the library can give the public more opportunities to participate in activities, help the public underst-

and the design concept, cultural connotation and value of LCCP, enable the public to develop a sense of cultural identity, and then like and buy LCCP.

If conditions permit, libraries can also create special "cultural and creative space" as the "third space" of the library for activity promotion. "Cultural and creative space" can not only be used to design and display LCCP, but also provide cultural and creative experience. The public can personally participate in the whole process of design and assembly of LCCP, and experience the charm of LCCP development in "cultural and creative space". By providing an "experience", creative industries represent a new and growing source of value in many economies[15].

Exhibition promotion includes the promotion of LCCP by participating in Expos, trade fairs and forum etc. The exhibition has the function of introducing, displaying and promoting LCCP. It plays an important role in promoting commodity circulation, technology exchange, information communication and economic cooperation etc. By participating in various exhibitions, contacting the market and exhibitors, and communicating with potential consumers, libraries can constantly update their concepts and innovative ideas. In addition to the promotion role of the exhibition itself, the exhibition promotion can also bring additional promotion dividends, because the exhibition will produce a series of exhibition effects: spillover effect, pulling effect, agglomeration effect, siphon effect, radiation effect etc.

2) Online Promotion

With the development of science, technology and network, online promotion of LCCP can be carried out through various new media forms. It can help consumers quickly know and understand the library's LCCP. New media is a communication form that provides information through the Internet, mobile communication network and other channels, using websites, intelligent mobile devices, virtual information technology and so on. New media has the advantages of digitalization, interactivity and personalization. It has become an important tool for mass information dissemination by adopting personalized and fragmented expression. The digital environment has dramatically affected creative industries in all kinds of ways, requiring dramatic changes in all parts of the value chain, including business models, stakeholder relationships and intellectual property management[16].

The users of new media are not only the recipients of information, but also the disseminators of information. Moreover, the two roles can be interchanged, and the media and users communicate with each other in the interaction. Recent developments in information and communication technology can indeed help to create user-friendly interfaces conveying and promoting the understanding of distributed, diverse, multimedia public information on cultural destinations and sites and the available services[17]. New media can provide personalized information services to users according to their habits, preferences and needs. New media is based on the Internet and has unlimited information capacity. Massive information can be rapidly transmitted through the Internet, intelligent mobile phones, and other new media.

The new media promotion of LCCP should be carried out from the public perspective and in the form that the public likes. The library can realize unified information release through the construction of the portal website. Library can present the collection resources and LCCP through 3D imaging and visualization technology, and realize the communication between users and users, users and applications through the interactive communication

module.

Online store promotion is also a commonly used online promotion mode in China. The most common ones are Taobao, Tmall and Jingdong Mall. For example, Tmall flagship store of "National Library Cultural and Creative Alliance" is an online store that provides LCCP promotion for member libraries. The promotion of online stores should not only do a good job in store design, product display, purchase links etc., but also do a good job in introducing the design concepts and contents of LCCP. These information is an important way to convey the cultural connotation of LCCP. It can not only let consumers understand the creative background of products, arouse consumers' interest, but also spread and popularize cultural knowledge.

The App promotion effect is also good. The library can use some popular Apps to promote LCCP, such as Weibo, Wechat, Tiktok, Kwai etc. APP can use big data technology to statistics and analyze user information to achieve accurate marketing. Library can also develop its own App to push the information of LCCP to readers directly. By registering as a member, readers can handle library business on the App. They can not only receive the information, but also give their feedback.

8 Conclusion

The development of LCCP in China is at the initial stage, but the development momentum and prospects are gratifying. Both the country and the society have put forward requirements for the LCCP. This paper aims to explore the problems existing in the development of LCCP in China, put forward innovative development ideas, and provide practical suggestions. On the one hand, the library should closely follow the social development trend, actively innovate the service content, and deeply develop the library resources; on the other hand, the library should make full use of scientific and technological methods to explore the innovative path of LCCP development to realize the cultural inheritance. There are some omissions and deficiencies in this study, which need to be supplemented and improved by the follow-up research.

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Exploring the Current Situation of Book Donation in University Libraries
——*An Example from Library of Beijing Jiaotong University Weihai Campus*

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Abstract

Accepting book donation is a long-term work of university libraries. This paper analyzes the current situation of book donation in university libraries by using the case of book donation by graduates in the library of Beijing Jiaotong University (BJTU) Weihai Campus. In order to promote an efficient work of accepting book donation in university libraries, this paper has put forward countermeasures and suggestions in six areas: purpose, system construction, management, processing, publicity, effect and meaning of book donation.

For a university library, donated books can enrich collections, enlarge the scope and variety of the collection, cut down the cost of purchasing books and publicize the library. However, there are many problems in the process of accepting donated books in university libraries. For instance, irregular book donation system, lack of dedicated staff for book donation, inadequate ways and efforts to publicize book donation, low utilization of book donation and high levels of waste, lack of a platform for publishing the results of book donation, lack of reusing system. Based on the successful work of book donation from graduates in 2020, which is held by the library of BJTU Weihai Campus, this paper will discuss the actual work in the library and put forward prospects for better book donation work, with a view to promoting the development of book donation activities in Chinese university libraries.

Key words: college library;book donation;system construction;management;publicity

1 Background

The earliest study of library book donation in China was published in 1982 by Shi Shiyu, "Book Donation and Exchange in American Libraries". This paper has drawn the attention of Chinese scholars to book donation activities, although it was about foreign related work. By 1989, He Jianxin discussed the management of donated books from three aspects: their origin, sub-editing, and canonization. This is an early study of book gift management in China, and since then, scholars those who research on donated books management has been on the right track[1].

In recent years, China has been paying highly attention to donating books to university libraries. The newly revised "Library Regulations for General Institutions of Higher Education" in 2015, clearly stipulates that "institutions of higher education shall encourage social organizations and individuals to donate to libraries in accordance with the law" and "libraries shall seek and accept social donations in the development of document resources".

In general, great foreign university libraries placed great emphasis on donation promoter, they have complete framework content, clear expression of needs, clear donation process, and professional legal advisory. Most Chine-

se university libraries have generally formulated their own rules about accepting donated books, but the managements are quite different. There is still some space for improvement. In China, being charitable is always in the traditional culture. Book donation activities can not only provide opportunities for good deeds to society, but also strengthen the communication and interaction between university libraries and society, which can multiply the channels of developing document resources. Therefore, university libraries in China should pay more attention to the policy of accepting donated books, continue to improve in term of publicity, policy formulation, demand expression, process setting and legal support, in order to promote better work of document resources developing.

There are three main donating ways in university libraries. Firstly, donation from teachers and students in campus. Secondly, donation from outside the university, mainly from alumni, cultural publishers, government agencies, off-campus readers and warm-hearted individuals. The third is international donation, which mainly refer to the donation of foreign language books by international friendly personages and institutions (Books-for-China Project). All of the above donations are existed in the library of BJTU Weihai Campus. The donations from graduating seniors are the most important and special part. Graduates usually donate books to the library that they cannot take back home before they leave, in the hope that they can help other students. Donated books from graduates are popular and highly utilized, while books from other two donation ways are less utilized.

2 Purpose

BJTU Weihai Campus is a Chinese-foreign cooperatively-run school. The campus needs to introduce high-quality English original professional course materials and other educational resources. However, since the campus has not established a textbook section at this stage, the campus lacks a way to manage textbooks in a unified approach. At present, students cannot guarantee that they will be able to buy the book within the time limit if they buy on their own through the Internet, and some foreign language textbooks are very expensive, which increases students' financial burden. Library has proposed a multi-method material security program for teaching materials, in order to help students to get the books they need for class, in which the book donation is one of the important ways.

Most of the donors are graduating seniors. College students are the inheritors and builders of a society. During four years of study in campus, they might have purchased a large number of textbooks, exercise sets, reference materials, as well as various books on science and technology, literature, etc., which are related to their curriculum and majors. The donation activity organized by library can recycle these resources, make them available again.

The books donated by graduates can meet the needs of students from lower grades. Donation can realize the recycling of book resources, and make the books more useful. It not only improves the utilization rate of books and be more environmentally friendly, but also helps to increase reading interest of readers and motivate them to read. It will form a good influence in campus.

3 System Construction

The acceptance of donated books requires systematic and standardized rules and regulations. At present, many univ-

ersity libraries do not have a book donation system, and some university libraries already have a book donation system, but the system still needs to be improved. A thorough system of book donation should include rules for collection, registration, classification, publicity, curation, processing and utilization. However, at present, there is no unified regulation on the handling of donated books in our library community, and donated books are in a state of confusion in terms of collection, processing, management and utilization.

Combine book donation with the service functions of university libraries. On the one hand, university libraries can combine donation services with local social services and give book donors preferential policies for book borrowing from the library. For example, social readers can get a free loan from the library by donating valuable books to the library. This practice is a representation of the library's function, serving the society, which can enrich collections. So that more social readers can access to the resources of university libraries. On the other hand, university libraries can participate in the recycling of students' study materials through book donation events. This work innovates the academic support services of the library in an environmentally friendly way. Library can lead students to participate in a book donation campaign for recycling educational materials with support from Student Affairs and other relevant departments, establish a database of recycling studying materials and a relevant system of operation and management, so that second-hand studying materials play the renewable value, and get some advances in academic support services[2].

Librarians from Beijing Jiaotong University Weihai campus have fully demonstrated the importance and necessity of the management of donated books before organized the donation event. A fixed source and type of book donation has been determined, i.e., mainly donations from graduates and teachers and students on campus, supplemented by other donations. Multiple channels of book donation had been established, graduating seniors can choose to deliver their donated books to the library in person or leave them in the dormitory and wait for the library staff to collect them.

The publicity of donated books is a very important job. BJTU Weihai campus library have made an elaborate plan to design the brochure of book donation. Specialized staffs are assigned to screen, sort and manage donated books, carefully catalog, process and shelve the books selected for the collection, and carefully plan book passing activities. The utilization and management of the donated books are strengthened in many ways[3].

4 Management

Arrange people to be responsible for the donation work. University libraries would be better to have specific persons to manage the book donation, aligning policy interpretation with concrete work to make donation work to go through. The librarians who are responsible for book donation require the following qualities: First, a high level of professionalism. The librarians shall not only be familiar with the collection, academic discipline and major settings, have a comprehensive understanding of the requirements of readers, but also be able to identify good books that meet the needs of readers from the uneven quality ones in donated books, enrich the library collection. Second, good communication skills. Good communication skills can fully demonstrate the professional competence

of librarians and the service level of university libraries. Even if librarians refuse the donation, they shall explain patiently and carefully to get understanding and support from donors. Third, strong sense of responsibility and commitment. Only if librarians have a strong sense of responsibility and enterprise, they can accept quality donations, refuse improper donations and unreasonable requests, do not cater to the needs of the library and readers, and always put the interests of the university library in the first place.

BJTU Weihai Campus Library in the book donation work is in line with the principle of service first and resource utilization maximization, always do a good job of planning, publicity and service work. Library staffs has a clear division of work, with special staff responsible for the collection of donated books. On the occasion of the graduation of the 2020, the library of Weihai Campus organized a book donation activity for graduates. With the help of the property staff and teachers from other department, the library collected more than 6,400 secondhand books from graduates and placed them all in the library.

After the collection, the library staffs carried out a utility assessment of these donated books at first, then identified which books were suitable for the collection and which were suitable for Book-Crossing, removed of worthless books, strictly controlled the quality of books for passing on, according to the subject specialties of BJTU Weihai and the library collection structure. In the case of obtaining a large number of donated books, the quality of secondary use of books was effectively controlled, and a lot of manpower and collection space was saved in the post-processing and passing of books.

In addition, there was a clear division of work in book donation management. There were staff members responsible for planning and publicity, some were responsible for sorting and processing, some were responsible for the passing and reusing, and some were responsible for closure and summary. The whole team worked together to publicize the book donation and passing activities.

5 Processing

A healthy development of the book donation is based on a clear assignment. A meticulous and in-depth work of book donation shall be put in charge of persons specially appointed. Process the donated books, improve the utilization of them, let more readers benefit from them are important parts of the book donation.

Some donated books are not suitable for collection, but still have high value in use. University libraries can take other measures, such as Book-Crossing, passing or donate to other libraries, to maximize the utilization. For those which are suitable for inclusion in the collection system, university libraries should take various measures to improve the utilization of resources, the specific measures are as follows: First, keep it at a high level from the source. Libraries need to check, screen and do the duplicate checking strictly, bring the books with high quality and good content into collection, and continuously optimize the resource system of the collection. The second is to do a good job of processing and circulation. The university library should promptly sort out the donated books in the collection, and incorporate them into the circulation system.

BJTU Weihai campus Library attaches great importance to the processing of the donated books, treating it as the central part of the book donation activities. After the books arrive at the library and are selected, they are processed first and then check and accepted. On the one hand, the donated books were not processed before, and the processing of the donated books requires special manual cataloging by the collection staff, affixing the request number, barcode, pasting the magnetic strip and sealing the library stamp. Most of the donated books are dusty, requiring processors to operate with masks and gloves. More than 6000 donated books in 2020 had to be processed and finished before next semester. Time for processing was very short, that increases the workload for the processing staff.

On the other hand, the large number of copies of donated books makes processing and organizing work more difficult. About half of the books donated to the library have 20 to 30 copies, and some of them have nearly 100 copies. According to the situation of the books and the collection, the library divided them into three categories, Book-Passing, Book-Crossing and collection replenishment. More than 400 books were stamped with "Book-Crossing" and placed on the special Book-Crossing shelves in the study room on the first floor of the library for readers to get for free. More than 1,000 books were added to the collection and stacked in the reading room for circulation after being catalogued. The rest books are carefully selected and classified, and then were given to students on campus to meet their needs for teaching materials and to give full play to the value of books.

After this graduates donation event, library have summarized some experiences of receiving a large number of donated books. For a large number of donations, it is better for the library to use the strategy of door-to-door selection, arrange a certain number of people to select books suitable for passing and collection carefully. Books that do not meet the requirements will not be accepted. In this way, library can select the right books, and will not cause a lot of confusion to processing and collection culling by receiving without selectivity. If library has been taking the strategy of pack-and-pull-it-all-back, go straight into acceptance processing, library will find a lot of unsuitable books for reprocessing in the subsequent cataloging process, which would cause a great burden to the processing work, and could cause a lot of waste of labor and money. Therefore, libraries should change from passive to active in collecting donated books. Therefore, selecting the appropriate books at the beginning is particularly important. In this way, we can not only reduce the waste of labor and money, but also encourage the donors to donate books that are suitable for library.

6 Publicity

Overview of the demand for documentary collections and donation services of a university library can be published on a detailed, transparent and easy to use platform or a website. It is easier to win the trust of the donors and arouse their interest and motivation to donate books to the library. So, it is necessary for university libraries to improve their websites in the section of book donation. This makes it easier for the donor to understand the school's policy about book donation and to prepare for the donation in advance. Content of donated books can be displayed online, so that students on campus can get information from it. The website is also able to give commendation to the donors for donating to the library. At the same time, information on the website needs to be up to date, to ensure continuity

in the publicity of the book donation policy and donation services. Besides a website, university library can use all kinds of social media to do the publicity work. To make our students and staff, or even the community, recognize the importance of book donation and to create a good atmosphere of interaction in order to publicize the sustainable development of the book donation.

University libraries should pay attention to book donation and improve the level of donation services. University libraries in China are increasing the publicity of book donation through public boards, library magazines, school newspapers, WeChat tweets and campus broadcasts to give full play to the role of donated books in teaching and research and to maximize the utilization of donated books. It is worthwhile for universities to learn that some of the 'double first-class' universities have a separate donation section on their library homepage, which is prominently placed, and set up thematic pages for book donation, where information about donations, collection principles and donation lists are published, and donated works, books and manuscripts are digitized and displayed in separate sections.

The Library of BJTU Weihai Campus also made full use of all available means of publicity to promote the book donation and passing activities of the graduates in order to stimulate more students to donate. For example, it makes use of advantages of library's official website and WeChat official account to enrich the publicity channels and does timely communication and publicity work. It also does the publicity work of book donation on the campus website and the library website, and cooperates with the Department of Student Affairs, the Residence Management Office and the Youth Volunteer Association, to keep a good communication and pass on the latest information.

In 2020, students had been studying online at home for the whole spring semester. When the graduating seniors were back to campus in July, library put up several posters on campus, tweeted on WeChat and cooperated with college students' counselors, to publicize the donation event. Update on WeChat official account. At the beginning of the following fall semester, library worked with the Youth Volunteer Association, to make sure that every student on campus know the event that were going to be thrown, "Get your gifts teaching materials from seniors". In the final, library chose a suitable time that current students (including first-year students) could participate in, which ensured the smooth running and effectiveness of the event[4].

In addition, the library of BJTU Weihai Campus has further standardized and refined the book donation process. Accepting book donation is a long-term task for libraries, so only by standardizing and refining the workflow of donations can libraries ensure that the work is standardized and steadily promoted. For those donated books that have been included in the collection, libraries should first do the preliminary work such as registering them, putting barcodes, magnetic strips and sealing the library stamp, and then do the follow-up work such as interviewing, cataloguing, collecting, putting on book labels and handing over to the reading room. In addition, university library technicians can also use computer technology to explore and develop a book donation management system to help with the donation process.

7 The Meaning

At 8:00 a.m. on 12 September 2020, at the lobby of library, library staffs and volunteers sorted the donated books by subject. The book-passing event began at 9:00 am, students entered in order after sign in on WeChat. They selected the books that they needed and wanted. Each taken away books would be sealed by a special stamp of this event. The whole event was lively and orderly. Before 10:30, more than 4,000 books were all taken away by students. This book donation and passing activity was successfully completed and received a good effect beyond expectation.

The book donation is significant, passing on love and care from the seniors and alma mater, meeting the practical needs of current students, maximizing the utilization of the books and passing on the fine Beijing Jiaotong University traditions of thoughtfulness, gratitude, diligence and frugality[5].

The library has helped to recycle educational materials through its book donation work. This work is not only green, but also innovative in terms of library services to help students. The library can work with the support of the Department of Student Affairs and relevant departments to guide students to participate in the donation of materials for recycle, so that resources can be shared and second-hand materials can be recycled, and the library's support services can be innovative.

By receiving, managing and reusing the donated books, libraries can enrich their collections, and they can use donated materials to provide users with multiple copies of popular materials and enhance their services. Donated materials can also be serve to enrich the literature and replace lost and damaged materials. At the same time, donating and accepting donations is a way for libraries to enhance staff-student relations and strengthen social relationships.

Through the analysis about the event of donating and passing books of BJTU Weihai Campus library, it can be seen that the donated-book is an important source of supplementing and enriching the collection resources of the university, and it is necessary to do publicity work for the book donation. With scientifically management, carefully processing and reasonably using, the donated-book can play its maximum function. We should not let the donors down, and not waste the reuse value of each donated book, so that the donated books can play a significant role in the library and the discipline construction of the university.

Book donation work is a scientific and orderly work in university library. For the donation of books, libraries should not totally repudiate, nor accepted as a whole, but according to the actual situation, recycle those can be reused, maximizing the utility of the books and continuously explore new ideas and new methods to ensure the long-term, stable and effective implementation of book donation.

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Research on Evaluation Index System of University Library Digital Resource Service Based on AHP

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Abstract

With the advent of the period of big data, the library's collection mode, service mode and the usage patterns of the users have changed greatly, which brings great challenges to the development of the library itself. As the digital resources of the library break through the limitation of time and space, under the catalysis of the information age, its quantity increases rapidly, the scale also expands unceasingly, and it occupies an increasingly important position in the library literature resources. It obtains the favor of the majority of users with its rapid, convenient, fast, comprehensive and many other advantages. On this background, in order to enable the library to more fully to realize library at present stage is in the midst of the digital revolution era environment, clear that the challenge for the digital resource service, solve the problems of different development level and low service level of digital resources in university libraries, improve the overall level of digital resource service of high library and strengthen the quality of digital resource service, let us can provide personalized digital resource service for teachers and students, This paper tries to construct a set of comprehensive evaluation system for digital resource service of university library and scientific analysis of the advantages and disadvantages, puts forward the future development direction of university library digital resource service construction and the Suggestions for improvement to promote the sustainable development of digital resource service and construction in university library.

Key words: Analytic Hierarchy Process; Digital resource service; High school library; evaluation

1 Research Background

With the advent of the information age, "digitalization" is no longer a simple concept. People's basic living and working Spaces are gradually moving toward "digitalization". Exchange of information between people can be realized as long as it is through the Internet. With the rapid growth of the number and scale of library digital resources, digital resources have replaced the traditional library collection resources in the status of library document resources with its flexible and fast way of communication and very powerful form of expression[1]. Digital resources gradually occupy the leading position, and its importance is self-evident. Because the library digital resources break through the limitation of time and space, its acquisition way is very convenient, so it is favored by the majority of users. But at the same time, the influence of the "digital", Library users' access to literature resources has changed greatly, and their demand for information and information quality is getting higher and higher. They hope to obtain timely and accurate information resources that meet the retrieval requirements, which requires the library information service platform to build a more professional data and a more scientific, perfect and unified data resources retrieval system to provide users with "one-stop" digital resources services and better meet

the needs of users personalized digital resources.

Of university library, therefore, in order to fully realize its own digital resources construction environment, clear grasp the challenge for the services of digital resources, practical guide future work of the library, improve the quality of library digital resource service, continuously improve the efficiency of the library digital resource service at the same time, better customer service for the teachers and students, Promote the sustainable development of library digital resources.

2 Research Status of Evaluation Index System of Electronic Data Resources in University Libraries

In the core collection of Web of Scienc, with "Library Digital Resources Evaluation" as the theme, relevant literatures from 1999 to 2019 were retrieved. There were 39,162,773 records in the selected data limit. After excluding irrelevant literatures, Among them, 188 records matched the retrieval formula. Through the chronological distribution of these 184 papers (as shown in Figure 1-1). It is found that the research on library digital resources started in the late 1990s, and then the research interest on library digital resources continued to increase until 2003. It can be seen that digital resources have been a hot research issue in the library circle for nearly 20 years. Through reading the abstracts of these literatures, it is found that the researches on performance evaluation, quantitative evaluation, construction of evaluation model and implementation of evaluation project of digital resources are relatively concentrated.
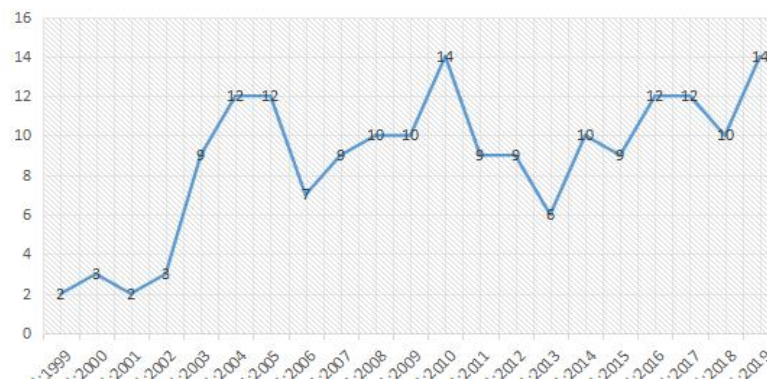

FIG. 1-1

In the late 1990s, libraries and some institutions around the world carried out a series of evaluation studies on the use of digital resources and service performance. American scholars Smith and Rowland took the lead in proposing that the performance evaluation of digital resources should be carried out to measure the service situation of digital resources.

Most of the characteristics of digital resource evaluation of university libraries in the world are practical applications. From retrieval to literature analysis, it can be found that many libraries and specific alliance institutions carry out the evaluation and implementation of digital resource projects through funding, and the emphasis of the research is different, but they have the same characteristics: Attaches great importance to the data

collection and system juice, have the ability to organize large-scale data collection and survey, it is true in terms of data statistics standard is not the same, but the basic USES the quantitative analysis method, the perfect information exchange and academic discussion of the studies on the mechanism is also an advantage, therefore, the evaluation system appears to be more perfect and scientific.

3 The Construction of Digital Resource Service Evaluation Index of High School Library

3.1 Construction Principle of Evaluation Index System

In this paper, using the analytic hierarchy process (AHP) to build the university library digital resource service evaluation system, this is a complex, strict design work, must be considered when design index of the scientific and rational and comprehensive, at the same time practical guiding significance to the demands of its [2], it is the key to the success or failure of the follow-up evaluation, when the design should follow the following principles:

(1) Scientific principles

In building the college library digital resources evaluation index system of service must be guided by the scientific thought, should fully consider the correlation between the assessment index, should not have a high similarity index is repeated, its connotation and denotation definition should be divided clearly, should distinguish clearly the meaning of every index, should not confuse each other, more should not be missed the evaluation subject, indexes to comprehensive, clear, Be based on facts. Scientific and reasonable evaluation methods should be adopted to make scientific principles run through all the evaluation processes and avoid excessive subjective assumptions. Only by taking data as the main evaluation basis can the evaluation results be real and effective, and the results of the evaluation system established on this basis can ensure its credibility.

(2) Information integrity principle

As the name implies, the accuracy and comprehensiveness of information are required when constructing the evaluation index system of digital resource service in university libraries. The evaluation of digital resource service of university library belongs to the construction of evaluation model at macro level, which requires that the understanding of digital resource service of university library must be multi-level and all-round. In constructing evaluation index system of college library digital resources services, the selected indicators should be purposeful, at the same time as complete as possible, including static and dynamic two aspects, such as static aspects include digital content, digital resources retrieval, dynamic should include consulting and readers' utilization of digital resources, establishment of indicators to cover the static and dynamic aspects, at the same time, The evaluation of data resource service can not only consider or focus on one side, resulting in the problem of over-generalization.

(3) Operability principle

In constructing evaluation index system of university library digital resource service must pay attention to consider its index in the execution of practicability and maneuverability, the index system of evaluation scheme and design cannot be too complicated and try to be comprehensive, simple, clear. The concept of the selection of indicators has

its abstractness, but the index must be easy to quantify, The abstract concepts are concretized into simple variables that can be calculated statistically, and the selected indicators should be feasible and easy to operate [3]. At the same time, the selected index must be easy to establish the weight coefficient, can use the statistical analysis method to assign the weight of the index, the most important is to evaluate the digital resource service of university library has its practical significance and reference significance.

(4) The principle of combining qualitative and quantitative

Qualitative analysis refers to the judgment and analysis made by researchers based on their rich practical experience and subjective intuition, while quantitative analysis is based on a large amount of data and uses mathematical analysis methods to analyze the data characteristics, data changes and data relations of social phenomena, with relatively objective results[4]. The method of combining qualitative and quantitative analysis can not only make up for the deviation caused by subjective assumptions and lack of objective reliability supported by data in qualitative analysis, but also avoid the lack of practical guiding significance of conclusions obtained by quantitative analysis alone. Therefore, we should follow the principle of combining qualitative and quantitative evaluation indexes to ensure the scientific nature of the evaluation system and the objectivity and comprehensiveness of the evaluation results.

(5) Innovation principle

Innovation is the driving force for the development of a discipline. The evaluation standard of digital resource services of university libraries is not immutable, and it will constantly change with the development of digital resources and the needs of users. Therefore, when constructing the evaluation model of digital resource services of university libraries, it should be combined with the research hotspots of library academia. Not only focus on the college library digital resources itself, pay more attention to its service and user experience and feeling, on the basis of reference to other digital resources evaluation system, to the point of view of the user to view the services of digital resources, with the development of the vision to build the index system, advancing with The Times, reflects the advanced and innovative.

3.2 Design of Questionnaire Survey for Evaluation Index System

This research will firstly adopt literature research method, preliminarily determine its evaluation indicators by reading and referring to the evaluation system of a large number of digital resources and the author's cognition, and design expert questionnaires based on this reference, and issue questionnaires to experts and professors in the field of library research [5]. The key point of this study is to select a more objective and scientific evaluation index system of digital resource service of university library through experts' recognition of the connection between the indexes at the same level and the importance of different indexes at each level. Because the questionnaire is different from the general questionnaire which is widely distributed, only the individual survey of experts in the field, the number is limited, using the judgment matrix model, at the same level of the relationship between the relative importance of two indicators, in order to finally determine the weight of each indicator, there are several important steps in the design of the questionnaire.

3.2.1 Determine the Purpose and Content of the Survey

The main purpose of this questionnaire is to screen out the most important and representative evaluation indexes through the method of expert scoring, so as to finally build a scientific and reasonable evaluation system of digital resource service of university library. For the convenience of marking by the experts and professors, the author first summarized through literature survey and self cognition to the digital resources service, for the index system of the primary indicators and secondary indicators selection and construction, has carried on the preliminary tries to cover all bases, advancing with The Times, is paid attention to in the basic evaluation indexes at the same time, based on innovation, aims to build a more comprehensive and scientific evaluation system, For the reference of experts, and the relative importance of the index scoring.

3.2.2 Determine the Survey Object and Method

This questionnaire is to eventually build up the evaluation index system of the digital resource service of university library, so the investigation of the object should be a long-term engaged in the research of library industry Gui librarians or experts and professors in the field of library intelligence, they to library digital resources services have more in-depth understanding, research and experience, evaluation are more objective, authentic, effective, It's better to ask them for advice.

To understand the situation of digital resource service of university library, and to construct the evaluation index system of digital resource service of university library more scientifically and reasonably. Based on this, the author visited university libraries and sent questionnaires to the teachers engaged in digital resource services in the library information consulting departments of five domestic universities and the professors in the fields of library information and archives management by email. Since expert questionnaires put quality before quantity, a total of 20 questionnaires were issued and 15 were recovered. Among them, one expert questionnaire was not completely filled in and was discarded. Therefore, there were a total of 14 effective expert questionnaires.

3.3 Construction of Evaluation Indicators

On the basis of investigation, this paper establishes the evaluation index system of digital resource service of university library, and establishes the analysis model of influencing factors of digital resource service quality of university library by using Analytic Hierarchy Process (AHP). It mainly includes the following steps:

(1) Establish the hierarchical structure model

This paper makes a literature study on the factors affecting the service quality of digital resources in university libraries, and uses fuzzy mathematics method to sort out, statistic and analyze the scores of experts and professors in 14 expert questionnaires. To digital resources in college library service quality factors influencing indexes selection, after repeated discussions and filter, finally determine the three-level hierarchical structure, this paper established the college library digital resources service quality influence factors analysis model of the first layer is the target (A), the university library digital resources service quality factors. The second layer is the criterion layer (B), that is, digital resource content, digital resource search, digital resource consultation and reader usage. The content factors of digital resources include authority of data resources, update frequency of data resources and prop-

ortion of subjects covered. The factors of digital resource retrieval include accuracy of retrieval results, universality of retrieval technology and comprehensiveness of retrieval methods. Digital resource consultation includes virtual reference consultation, reader training and help and subject librarian professional ability. Reader usage includes reader satisfaction, reader usage and download times per capita. After determining the hierarchical structure, draw the following hierarchical structure model:
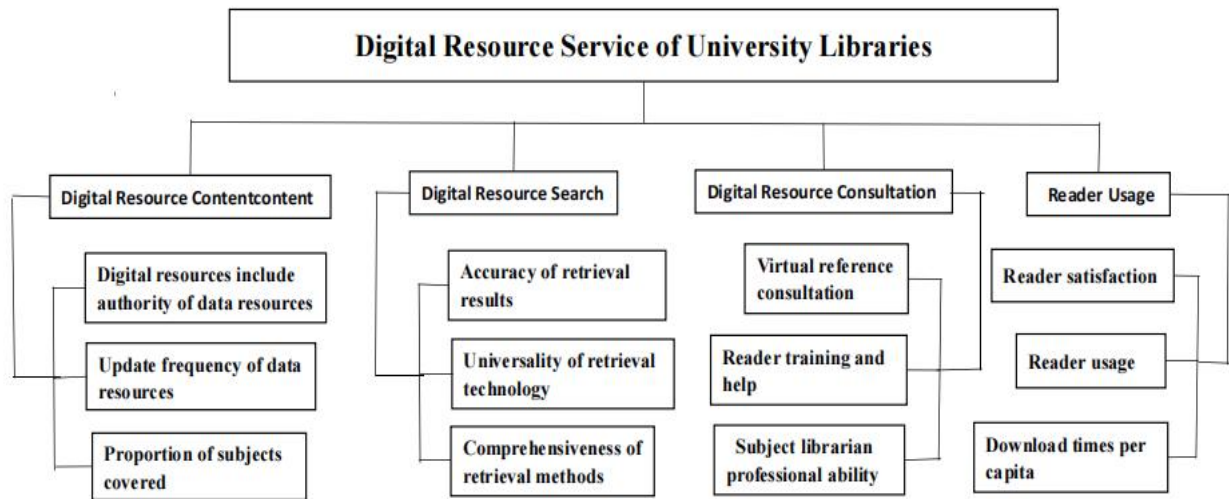
(2) Construct judgment matrix

Starting from the second layer of the hierarchy model, pairwise comparison matrix is constructed by using pairwise comparison method and 1-9 comparison scale for the factors in the same layer belonging to each factor in the previous layer until the lowest layer.

In the first-level index of influencing factors of service quality of digital resources in university libraries, the matrix can be obtained:

A0：

$$
\begin{bmatrix}
1 & 1/4 & 3 & 3 \\
4 & 1 & 5 & 4 \\
1/4 & 1/6 & 1 & 1/3 \\
1/3 & 1/5 & 3 & 1
\end{bmatrix}
$$

Among the four second-level indicators of influencing factors of service quality of digital resources in university libraries, the matrix can be obtained successively:

A1：   A2：   A3:   A4:

$$
\begin{bmatrix}
1 & 1/5 & 1/3 \\
5 & 1 & 3 \\
3 & 1/3 & 1
\end{bmatrix}
\quad
\begin{bmatrix}
1 & 2 & 5 \\
1/2 & 1 & 3 \\
1/5 & 1/3 & 1
\end{bmatrix}
\quad
\begin{bmatrix}
1 & 1/3 & 3 \\
3 & 1 & 5 \\
1/3 & 1/5 & 1
\end{bmatrix}
\quad
\begin{bmatrix}
1 & 1/4 & 1/5 \\
3 & 1 & 1/4 \\
5 & 4 & 1
\end{bmatrix}
$$

(3) single hierarchy sorting

Hierarchical single ranking refers to the relative weight of each factor of their judgment matrix against its criteria, and carries out consistency test on it. The judgment matrix should first work out the maximum eigenroot, and then its corresponding eigenvector W. In this paper, the sum product method is used to calculate the maximum eigenroot and its corresponding eigenvector of matrix. If the matrix is consistent $\lambda_1 = \lambda_{max} = n$,All other characteristic roots are zero; When the matrix A does not have consistency, then $\lambda = \lambda_{max} > n$,Remaining characteristic roots $\lambda_2, \lambda_3, \cdots \lambda_n$, The relationship is as follows: $\sum_{i=1}^{n} \lambda_i = n - \lambda_{max}$ In this paper, the negative mean value of the remaining feature roots except the maximum feature root of the judgment matrix is introduced to measure the deviation consistency of the judgment matrix, $CI = \dfrac{\lambda_{max} - n}{n - 1}$.

(4) Total hierarchy sorting

According to the importance of each factor, we form a comparative construction judgment matrix, list the corresponding calculation results, and get the relative importance comparison among the factors influencing the service quality of digital resources of the total target library.

Weight vector W0= (0.2359, 0.5579, 0.0678, 0.1394)

$\lambda_{max} =$ 4.0676，CI = 0.02253, CR= 0.02503 < 0.1

Weight vector W1= (0.1062, 0.6333, 0.2605)

$\lambda_{max} =$ 3.0387，CI = 0.01936, CR= 0.03281 < 0.1

Weight vector W2= (0.5813, 0.3092, 0.1096)

$\lambda_{max} =$ 3.0037，CI = 0.00185, CR= 0.00313 < 0.1

Weight vector W3= (0.2605, 0.6333, 0.1062)

$\lambda_{max} =$ 3.0387，CI = 0.01936, CR= 0.03281 < 0.1

Weight vector W4= (0.0989, 0.2321, 0.6690)

$\lambda_{max} =$ 3.0218，CI = 0.0109, CR= 0.01848 < 0.1

The second layer of influencing factors of library digital resource service quality is the criterion layer, namely digital resource content, digital resource search, digital resource consultation and reader's use, whose weights are 0.2359, 0.5579, 0.0678 and 0.1394 respectively. Among the secondary indicators, the content factors of digital resources include the authority of data resources, update frequency of data resources and proportion of subjects covered, whose weights are 0.1062, 0.6333 and 0.2605 respectively. Digital resource retrieval factors include accur-

acy of retrieval results, universality of retrieval technology and comprehensiveness of retrieval methods, and their weights are 0.5813, 0.3092 and 0.1096, respectively. Digital resource consultation includes virtual reference consultation, reader training and help, and subject librarian professional ability, whose weights are 0.2605, 0.6333, 0.1062 respectively. Reader usage includes reader satisfaction, reader usage rate and per-capita download times, with weights of 0.0989, 0.2321 and 0.6690 respectively.

From the above data, we can see that in the criterion layer, the subjective initiative of digital resource retrieval accounts for a large proportion. If the overall function of digital resource retrieval is insufficient, other factors are unimportant. Factors in the secondary index of content of digital resources, data resources update frequency is particularly important, the whole center of digital resources is the update frequency of digital resources, once the update frequency update couldn't keep up with, without some architecture, data resources retrieval results continue to repeat, that the university library digital resources service quality must increase will not come up. In digital resource retrieval, the accuracy of retrieval results is very important. Only when readers can clearly obtain the retrieval results, can they improve the utilization efficiency and performance in the process of using them. In digital resources consulting, training and help the reader the most significant, the traditional training methods and modern data resources navigation guidance help method combine together again, so readers can learn through training depth library digital resources, and secondly by web page navigation aid for the easiest way, greatly improve the college library digital resources service function. In the use of readers, the most important is the number of downloads per capita. In a large number of readers' feedback, the number of downloads per capita occupies the upper hand. It is clear that the demand and utilization of digital resources in university libraries still accounts for a high proportion, and accurate digital resources in university libraries will become the core of university libraries.

4 Conclusion

Although the structure and form of university library collection resources have changed greatly, their essential functions have not changed, and they still need to provide services for teaching and scientific research of university teachers and students. At the same time, due to the development of digitization and the intersection and integration of various disciplines, higher requirements are put forward for digital resource services. University libraries begin to pay attention to improving the service level of digital resources in order to meet the personalized needs of teachers and students for digital resources. After a large amount of manpower and funds are invested in the construction, it is necessary for the library to timely understand and follow up the problems whether the digital resources of the library can meet the needs of users for learning and scientific research, whether the users are satisfied with the digital resources services provided by the library, and whether the services need to be improved. Through the evaluation of digital resource service of university library, this paper finds out that the actual service work of digital resource of library can be put into practice, whether it can be praised by users and what key points need to be improved, and provides certain basis for the decision-making of the future development of digital resource service of library.

Acknowledgement

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Compromises in *Their Eyes Were Watching God*

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Abstract

Their Eyes Were Watching God, as the representative work of Zora Neale Hurston, is agreed as the classic of women's literature. The heroine is an African-American woman who strives to own her self-identity under patriarchal society. However, by analyzing the fiction, it is found that Janie, the heroine, makes compromises towards patriarchal society. This paper, based on the Existentialist Feminism, aims to analyze her compromises to show her weakness, helplessness and disclose the survival predicament of African-American women.

Keywords: Their Eyes Were Watching God; Existentialist Feminism; Weakness

1 Introduction

Zora Neale Hurston is one of the leading characters in Harlem Renaissance. She is a great novelist and anthropologist in America. Her identity as an African-American woman writer and her distinctive writing style were incompatible with in American society at that time. However, she did not receive due attention when she was alive. It was not until the 1970s that Hurston were rediscovered as the foremother of black women's literature. T*heir Eyes Were Watching God* is one of her masterpieces. Since the publication, Their Eyes Were Watching God has received mixed reviews. Scholars have made extensive researches on the novel. Alice Walker commends in her book that "there is no book more important than this one." (86). In this novel, Zora Neale Hurston depicts a female character who contrives to find her own identity in the white and male dominated society through which Zora Neale Hurston has showed her concerns towards the survival predicament of African-American women. By adopting the technique of realism writing, the contemplation of the existence of the heroine has been reinforced. Therefore, Zora Neale Hurston tends to raise awareness toward women's immanent predicaments. Through depiction of women's concession to men for the sake of themselves, the novel has demonstrated females' awkward situations and handicaps under patriarchal society. In *Their Eyes Were Watching God*, the heroine makes compromises while struggling to get her identity. This paper aims to view the text through Janie's compromises from the perspective of existentialist feminism and condemns intraracial oppression and discrimination.

2 Janie's Compromises in Her Girlhood

Simone de Beauvoir holds that women have their weakness and this weakness is imposed on them by society. In this novel, since girlhood, the heroine, Janie, at a disadvantage, has no rights to make her own choices and makes compromises towards the white and male dominated society so as to survive. Her compromises are a sign of her weakness and helplessness, which hinders her pursuit of her dream of freedom.

Janie is raised by her grandmother, without presence of her parents. she and her grandmother live in a house on the

property of a white employer and she plays with the white children when she is a young girl. It is not until six years old that she realizes that she is not a white having no definite name. She says that: "Dey all useter call me Alphabet cause so many people hand done named me different names." (Hurston,1987:9). Name is the demonstration of for itself. she accepted it that she has no definite name, which suggests that in the bottom of young Janie's heart, she knows she is weak and dare not have the courage to challenge society and earn herself a name. Janie grows with her nanny who is used to be a slavery, therefore, influenced by her Nanny's thoughts she is submissive and dependent on men. Janie's Nanny, an abused and unprotected woman is faced with discrimination and oppression experiences lifelong pains and sufferings. She sees marriage as a shelter from indiscriminate sexual exploitation and financial instability, which influences her into having an obsession of arranging a good marriage for Janie. Nanny thinks that Logan Killicks who is older than Janie and has sixty acres is a good choice. Janie resists the marriage. "The vision of Logan Killicks was desecrating the pear tree, but Janie did not know how to tell Nanny that. She merely hunches over and pouts at the floor." (Hurston,14). Janie's pouting mouth is an indication of her silent defense, which angers her Nanny. She slaps Janie and educates her saying that: "Honey, de white man is de ruler of everything as fur as Ah been able tuh find out. Tain't Logan Killicks Ah wants you to have, baby, it's protection." (Hurston,1965:14). Under pressure from her nanny, although the vision of Logan Lillicks is not her ideal, Janie reconciles herself to the reality. She fails to seize her bright future by surrendering herself to her nanny. She has lost her rights to make choices of owning a name and marriage. Janie is helpless and lost. Through compromises Janie made in her girlhood, this novel demonstrates that the state of existence of Janie has been blocked and limited by her weakness. Without self-awareness and chances of being educated, African-American women are in a weak status. Predicament of African-American women is disclosed.

3 Compromises in Her Three Marriages

For Beauvior, freedom means continuous activities not the constant eager for more projects or the repetition of old ones. One must remain free. This can only happen if people choose an open future as opposed to a commitment to some project or other requiring them to relinquish their freedom. However, Beauvior also discovered that women have fewer options than to choose and that women's concrete freedom is limited in a gendered culture where it affects the roles of men and women. In *Their Eyes Were Watching God*, Janie loses her freedom and options by making commitment and compromises to men. When Janie is sixteen and she sees the blooming pear tree with bees. She looks forward to getting into a marriage which is like that. The expectation of romantic love is seeded in her heart as being Janie's part. She attempts to search for it but fails. Janie makes compromises by submitting to marriage in order to remove her loneliness. Janie relinquishes her freedom in the male-dominated world to achieve a sense of security and protection from men. These compromises in her failed and unhappy marriage show that women's transcendence is inhibited and thereby they are confined to the surroundings. Before her first marriage, Janie feels that she does not want Logan at all and she is confused about love. When Janie comes back to seek help from her Nanny, Nanny tells her not to be silly so she thinks that she still could love Logan Killicks if she tries. During the first short period of the marriage, Janie knows something is wrong but she never thinks of leaving Logan Killicks to find her freedom and self-direction. She still depends on Logan. "Long before the years was up, Janie noticed that her husband had stopped talking in rhymes to her. He had ceased to wonder at her long black hair and

finger it." (Hurston, 1986:26). In the mind of Logan, women are the same as mules. He treats Janie as his private property. Even the day that Janie knows that Logan buys mule to let her work with the mule, Janie still says nothing except "Ah'll cut de p'taters fuh yuh. When yuh comin' back." (Hurston, 27). This shows that Janie makes compromises towards Logan even she cannot feel connected with Logan both physically and mentally in order to not to be deserted and to have someone to depend on. For Janie, the walls of Logan Killicks' house and the fence around his sixty acres come to not represent the meanings of protecting herself, but the forces that isolate her from the sense of self. She still does not fight for herself. Janie's pursuit of freedom and self-identification remains stymied. "Still she hung back. The memory of Nanny was still powerful and strong." (Hurston, 29). Even Janie is not satisfied with Logan, she cannot risk her marriage for independence and autonomy. In Janie's mind, leaving Killicks rashly may bring her unstable life and loneliness. In a male-dominated society with sex discrimination, Janie is too weak to protect herself. What she could do for now is to submit herself to men. One day, another man, Joe Starks, asks her to leave Logan and go with him. Janie is not sure if Joe Starks is serious or not. It is not until Joe Starks gives her a certain answer that she has the courage to challenge Logan and leave him. In her first marriage, Janie makes compromises to protect herself and reduce loneliness until there is another man there to release her from the miserable marriage, which shows her weakness and predicament.

Though Janie takes courage to fight for herself and then leaves Logan, Janie still is not an independent woman and has to make compromises so as to survive. She depends herself upon another man, Joe Starks. Through the delineation of Janie's marriage to Joe Starks, the author exposes the aloneness of a woman whose sole role is to serve as a symbol of her husband's social status. The morning she leaves Killicks, she feels that the road air is like a new dress. "From now on until death she was going to have flower dust and springtime sprinkled over everything. A bee for her bloom." (Hurston, 1987:32). Janie leaves Logan and gets into another marriage. She thinks that Joe Starks is the true bee for her blossom. Janie's first marriage contains some fighting though she makes compromises. However, Janie's second marriage is mainly full of compromises. Janie's submission to Joe and her denial of the meaning of life imply that she is weak and is unable to resist the oppression to liberate herself. She does not dare to fight for herself until Joe Starks are old enough to die. In Janie's second marriage, Janie loses her self-expression. Loss of self-expression is loss of voice. Voice is a symbol of one's freedom and autonomy. Therefore, voice represents one's identity and differentiate subject from object. During the period of living with Joe Starks, Janie often loses her voice at the critical moment. Janie leaves Logan and goes with Joe to a colored town named Green Cove Springs. In Joe Starks' eyes, women have no right to voice their opinions. He does not allow Janie's voice and opinion to be heard in public. The time when Joe Starks is chosen to be the mayor, audiences ask Mrs. Mayor Starks Janie to speak a few words. Joe Starks says that "Thank yuh fuh yo' compliments,but may wife don not know nothin' 'bout no speech- makin'. Ah never married her for nothin'lak dat. She's uh woman and hr place is in de home." (Hurston, 43). Joe rejects this invitation on her behalf. When Janie hears this, she just makes her face laugh and does not make any protest over Joe's decision. Janie's voice is deprived. Janie feels something taking bloom off because of this interlude but she does not have the courage to stand up and resist against Joe Starks. Another example is that there are many people in the porch talking with each other one day. Janie wants to take part in the conversation but Joe tells Janie that she cannot involve in the conversation. hence, Janie makes compromises

and does not join the chatting. Janie sits in the little store and listens to their talking. When Joe comes back, she shares her idea with Joe, but Joe says that" You gettin' too moufy, Janie." (Hurston,1987:75) and he claims that women are equal to chickens. When Janie hears this claim she slightly fights for herself saying that "ah knows uh few things, and women folks thinks sometimes too." (Hurston,71). Joe dislikes it and controls her more for her resistance and wants her to be obedient. "Time came when she fought back with her tongue as best she could, but it did not do her any good. It just made Joe do more." (Hurston,71). Gradually, Janie pressed her teeth together and learned to hush. Even if Janie's hush is not from the bottom of her heart, in face of the patriarchal society and Joe's controlling, she makes compromises, pretending to be submissive. Janie is suffering in silence through years living with Joe until Joe is going to die. In the second marriage, Janie gradually transforms from mild resistance to silence and submission in order to never let herself be in an economical dilemma. Beauvior is primarily concerned with women. She describes the way where a gendered culture precludes women's capacity to grow and find self-direction. Janie never successfully makes herself equal to Joe Starks. Janie makes compromises such as loses her self- expression and self-dignity during her second marriage. Her compromises accordingly give herself a feeling that life is meaningless which is the denial of herself.

In her first two marriage, Janie is disappointed. She feels tied to marriage and that her life is empty with nothing. As Shawn has noted, both Logan Killicks and Joe Starks, charged with patriarchal domination, "place Janie where they want her to be" (78). Tea Cake displays these flaws Killicks and Starks have been faulted with. Therefore, in Janie's third marriage, she also is forced to make compromises and never really gets true independence and open future. Eventually, she loses her emotional independence. When Joe Starks was dead, Janie meets her third husband Tea Cake, she feels like Tea Cake is familiar to her long time ago. "She could not make him look just like any otehr man to her. He could be a bee to a blossom - a pear tree in the spring." (Hurston,1987:106). It can be seen that when Tea Cake shows up, Janie finds the hope for her life again. She is unable to see through the fact that men cannot be depended upon. One day Tea Cake eavesdrops Janie's conversation with Mrs. Tuner who proposes that Janie should leave Tea Cake and marry a light-colored one. Tea Cake slaps Janie in the face in order to prove that he is the boss. He said, "Janie is wherever Ah wants tuh be...Ah beat her tuh show dem Turners who is the boss." (Hurston,1987:148). When slapped by Tea Cake Janie does not even holler. She just cries and chooses to be silent when is faced with family violence, which indicates that she has to make compromises to ensure her personal safety. When Teacake steals Janie's money and gives her an sound answer for his stealing, Janie trusts Tea Cake again and tells Tea Cake that she also has other money on the bank. In a patriarchal society, Tea Cake has bad habits men have. He treats Janie as his own one and cheats on Janie. Janie accepts all these because of her submission to Tea Cake so as to eliminate the feeling of aloneness. When Tea Cake has rabies from a dog bite and is going to die, Janie is overwhelmed with anxiety. Janie does not realize that Tea Cake has controlled her mind subtly and she is emotionally dependent on Tea Cake. After establishing the relationships with Tea Cake, Janie begins to wear blue clothes because Tea Cake likes it. She wears the clothes not because of herself likes it but for pleasing Tea Cake which shows that she also has made compromises to submit to Tea Cake. Shortly after they marry, Tea Cake tells Janie that he would support her. Tea Cake insists on a traditional economic arrangement. Janie accepts this male chauvinism idea nicely and rely solely on Tea Cake as a bread-winner though she has enough money to live a dece-

nt life. For Beauvior, it is suggested that women should stick together and go out to work. In this way they can get liberation. However, the protagonist Janie's working in the field is not her conscious act. Tea Cake worries that Janie would be abetted by others, then he invites her to work with him in the field so that he can control her. Janie's working in the field does not conform to her own will but her compromises with Tea Cake. In her third marriage, Janie makes no resistance to Tea Cake's commands and several compromises through which Tea Cake successfully achieves his male chauvinism.

4 Conclusion

To sum up, in Zora Neale Hurston's *Their Eyes Were Watching God,* Janie does not totally shake off the shackles of patriarchy and makes kinds of compromises. Janie's compromises can be found through the exploration of her girlhood, her three marriages. Janie loses her rights of making choices before and in marriage and loses her self-expression in her first two marriages. In her third marriage, she loses emotional independence because of her compromises. Janie never defines herself outside the scope of her marital involvements. Though, at the end of the novel, Janie does achieve her goal and becomes the most empowered woman that feminists claim she is, her achievement of freedom and money is by making compromises and submitting to three men. She accomplishes her subject position as a result of her submissive behaviors in her life.

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Research on the Adaptability of Bohai Sea Shipping and Bohai Economic Circle

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Abstract

The Bohai Economic Circle is one of the seven major economic zones in China. Since the reform and opening up, the scope of the Bohai Economic Circle has been continuously expanded, and up till now it has expanded to the Beijing-Tianjin-Hebei Area, Liaodong Peninsula, Shandong Peninsula, and the Bohai Sea Economic Belt, extending its radiation to Liaoning, Shandong, Shanxi and central and eastern Inner Mongolia. There is an inseparable relationship between the Bohai Sea shipping and the development of the Bohai Economic Circle. The two promote and influence each other. Bohai Shipping adapts to the new normal of economic development and serves the Bohai Economic Circle, and will enter a new stage of development with the main line of promoting the development, transformation and upgrading of industries in the Bohai Sea.

This paper takes the Bohai Sea shipping and the Bohai Economic Circle as the research objects, and studies the adaptability between the two, in order to improve the Bohai Shipping to better develop the Bohai Economic Circle. This article firstly gives an overall overview of the origin and development of shipping. Secondly, through sufficient research and collection of various data, a corresponding summary report is obtained, which provides theoretical support for the coordinated development of Bohai Shipping and the Bohai Economic Zone, and analyzes the development status of Bohai Shipping and the Bohai Economic Zone. Finally, the paper proposes solutions for the current problems of Bohai Shipping and Bohai Economic Circle, to improve the level of Bohai Shipping service, and realize the coordination and development of Bohai Shipping and Bohai Economic Circle.

Key words：Bohai Shipping, Bohai Economic Circle, Adaptability

1 Research Background and Significance

1.1 The Origin and Development of Shipping

Human beings have been engaged in maritime transportation for thousands of years. The development of maritime transportation is closely related to the development and progress of shipbuilding and navigation technology. As early as the 15th century, navigation technology has made great progress[1]. In the Ming Dynasty of China, there was historical event that Zheng He went to the Western Ocean seven times[2]. Christopher Columbus of Italy discovered the New World in 1492, and Magellan, the Portuguese sailing explorer, made the first voyage around the world in the history of the whole human beings in 1519. In the following centuries, human beings have made great progress and development in navigation techniques such as measuring ship position and drawing nautical charts. With the progress of human civilization and the development of productivity, the shipping industry is constantly advancing. Since the rise of maritime transportation, the shipping industry has become an important means for human development of economy and trade.

Since the 20th century, the advancement of science and technology has played an important role in promoting maritime transportation. The ways for shipping communication has transitioned from radio to artificial satellite to GMDSS, computer-based ship integrated navigation and unmanned aerial vehicle cabin, etc., bringing ship automation into a new era. With the continuous development of the new technology revolution, the overall development trend of marine transportation is the specialization, large-scale and high-efficiency of ships, and the water transportation management and navigation safety systems also tend to be electronic. Therefore, the efficiency and economic benefits of maritime transportation are gradually increasing[3].

1.2 Significance

As the only gold coast in northern China, the Bohai Economic Circle has a huge space for development due to its advantages of horizontal integration. The coastal cities are rising rapidly. In 2018, the economic development of the Bohai Economic Circle has entered a stage of rapid development. It is of great significance to promote the development of China's maritime transportation, and it is also an important pioneer in the prosperity of China's "Maritime Power Strategy"[4]. This paper studies the Bohai Sea shipping and the Bohai Economic Circle, and puts forward the problems existing in the research on the adaptability of Bohai Shipping and the Bohai Economic Circle, so as to be more targeted for ports, anchorages, waterways, and ship types, and to strengthen the infrastructure of Bohai Shipping, improve the safety of the port shipping system facilities in the Bohai Economic Circle, improve the transportation quality of Bohai Shipping, promote the scientific development of Bohai Shipping, and achieve the coordination and balance between Bohai Shipping and the development of the Bohai Economic Circle under the requirements of the new era. Bohai Shipping has some comprehensive advantages such as various types of ships, economical shipping routes, and frequent trade exchanges, which are of great strategic significance for the construction of the Bohai Economic Circle.

2 Analysis on the Status Quo of Bohai Sea Shipping and Bohai Economic Circle

2.1 Infrastructure

In this paper, the shipping infrastructure of the Bohai Sea is mainly analyzed from the aspects of ports, ships, and shipping markets, which are introduced separately below.

2.1.1 Ports

The Bohai Economic Circle is a relatively developed area of China's transportation network, and is a hub for various transportation modes and communication networks. The Bohai Economic Circle is centered on ports, forming a port transportation system including more than 40 ports in Dalian, Yingkou, Tianjin, Yantai, Rizhao, Qingdao, etc[5].

As an important support for cargo transportation and information exchange in the Bohai Economic Circle, Bohai Port is an important strategic resource to promote the development of the Bohai Economic Circle. The Bohai Economic Circle has 567 productive berths above the intermediate level, including 351 berths with over 10,000-ton level6. As an important support for cargo transportation and economic development in the Bohai Economic Circle,

Bohai Port is an important strategic resource to promote the development of the Bohai Economic Circle. From the perspective of the berth capacity of the port, the berths of the Dalian Port are in a trend of fluctuating growth, which not only consolidates the position of Dalian Port as the largest port in the Northeast, but also promotes the development of the entire Bohai Economic Circle[7]. The figure is a line chart of the number of berths in major coastal ports above designated size from 2011 to 2019.
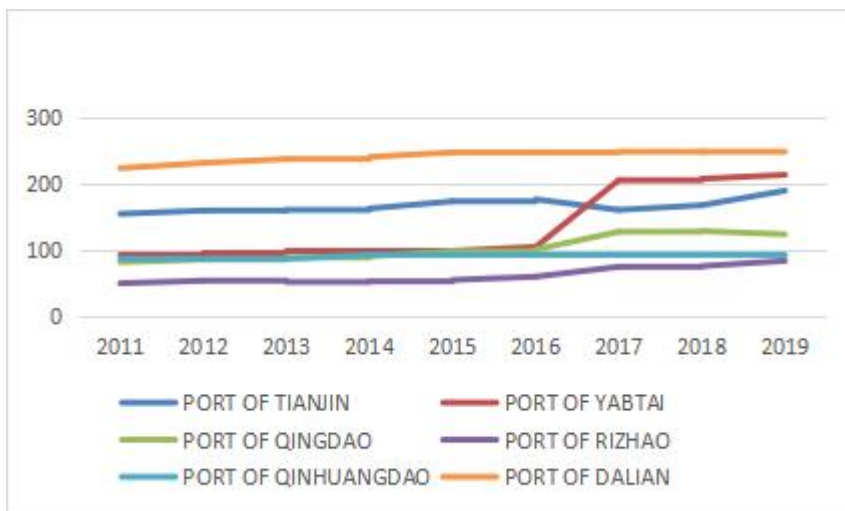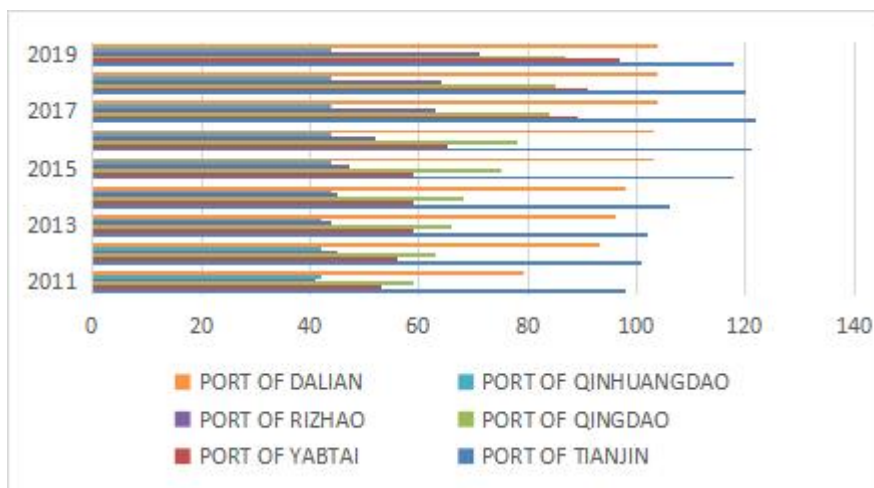

FIG 1

FIG 2

2.1.2 Ships

There are ten types of ocean-going ships in the Bohai Economic Circle: vehicle-carrying ships, bulk carriers, container ships, cruise ships, general cargo ships, ocean-going tugs, reefer ships, ro-ro ships, oil tankers and other types of ships[8]. Among them, bulk carriers, general cargo ships, oil tankers and container ships account for 42%, 20%, 18% and 7% of the total number of ocean-going ships respectively[9].
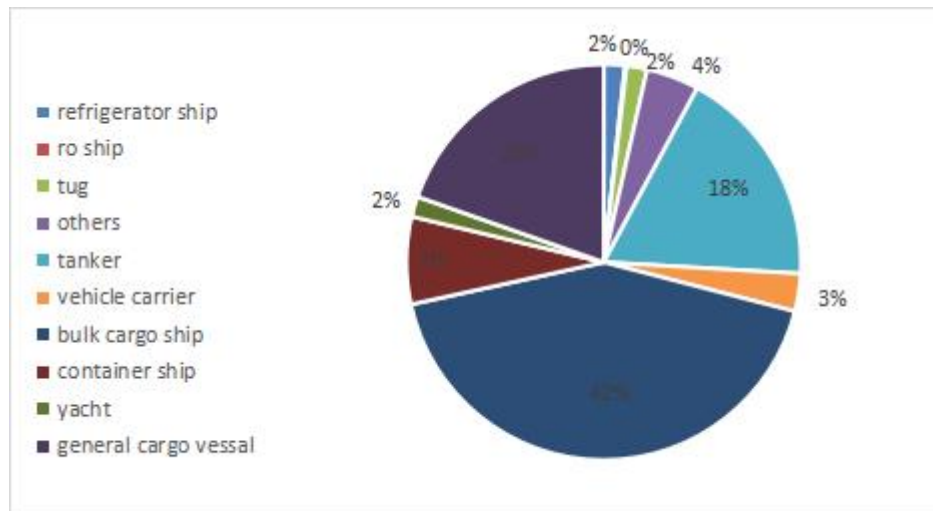
FIG 3

2.1.3 Shipping Market

As the world's economic center continues to shift to the Asia-Pacific region, the Asian fleet has quietly risen. In the 1990s, the prosperity of the world maritime market increasingly depended on seaborne trade in the Asia-Pacific region. Forty percent of the main capacity of the world ships, such as oil tankers, dry bulk carriers, container ships, etc., has been controlled by the Asia-Pacific region, of which the bulk carrier capacity accounts for half[10]. In 2007, the Asian ships surpassed Europe in one fell swoop. From 2003 to 2007, the average increase in fleet ownership was as high as 8.5%. On July 21, 2021, the Ministry of Transport released the national port cargo and container throughput amount from January to June 2021. From January to June 2021, the cumulative cargo throughput of ports nationwide was 7,643.34 million tons, with a year-on-year increase of 13.2%; the cumulative container throughput was 138.18 million TEU, with a year-on-year increase of 15.0%[11].

Among them, the accumulated cargo throughput of coastal ports was 4,963.13 million tons, with a year-on-year increase of 10.3%; the accumulated container throughput was 121.98 million TEU, with a year-on-year increase of 14.0%. According to the China Trade News, the Forecast Science Research Center of the Chinese Academy of Sciences has completed the "2021 Global Top 20 Container Port Forecast Report" in stages. The current research shows that China accounts for 9 of the world's top 20 container ports, and 7 of them ranked in the top 10 in the world[12]. The top 10 ports are Shanghai Port, Singapore Port, Ningbo Zhoushan Port, Shenzhen Port, Guangzhou Port, Qingdao Port, Busan Port, Tianjin Port, Hong Kong Port, and Rotterdam Port. In 2020, China will account for 7 of the top 10 ports in the world in terms of container throughput, and China will account for six of the top ten ports in the world in terms of cargo throughput. China's status as a major shipping country has been further consolidated.
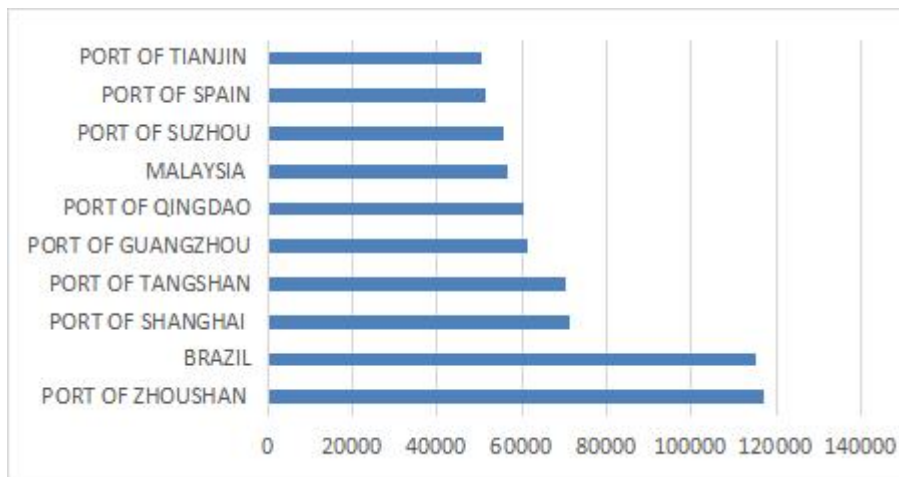
FIG 4

2.2 Status Quo of Economic Development in Bohai Economic Circle
2.2.1 Economic Aggregate

With the accelerating process of world economic globalization and regional economic integration, the total volume of China's import and export trade has also been greatly improved, and the influence of ports and port cities on the development of China's major economic circles and the overall social economy has also been increased continuously. In this context, it is more and more important to strengthen the development and cooperation between Bohai Shipping and the Bohai Economic Circle. From a geographical point of view, there are energetic cities and regions around the Bohai Sea, which represent a broad economic hinterland and unlimited economic potential.

TABLE 1

	GDP（100 million yuan）	Growth rate
TIANJIN	6354	16.5%
DALIAN	3858	16.5%
YANTAI	3460	13.6%
QINHUANGDAO	800	12%
PORT OF YINGKOU	703	20.3%

2.2.2 Development Characteristics

(1) Perfect Transportation Network

The Bohai Economic Circle has a complete transportation system. Sea transportation is centered on Tianjin, Qingdao, and Dalian ports, radiating to the surrounding area, and the sea transportation network is implemented all over the world; road transportation is China's railway transportation centered on Beijing; air transportation is based on some original large aviation centers. Some new airports are under rapid construction, and the coverage of the "Bohai Rim Express" will be wider[13]. The three-dimensional transportation network formed by the sea, land and air transportation network has played an indelible role in the development of the Bohai Economic Circle.

(2)Solid Economic Foundation

The cities located in the Bohai Economic Circle, such as Beijing and Tianjin, have a high level of economic development, which have laid a strong economic foundation for the development of the Bohai Economic Circle. So far, the economic growth rate of the central cities in the Bohai Economic Circle has been continuously improved, and the economic and social development in the region has been continuously optimized, becoming a benchmark for regional development. In 2019, the GDPs of Beijing and Tianjin were 3,537. 1 billion yuan and 1,410.4 billion

yuan respectively, accounting for 28% of the total value of 17,985.4 billion yuan among the three provinces and two cities in the Bohai region[14].

3 Comprehensive Problems Existing in Bohai Economic Circle
3.1Pollution of Marine Ecosystems in the Bohai Economic Circle
3.1.1 Continental Pollution

While the overall economy of the Bohai Economic Circle is developing rapidly, cities along the Bohai Circle are also vigorously developing their port and dock construction and coastal industries. Therefore, some estuaries will discharge a large amount of industrial wastewater, domestic sewage, chemical pollutants, and garbage. etc., resulting in the destruction of the offshore marine environment of most coastal cities around the Bohai Sea, the sharp deterioration of the marine ecosystem, and the loss of marine environmental resources.

In recent years, with the rapid economic development of the Bohai Economic Circle as a whole, the number of pollutant discharges from mainland sources is also increasing. Taking the real-time monitoring of the discharge of sewage in the Bohai Circle region in 2011 as an example, the real-time monitoring of mainland pollution sources along the coast of the Bohai Sea is an example. There are a total of 83 discharge outlets, including 14 municipal sewage outlets, 26 industrial sewage outlets, 31 sewage rivers, and 12 other sewage outlets. The chemical oxygen demand was monitored 290 times. The compliance rate was 70%, and the excess rate was 30%. The suspended solids were monitored 260 times. The compliance rate was 85%, and the excess rate was 15%[15]. A large number of industrial wastewater and domestic sewage discharged from coastal port areas enter the sea and pollute the marine environment near the coast. It is undoubtedly the damage to the marine ecosystem of the Bohai Sea and causes great pressure on the marine environment in the coastal waters. Therefore, land-based pollution has also become a prominent problem of ecological environment security.

TABLE 2

In 2011, real-time detection of discharge outlets inBohai Circle was carried out					
area	Check the number of sewage outlets	Cod		Check the number of sewage outlets	
		monitoring times	standard percentage	monitoring times	standard percentage
Shandong	17	62	55%	57	88%
Beijing	25	99	86%	93	92%
Tianjin	15	56	66%	56	80%
Liaoning	26	73	66%	54	74%
total	83	290	70%	260	85%

3.1.2 Marine Pollution

Marine pollution means that human beings have changed the original state of the ocean, causing the destruction of the marine ecosystem. Pollution caused by harmful substances entering the marine environment will damage biological resources, endanger human health, hinder fishing and other human activities at sea, and damage the qua-

lity of seawater and the environment. Marine pollution has undoubtedly brought a serious burden to the Bohai Economic Circle, caused environmental damage, and affected the quality of shipping in the Bohai Sea. The main sources of marine pollution are marine oil pollution, marine dumping pollution, and red tide pollution[16].

3.1.3 Ecosystem Imbalance

In order to promote the rapid economic development of the Bohai Economic Circle, people usually use the method of land reclamation, which leads to the destruction of the coastal wetland ecosystem and the gradual reduction of wetland organisms. At the same time, people will also change the nearshore hydrodynamic conditions, which will seriously affect the habitat of marine life.

According to the data survey, the marine biological species in the sea area of the Bohai Economic Circle is the least compared to other sea areas in China, the structure of the ecosystem is not complicated, and the marine biological species are not very complete. The ocean in the Bohai Economic Circle originally had 6 typical marine ecosystems, 5 of which were in a sub-healthy state and 1 was already in an unhealthy state[17].

3.2 The Influence of External Factors on Bohai Shipping
3.2.1 Geomagnetic Factor

The geomagnetic factor is a big problem in Bohai Shipping. This big problem will affect the communication efficiency of the ship and the magnetic compass of the ship will be interfered by the magnetic force of the abnormal magnetic area during navigation, which will lead to the failure of the pointer, and then affect the planned course of the ship[18]. Due to the reduction of communication efficiency, The failure of the magnetic compass pointer will directly or indirectly threaten the safety of the ship during navigation, causing damage to the hull and injury to the crew, and the loss can be immeasurable.

3.2.2 Meteorological Factors

The meteorological factors of the Bohai Economic Circle can be said to directly affect the sea state of the Bohai Sea. The common factors that affect the sea state include wind, waves, currents and tides. The Bohai Economic Circle is located in dense isobars, and a large number of winds of magnitude 7 are generated in this area every month[19].

3.2.3 COVID-19 Outbreak

In January 2020, the COVID-19 epidemic swept across and spread rapidly in March. Currently, more than 200 countries and regions are suffering from the COVID-19[20]. Due to the rapid spread of the new crown epidemic, the foreign trade economy of many countries and regions will be affected for a certain period of time, and China is no exception. China's economy accounts for about 16% of the world's total economy, and its contribution to world economic growth also exceeds 30%[21]. As an important channel for foreign economic and trade in the Bohai Economic Belt, Bohai Shipping is responsible for part of China's foreign trade freight volume. Therefore, affected by the COVID-19, the economic development of the Bohai Economic Belt is not optimistic.

4 Solution
4.1 Environmental Aspects

In May 2017, the "Belt and Road" International Cooperation Summit Forum was held in Beijing, and China proposed the establishment of the "Belt and Road" Green Development International Alliance[22]. The United Natio-

ns Environment Programme and the Ministry of Environmental Protection of China, as co-sponsors, will join hands with all walks of life to jointly implement this initiative, so that greenness can run through the entire "Belt and Road"[23] The Bohai Economic Circle is the leading region in the economic development of the Northeast region and even the North[24]. The terrestrial economy should develop in a green way, as well as the marine economy, which should be in accordance with the requirements of the times and achieve green transformation. Marine environmental pollution in the Bohai Economic Circle has a tendency to inhibit the growth of marine economy, and the growth of marine economy will also have a certain impact on marine environmental pollution. Since the marine environmental pollution in the Bohai region inhibits the growth of the marine economy, it is necessary to strengthen the development of the marine circular economy[25]. On the one hand, from the perspective of marine environmental pollution, it is necessary to reduce the amount of oily sewage, and the discharge of petroleum pollutants and inorganic nitrogen pollutants; sewage and other pollutants must be strictly treated, and can only be discharged into the sea after reaching the standard. What's more, it is also of great importance to implement marine garbage sorting and recycling, establish a relatively complete marine garbage disposal supervision system, set up corresponding garbage collection points, etc., and gradually cancel the use of non-degradable and non-recyclable disposable products[26].

On the other hand, from the perspective of marine economic growth, the existing marine industry can be cyclically transformed to reduce waste emissions while increasing resource output[27]. In key industries, a waste recycling and treatment system is specially established to promote waste recycling; extending the circular industry chain of traditional marine industries and cultivating new growth points of marine circular economy, such as marine service industry, marine tourism greening, marine strategic emerging industries, etc.[28]

4.2 Economic Cycle

From the above analysis, it can be seen that the shipping market has its inherent cycle, and it is difficult for shipping companies to develop and grow by continuing to operate the shipping business. Therefore, large-scale shipping enterprises should give play to their strengths and avoid weaknesses, and on the basis of accurately judging the stage of the shipping market cycle, adopt flexible operating policies, and choose the way of increasing or decreasing the shipping capacity that is suitable for their own enterprises[29].

5 Conclusion

Based on the background of the origin and development of the shipping industry, this paper studies the development status of the Bohai Sea shipping and the Bohai Economic Circle. Based on the basic situation at home and abroad, his paper makes a detailed analysis of the Bohai sea port shipping and the development of the Bohai Economic Circle. While analyzing the current situation of shipping development in the Bohai Economic Circle, the current problems in the Bohai Economic Circle are found, including the impact of marine ecosystem pollution and peripheral factors on Bohai Shipping. In view of the above status quo, this paper proposes solutions related to "environment and economy" at the end, and looks forward to the research on the adaptability of Bohai shipping and its Bohai Economic Circle, which will help Bohai shipping and Bohai Economic Circle in the new era, continue to promote the development of China's shipping economy.

6 Outlook

The economic development of the Bohai Economic Circle is one of the key regions of the Asia-Pacific region and China's economic development across the century, and it is also a hot spot concerned by people at home and abroad[30]. The region not only has obvious geographical advantages, rich natural resources, but also has a good industrial foundation, prosperous finance and commerce, developed transportation and communication, and strong science and technology, education and talents.

It is the most active and potential coastal economic development area in China after the Pearl River Delta and the Yangtze River Delta. The development of the Bohai Economic Circle can not only radiate and promote the economic development of North China, Northeast China and Northwest China. At the same time, it can also actively participate in the international division of labor and international exchanges in the Asia-Pacific region through joint cooperation, improve the overall pattern of China's opening to the outside world, and play an immeasurable role in the sustained, rapid and healthy development of the national economy.

With the formation and development of the national economic all-round opening pattern, the Bohai Economic Circle is bound to become a new hot spot for China's opening to the outside world. Geographically, together with the Yangtze River Delta Region and the Pearl River Delta Region, it constitutes the three core areas of China's coastal open regions, becoming the third and largest key area for development and opening in China[31].

In the future, the Bohai Economic Circle should focus on the northern and northeastern regions of China, establish an open economic structure, and be directly linked to the Asia-Pacific economic circle. The Bohai Economic Circle has convenient shipping, and its cultural background is similar to that of the Asia-Pacific Economic Circle. The two have strong economic complementarity and have superior environment and conditions for regional cooperation. Therefore, the two should maintain close contact, cooperate in competition, seek development in alliance, give full play to their overall advantages, link their own development with the overall economic development of the Bohai Economic Circle and even the whole country, and contribute to the economic development of each.

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An Underwater Bionic Jellyfish for Rapid Treatment of Entangled Water Plants

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Abstract

In recent years, with the rapid development of science and technology, the application range of bionic robots[1] has become more and more extensive in all walks of life. In order to meet the needs of underwater operations, this thesis designs a bionic jellyfish robot that can quickly process the entanglement of water plants underwater. In terms of composition, it includes five parts: basic components, drive components, spiral brake components, camera components, and remote control components; In terms of structural design, it includes buoyancy-driven design, robotic arm design, motion system design, airtight cabin design, and control circuit design. In terms of application, it can quickly and effectively deal with the situation where propellers or large marine organisms are entangled by water plants. Reduce the need for manual underwater operations.

Keywords: structure composition, dynamic simulation, underwater processing

1 Research Status of Biomimetic Robots

Bionics[2] is an ancient and young subject. People study the working principles of the structure and function of objects, and invent new equipment, tools and technologies based on these principles, and create advanced technologies suitable for production, learning and life. The word "bionics" was formed in 1960 by American Steele based on the Latin "bios" (life mode) and the suffix "nic" (the nature of something). This term has only been used since about 1961. The functions of certain organisms are so far superior to any artificially manufactured machinery. Bionics is a discipline to realize and effectively apply biological functions in engineering. For example, in the aspects of information reception (sensory function), information transmission (nerve function), automatic control system[3] etc., the structure and function of organism have given great inspiration in mechanical design[4].

Bioenergy[5] has developed from low-efficiency mechanical energy conversion to high-efficiency bioenergy conversion. The research of bioenergy should be based on the interdisciplinary of biology, chemistry and physics, seeking the principle of high-efficient use of bioenergy. It also should study the mechanism of bioenergy transfer and conversion and its relationship with biological tissues. And the research on new energy sources and new energy conversion devices is also very important. With the increasingly prominent energy problems of mechanical systems and the deepening of the concept of energy conservation and environmental protection, the high-efficiency bionic institutions will inevitably become one of the development trends of modern institutions. The research objectives focus on the four aspects: function, efficiency, quality, and loss, so as to improve the energy utilization rate of the bionic robot and reduce the energy consumption.
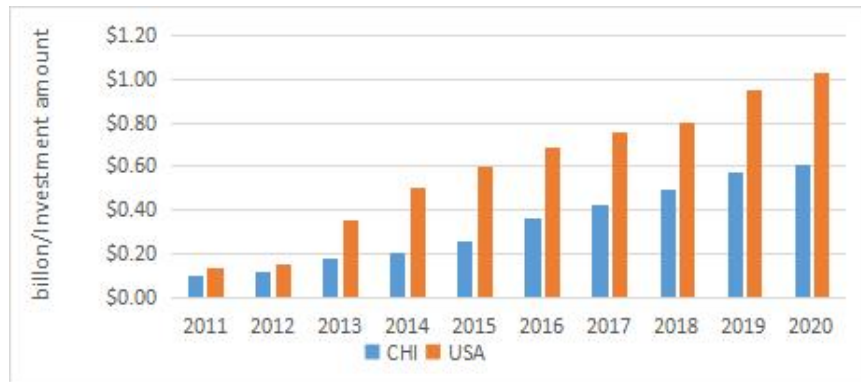
FIG 1

Since the 21st century, countries all over the world have invested more and more in bionic robots year by year. In the Figure 1, the comparison of the total amount of investment between China and the United States in the past nine years shows that the frequency of robot applications in various fields is increasing, and the same is true for underwater operations. As a type of underwater robot, bionic jellyfish is smaller than conventional underwater robots, consuming relatively low energy. It can not only move freely and communicate with upper and lower computers, but also can achieve rapid underwater speed. Therefore, it can effectively deal with the situation that propellers or large marine organisms are entangled by water plants.

2 The Component Composition and Structural Design of the Bionic Jellyfish
2.1 Components

Jellyfish[6] is an invertebrate plankton in the aquatic environment[7]. The main component of the body is water, and it is composed of two germ layers inside and outside. It has three m ain parts: an umbrella-shaped or bell-shaped body, contacts and tentacles. Its body shape is like a transparent umbrella, which can be large or small. The diameter of some large jellyfish can reach 2 meters. There are some whisker-shaped tentacles on the edge of the umbrella-shaped body, and some tentacles can be as long as 20-30 meters. There are some special muscles under the bell-shaped body of the jellyfish that can expand and then contract rapidly, expelling the water from the body. By spraying water, the jellyfish can swim in the opposite direction. The jellyfish has a cortex that shrinks the bell-shaped body, allowing the jellyfish to move quickly. There is a row of small round sacs on the edge of the bell. When the jellyfish tilts to one side, these sacs will stimulate the nerve endings to contract muscles and turn the jellyfish to the correct direction. The tentacles mainly perform the predatory function.

The bionic jellyfish consists of a bell-shaped body, contacts and tentacles. The shell of the jellyfish is made of resin 3D printing. Photosensitive resin[8] is a kind of 3D printing material, it is similar to ABS material, with smooth surface, high precision, surface can be painted, with good hardness. Photosensitive resin is very suitable for printing prototypes, such as design models and those with special requirements on high temperature resistance or higher toughness. The photosensitive resin is generally in a liquefied state. The printed objects using this material generally have the characteristics of high strength, high temperature resistance[9], and water resistance. The photosensitive resin material not only has a good molding effect, but is also relatively cheap, so it has become the

material of choice for printing prototypes. We will install the driving device and obstacle avoidance sensor in the bell body, other electronic components and power components in the sealed chamber, the propeller at the end of the tentacle, and the lighting lamp and camera module on the tentacle. The lighting is made of LED material. LED has the characteristics of long life, high luminous efficiency, low radiation, low power consumption, energy saving, environmental protection and small size. The camera module is equipped with a USB camera. This component is easy to install and operate. The cost of it is lower than traditional surveillance cameras[10], and it can achieve remote viewing through the network.
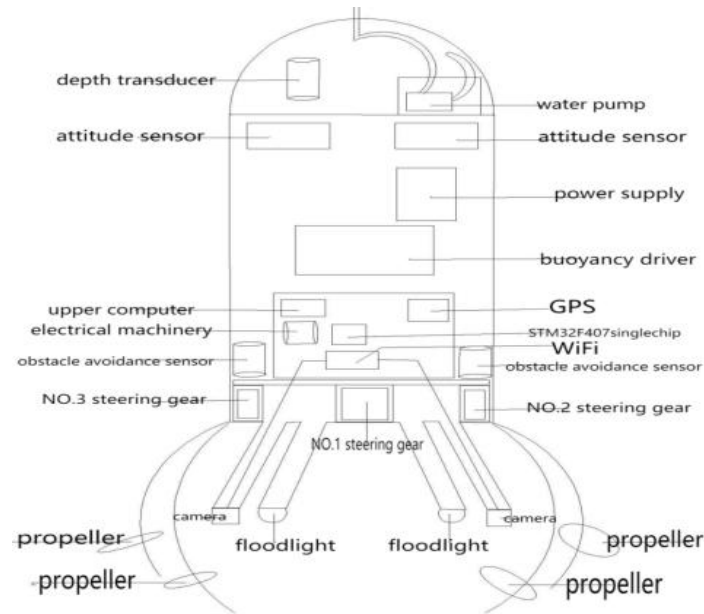
FIG 2

2.2 Buoyancy-Driven Design

Buoyancy drive[11] is a high-efficiency and energy-saving underwater movement, which is generally achieved by changing the displacement. When the buoyancy is greater than gravity, the bionic jellyfish robot floats; when the buoyancy is less than gravity, the bionic jellyfish robot dives; when the buoyancy is close to gravity, the bionic jellyfish robot is in a nearly suspended state.

The buoyancy adjustment can be realized by filling the oil tank which is outside the cabin by the hydraulic servo system. Since the water pressure in the shallow sea area is small, the buoyancy force is changed by the method of driving the elastic bellows by an electric push rod. Because the changing volume of the elastic bellows accounts for a large proportion of the total drainage volume, the position of the buoyancy center will change significantly during the process of buoyancy adjustment. The reasonable design of the structure positively correlates the changes of the two, which can realize the simultaneous adjustment of the size of the buoyancy and the movement posture.

When the bionic jellyfish robot works in limited water depth, the sealed shell will not leak or be damaged, and the buoyancy drive can work normally. When the steering gear of the body cavity propulsion system outputs the maximum torque, each part of the transmission chain is within the strength limit, and the margin is relatively suffic-

ient. The joint swing of the buoyancy driver and the steering gear can effectively change the motion state and posture of the biomimetic jellyfish robot. The bionic jellyfish is equipped with a WIFI module, and the user can complete the corresponding data transmission and control by connecting the local area network of the WIFI module with the mobile phone APP or computer PC.

2.3 The Design of the Robotic Arm

Robotic arm[12] refers to a technical device used to reproduce the functions of human hands. It is an automatic mechanical device that imitates part of the movement of human arms and realizes automatic grasping, handling or operation according to a given program, trajectory and requirements. The mechanical arm can replace the heavy labor of manual labor, significantly reduce the labor intensity of workers, improve working conditions, and increase labor productivity and automation level.

The technical level and application level of industrial robots[13] reflect the level of industrial automation in a country to a certain extent. With the popularization and development of industrial automation, the application of handling robotic arms has gradually become popular, mainly in the production lines or cargo handling in the fields of automobiles, electronics, mechanical processing, food, medicine, etc. It can better save energy and improve the efficiency of transportation equipment or products, reduce the limitations of other means of transportation, and thus meet the requirements of modern economic development. At present, the level of industrial robot technology and its engineering application in our country is still far from that of foreign countries. The application scale and industrialization level are low. The research and development of robotic arms directly affects the improvement of my country's automated production level. Technical considerations are very necessary. Therefore, the research and design of the robotic arm is of great significance.

2.4 Design of the Motion System

The motion system is provided by three steering gears[14]. By cooperating with the double-section tentacles, rotating shafts and bearings, it adds a degree of freedom to the motion of the bionic jellyfish, No.1 steering gear provides power to the rotating shaft. No. 2 and No. 3 steering gears are respectively located at the beginning of the two tentacles, which combine with each other so that the bionic jellyfish can realize free movement in multiple directions in the underwater space.

2.5 Design of Sealed Cabin

The sealed cabin is thin-walled cylindrical[15] as a whole, made of transparent acrylic[16]. Its upper end is connected with the root of the elastic bellows, and its lower end is connected with a circular sealing end cover. The end cover adopts an O-ring sealing method to seal the end surface of the sealed cabin. There are 4 watertight sockets on the end cover, 3 of which are underwater steering gear interfaces, and the other is a multifunctional interface for power supply, debugging, download, and antenna.

A depth sensor and a water pump device are arranged inside the sealed cabin, and the axis of the push rod of the water pump coincides with the axis of the cylindrical sealed cabin. Therefore, the minimum inner diameter of the a-

irtight cabin is d=280mm, and the wall thickness of the airtight cabin is 15mm, then the outer diameter of the airtight cabin is D=310mm.

Considering the overall appearance ratio, the length of the sealed cabin is slightly longer than the push rod of the water pump, so the length of the sealed cabin is L=400mm.

2.6 Design of Control Circuit
2.6.1 Power Board

The power board supplies power to the entire system and mainly implements the following three functions:

1) Be responsible for providing the required level power conversion for the system, where the control board needs 6V level, the steering gear needs 10V level, and the motor directly uses the battery level;

2) Provide total current detection[17], battery voltage detection, battery overcurrent protection, steering gear and motor current detection, and steering gear and motor overcurrent protection;

3) Integrate the control circuit of the control board with the power supply of the steering gear and motor, and provide the steering gear and motor access interface.

2.6.2 Control Panel

The control board takes the master computer as the core and realizes the following four main functions:

1) Control the steering gear and motor;

2) Collect sensor data, including depth sensor data, voltage and current data of the power supply board, attitude angle data, etc.;

3) Communicate with the host computer, receive control commands from the host computer, and send sensor data to the host computer.

The main control machine uses the STM32F407 single-chip microcomputer[18], which is an ARM Cortex-M4 core. The highest frequency is 168MHz. It has 100 pins and rich peripherals, including three 12-bit AD, twenty four AD channels, which enables it collect more Sensor data. It also has six USARTs, two I²S, three I²C, two CAN, one SDIO, and three SPI, which is conducive to modular design. SDIO directly drives SD card. In addition, this single-chip microcomputer provides a low-level base, and you can write programs without deep understanding of the registers, which can realize the rapid development of the project. This single-chip microcomputer also has the advantages of high cost performance and complete information.

4）Data storage.

There is an AC interaction between the power board and the control board. The power board supplies power to the control board. The current and voltage information of the power board is transmitted to the control board through the FPC. Similarly, the control information of the control board is transmitted to the power board also through the

FPC. Realizing the separation of the control board and the power board can weaken the coupling relationship[19] between the two, which is conducive to debugging when problems occur, and also to the expansion of functions.

2.6.3 Battery

At present, there are mainly three kinds of batteries in the market, namely lithium batteries[20], nickel-metal hydride batteries[21], and lead-acid batteries[22]. Among them, the energy density of lithium batteries is the largest. So the lithium batteries of the same capacity can be made small. However, considering the unsafety of lithium batteries, the use of lithium battery is rarely seen in underwater vehicles, and the cost of lithium battery is high, so it is not recommended to use lithium battery.Compared with lithium batteries, nickel-metal hydride batteries have higher safety, longer life, lower cost, and have the advantage of high-power discharge. However, under water, the energy density of Ni MH battery is relatively low. The battery is only 1.2V. If a relatively high level is required, a lot of lithium batteries need to be spliced. Compared with other power sources, lead-acid batteries have many advantages, such as mature technology, high safety, high recycling rate, applicable temperature bandwidth, stable voltage, good combination consistency and low price. The disadvantage is that they are relatively bulky.

Considering that a relatively large counterweight is needed in the jellyfish robot, a 12V, 36Ah, 7.1Kg lead-acid battery is selected as the power source of the entire system. At the same time, the battery is used as the rotor to move inside, which is beneficial to maintain the posture of the jellyfish robot stable.

2.6.4 Current Detection and Power Supply Protection

When the system is working, the main power supply, the steering gear power supply, and the motor power supply need over current protection, and the corresponding current detection[23] is also required for them. The control board switching power supply chip itself has an over current protection function, so current protection[24] may not be needed. The power board outputs a total of four detection data, which are the total current data, the total current data of the steering gear, the current data of the motor and the battery voltage (the power can be calculated by the voltage). The current detection uses the current detection chip OPA548[25]. This chip provides multiple current versions. The internal Hall sensor is used for detection. The output voltage directly corresponds to the current value. When the current is 0, the output is 2.5V. The total current detection of the power supply uses the 12A version, and the servo current and motor current use the 3A version. The battery voltage detection uses a reference power chip to provide a 2.5V reference source. The voltage of the battery voltage divided by the resistance and the reference source voltage are output through a differential amplifier circuit that can be collected by the single-chip microcomputer.

3 Design of Bionic Jellyfish Control

3.1 The Composition of the Bionic Jellyfish Control and Detection System

The control system of the bionic jellyfish mainly realizes the following functions, including positioning, underwater detection, automatic obstacle avoidance, and water treatment, etc. The control system takes STM32F407 single-chip microcomputer as the core. It realizes motion control, analyzes and transmits the data collection function of the sensor, and provides data screening function. The control board communicates with the power board through the c-

ontrol interface and the current and voltage detection interface. In addition to collecting current and voltage data, the AD of the master computer also leads out two separate channels for expansion, such as depth sensors, position sensors, etc. The temperature and humidity sensor uses DHT22, which is a digital sensor and can directly use the IO port to read data. The AHRS attitude angle module[26] outputs data through the UART port, and the microcontroller uses the UART port to receive attitude angle data. UART communication is also used between the WIFI module and the single-chip microcomputer, and the camera part adopts a USB camera, which is directly transmitted to the upper computer through WIFI without the single-chip computer to participate in the calculation. TF card and EPROM can be selected for storage. TF card can be used when a large amount of data needs to be stored, and E2PROM can be used when storing parameters. In addition, the single-chip microcomputer also leads out some IO ports, which can realize function expansion. In normal operation, the attitude sensor can be used to detect the status information of the bionic jellyfish in real time. On the one hand, it can detect whether the bionic jellyfish is out of balance and other phenomena. On the other hand, it can detect whether the current movement of the bionic jellyfish is consistent with the movement required by the control. The attitude sensor is a high-performance three-dimensional motion attitude measurement system based on MEMS technology. The temperature-compensated three-dimensional attitude and orientation data are obtained through the embedded low-power ARM processor, and the quaternion-based 3D algorithm[27] and special data fusion technology are used, for the output of three-dimensional attitude data in real time. Attitude sensors can be widely embedded in model drones, robots, mechanical gimbals, vehicles and ships, ground and underwater equipment, virtual reality, human motion analysis, and other products that require autonomous measurement of three-dimensional attitude and orientation. The obstacle avoidance sensor[28] contains an infrared sensor. The obstacle avoidance function can prevent the bionic jellyfish from colliding with obstacles during underwater movement. The sensor has the characteristics of long detection distance, small interference from visible light, low price, easy assembly, and convenient use. It can be widely used in many occasions such as robot obstacle avoidance and assembly line piece counting. The distance of detecting obstacles can be adjusted by the potentiometer knob on the tail as required. The steering gear control board is mainly used to control the joint movement of the steering gear of the tentacles of the robotic arm to realize the normal movement of the bionic jellyfish.

3.2 Realization of Motion Control

For the motion control of the jellyfish, this paper uses the WIFI module carried by the bionic jellyfish to receive the motion control instructions sent by the host computer through WIFI communication, and the CPU algorithm processes these data instructions to the steering gear control board, thereby realizing the control of the tentacles. In the process of automatic endurance, the bionic jellyfish uses the attitude sensor and infrared sensor to realize the change of the movement mode and the change of the movement direction, while ensuring the balance of the bionic jellyfish's attitude, and realizes underwater obstacle avoidance and other functions.
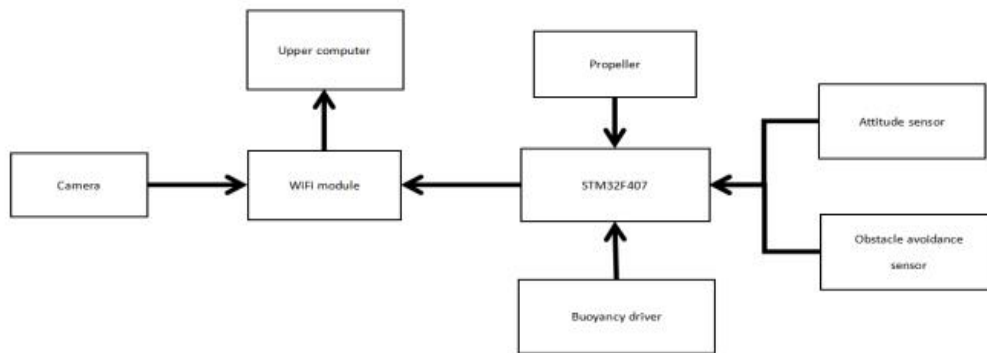
FIG 3

3.3 Realization of Water Weed Entanglement Treatment
3.3.1 Control Realization of Bionic Jellyfish

The control part of the entire motor can be divided into servo motor control and stepper motor control. The stepper motor can be controlled by external controllers and buttons, while the servo motor can only be controlled by sending instructions from the computer to the servo drive. After analyzing the structure of the bionic jellyfish robot, it can be seen that the jellyfish antenna telescopic one cycle reducer requires 60 degrees for forward and reverse rotation. Since the reduction ratio is 81, it corresponds to the servo motor that requires 4860 degrees for forward and reverse rotation, which is 13.5r. Knowing that the number of pulses required for one revolution of the motor is 1000, to complete a complete cycle, the servo drive needs to send out 123750*2 pulses. In order to avoid interference during the movement and damage the mechanism, it is determined that the number of pulses required for the jellyfish tentacles to complete one cycle of expansion and contraction is 120,000*2. For the telescopic frequency of the jellyfish antennae, it can be achieved by controlling the frequency of sending the pulse sequence, that is, by controlling the speed of the motor's forward and reverse rotation. Power on the servo drive and communicate with the computer, control the motor to perform forward and reverse movement, observe the periodic expansion and contraction of the jellyfish antennae, adjust the four auxiliary antennae to synchronize their swing trajectories,change the motor speed to obtain antenna swings of different frequencies. After debugging, the period is set to 5s, and the ratio of telescopic frequency is 1:3.

The jellyfish rapidly shrinks the bell-shaped body structure when advancing, and accelerates forward after drainage. At this time, it relaxes slowly. During the relaxation, the jellyfish decelerates to prepare for the next contraction. According to the movement characteristics of the jellyfish, the underwater propulsion performance of the bionic robotic jellyfish is tested.

3.3.2 Realization of Detection Function

The bionic jellyfish is installed with a camera and a lighting lamp on the contactor, and a WiFi camera module is used. The real-time video collected by the camera can be directly transmitted to the host through WiFi module.

3.3.3 Realization of Winding Processing Function

For the rapid treatment of the entanglement of water plants, the high-speed rotation of the propeller is used to automatically separate the entangled water plants. The user can intuitively observe the operation of the bionic jelly-

fish and the degree of separation of the entangled water plants through the picture transmitted by the camera module. A propeller is a device that relies on the blades to rotate in air or water to convert the rotational power of the engine into propulsion. There can be two or more blades connected to the hub, and the back side of the blade is a spiral surface. There are many types of propellers and they are widely used, such as propellers for airplanes and ships. The propeller has 2, 3 or 4 blades. Generally, the more the number of blades, the greater the absorbed power. Sometimes a sleeve-shaft propeller is also used on high-power turboprop aircraft, which are actually two counter-rotating propellers that can offset the reaction torque. In light aircraft with engine power less than 100 kilowatts, two-blade wooden propellers are commonly used. It uses a piece of spliced wood on both sides to make twisted blades, and the middle opening is connected to the engine shaft. The propeller has to withstand the centrifugal inertia force and aerodynamic load of the blade itself during high-speed rotation. The centrifugal force of the high-power propeller at the root of the blade can reach 200 KN (20 ton force). In addition, there are vibrations caused by the engine and aerodynamic forces. High-power engines generally use 3-blade and 4-blade propellers, and mostly use aluminum alloy and steel to make the blades. The aluminum and steel blades can be made thinner due to the strong material, which is beneficial to improve the efficiency of the propeller at high speed. After the 1970s, composite materials were also used to make blades to reduce weight. The airflow angle actually reflects the ratio of the forward speed and the tangential speed. For a certain profile of a certain propeller, the profile angle of attack varies with the ratio. As the angle of attack changes, the pulling force and drag torque also change. Use the feed moment ratio "J" to reflect the airflow angle at the tip of the propeller, $J=V/n*D$, where D is the diameter of the propeller. Theories and experiments prove that the propeller's pulling force (T), the power (P) and the efficiency (η) required to overcome the propeller's drag moment can be calculated by the following formula:

$T=Ct*\rho*n^2*D^4$

$P=Cp*\rho*n^3*D^5$

$\eta=J*Ct/Cp$

In the formula: Ct is the tensile force coefficient; Cp is the power coefficient; ρ is the air density; n is the propeller speed; D is the propeller diameter. Among them, Ct and Cp depend on the geometric parameters of the propeller, and their value varies with J for each propeller. The characteristic curve shows the relationship between the propeller's tensile coefficient, power coefficient and efficiency with the change of forward ratio.

4 Conclusion

This paper studies a kind of bionic jellyfish that can quickly treat the entanglement of water plants underwater, and provides certain solutions to the problems of underwater operations, thereby reducing the labor cost of underwater operations. The dual-section tentacles of the steering gear combination are designed to ensure the normal movement of the jellyfish by combining with each other, achieving a design consistent with the movement of the normal jellyfish, and at the same time enriching the corresponding research content of bionics. In terms of motion control, posture sensors and obstacle avoidance sensors are added. Through manual control, the stability of the bionic jellyfish in underwater movement is ensured, while preventing collisions with obstacles, which greatly improves the

durability of the product.

5 Outlook

In the future development, people's use of bionic robots will gradually transition from a conventional environment to a more demanding scene, which will inevitably cause higher and higher requirements on the structure and function of bionic robots. In view of the current scientists' understanding of biological structure and its functions, and the rapid development of multidisciplinary technology involved in the field of biomimetic robots, biomimetic robots are gradually showing new development trends, aiming to make their bionic performance more realistic, to adapt to the harsh and changeable environment, to achieve more intelligent control. The bionic robot will abandon the traditional robot control method, focus on the micro-electromechanical and physical and chemical properties [29] of biological systems, and further study the bionic control[30] methods such as electromyographic signal control and EEG signal control on the existing basis. The bionic robot will be controlled by neurons. The bionic robot will be more finely controlled by the nervous system, and make breakthroughs in multi-sensing information fusion, remote monitoring, multi-robot coordinated control, etc. It will achieve a more precise, more adaptable, faster response control process and good environmental perception. The use scenes of robots gradually tend to be more precise, narrow and complicated. The demand for this task scene will inevitably accelerate the transformation of bionic robots to miniaturization[31]. The key to the miniaturization of biomimetic robots is the miniaturization of electromechanical systems. By highly integrating components such as driving devices, transmission devices, sensors, controllers, and power supplies, the overall miniaturization of the biomimetic robot can be realized. With the development of artificial intelligence technology, bionic robots have transitioned from traditional purely mechanical to intelligent[32]. The intelligence of the biomimetic robot is mainly reflected in the diversification of tasks, the humanization of the completed actions, the precision of the control level, etc. It is conducive to more perfectly imitating the physiological functions of living beings and completing tasks more safely. In addition, the high similarity between the shape of the biomimetic robot and the imitated creature is also one of the development trends of the biomimetic robot. The profiling of robots can help them complete tasks more concealedly and safely in military reconnaissance, cover and other combat scenarios. The diversification of future use scenarios will inevitably lead to the development of bionic robots in the direction of multi-functionality. At present, scientists have developed various forms of bionic robots, and their unique motion forms help them complete specific tasks in different environments. As an important member of the robot family, the characteristics of bionic robots enable it to complete some tasks that are more dangerous or impossible for humans to complete. Therefore, bionic robots are currently developing rapidly. Nowadays, countries in the world have entered a new era of large-scale development and utilization of the ocean, and the role of the ocean in the development of human society has become more prominent. How to make good use of the ocean and make better use of the important role of the ocean in social development is the focus of all countries. Our country's marine strategy is of great significance to guide the country to make better use of the ocean to promote national development through the overall planning of the development of marine undertakings and the security of marine interests. After years of development, countries have made significant progress in the marine industry system, marine science and technology, and marine resource development capabilities. The marine industry[33] has entered the best period of development in history, laying a soli-

d foundation for the further use of the oceans and the development of marine undertakings. However, although the current research on biomimetic robots has made great progress, there are still many shortcomings, such as the structure is not perfect and so on. Therefore, people should strengthen the study of biological forms and characteristics in nature, seek inspiration from abundant examples, and then combine artificial intelligence, mechanical manufacturing, and information science to realize the biological imitation and reproduction and achieve a qualitative leap in bionic robot function and technology.

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