

# Research on *Oceanography* Instruction Based on the Cultivation of Maritime Power Consciousness

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**Abstract:** Against the backdrop of intensifying global oceanic rivalry in the 21st century, fostering university students' maritime power consciousness has become a strategic imperative for China. As the future backbone of the nation's maritime undertakings, the enhancement of university students' maritime power consciousness is essential for consolidating the marine talent base, advancing marine science and technology innovation, safeguarding national marine rights and interests, promoting marine ecological protection, broadening international perspective, and exerting demonstrative social influence. Taking the undergraduate course *Oceanography* as the vehicle, this study distils and designs specific teaching cases focusing on the cultivation of awareness in five aspects: marine rights and interests, marine economy, marine culture, marine ecological protection, and marine science and technology innovation. By integrating these cases with the core content of the course, this paper aims to achieve the organic unity of knowledge delivery and value inculcation, and guide students through a cognitive and emotional transformation from "knowing the sea" and "loving the sea" to "strengthening the sea". The resulting framework offers a replicable and scalable paradigm for the construction of a marine awareness education system for college students from the perspective of curriculum ideological and political education.

**Keywords:** Maritime Power Consciousness; *Oceanography*; Ideological and Political Education of Curriculum

## 1. Introduction

The 21st century is poised to be an oceanic century. With the improvement of productivity levels and the rapid development of science and technology, human beings' cognitive dimensions of the ocean continue to expand, and their dependence on it is growing increasingly intense. and their dependence on the ocean is increasing with each passing day. The ocean has become a strategic commanding height for all countries to enhance their comprehensive national strength and compete for strategic advantages <sup>[1]</sup>. A thriving ocean nurtures a thriving state, and a powerful ocean underpins a powerful nation. The development of the marine cause not only directly affects a country's economic strength and international status but also shapes the fate of the nation. Elevating national ocean awareness has become a common strategic imperative for maritime states. Strengthening marine education and raising the public's maritime power awareness are important foundations and key supports for consolidating the national maritime strategic position.

Boasting an extensive coastline, vast maritime jurisdictions, and abundant marine resources, China possesses inherent advantages and enormous potential for developing its marine cause. However, the long-standing "valuing land over sea" mindset has left the public with a weak ocean consciousness. This not only restricts the rational exploitation of marine resources and the high-quality development of the marine economy but also hinders the implementation of the national maritime strategy and the safeguarding of national maritime rights and interests. In response, this study takes the undergraduate course *Oceanography* as the vehicle and seamlessly embeds the cultivation of maritime power consciousness throughout the entire pedagogical process.

Based on this, this paper takes the teaching of the university course "Oceanography" as a carrier, integrates the cultivation of maritime power awareness into teaching practice, and excavates the teaching cases of the five dimensions of marine rights and interests, marine economy, marine culture, marine ecological protection and marine science and technology innovation in the course and integrates them with the course content in depth. It aims to achieve the organic unity of knowledge impartment and value guidance and promote students' emotional and ideological transformation from

understanding the ocean, loving the ocean to aspiring to build a maritime power, as well as to provide a replicable and promotable model for constructing a marine awareness education system under the perspective of ideological and political education in university courses. Furthermore, it will consolidate the talent base for the implementation of China's maritime power strategy, gather social consensus, and help the country take the initiative in the global maritime competition. Drawing on five thematic dimensions - maritime rights and interests, marine economy, marine culture, marine ecological protection, and marine science and technology innovation - we construct an integrated instructional model grounded in knowledge delivery, driven by case-based teaching, and oriented toward value internalization. This synergy enables students to ascend cognitively and emotionally from understanding and loving the ocean to committing themselves to building a strong maritime nation. The resulting framework offers a replicable and scalable paradigm for incorporating ocean awareness education into university curriculum-based ideological and political education, thereby consolidating the talent foundation, forging societal consensus, and securing the initiative for China in global maritime competition.

## 2. The Necessity of Fostering University Students' Maritime Power Awareness

Faced with the opportunities and challenges brought by the maritime century, university students, as successors to the cause of socialism with Chinese characteristics and a crucial force for the great rejuvenation of the Chinese nation, are undoubtedly the backbone for building China's maritime power. However, the deficits and delays of their maritime power consciousness have weakened the talent reserve for building a maritime power to a certain extent. Therefore, enhancing university students' awareness of building a strong maritime country is of great practical necessity and strategic urgency, which is mainly reflected in the following six dimensions:

Firstly, university students are the future of the country and the hope of the nation, as well as the reserve force for building a strong maritime country. Cultivating their awareness of building a maritime power can provide solid talent support and intellectual guarantee for the implementation of the maritime power strategy, and it is an inevitable requirement for the realization of the national maritime strategy.

Secondly, cultivating university students' awareness of building a strong maritime country can guide them to pay attention to the exploration and utilization of marine mineral resources such as petroleum and natural gas, further promote breakthroughs in marine scientific and technological innovation and the quality and efficiency improvement of the marine economy, which serves as an important way to enhance the country's comprehensive competitiveness.

Thirdly, cultivating university students' awareness of building a strong maritime country can strengthen their sense of identity and responsibility towards national maritime rights and interests, guide them to establish the concept of safeguarding national maritime rights and interests in accordance with the law, and lay a solid ideological foundation for protecting national sovereignty and maritime security.

Fourthly, cultivating university students' awareness of building a strong maritime country can enhance their consciousness of marine conservation and encourage them to actively participate in marine ecological protection initiatives, which constitutes an important pathway to promote marine ecological conservation.

Fifthly, cultivating university students' awareness of building a strong maritime country can broaden their international vision and global awareness, guide them to examine marine issues from the perspective of a community with a shared future for mankind, which is a realistic need to address global maritime challenges.

Sixthly, university students are vigorous and open-minded, with strong abilities to acquire and disseminate knowledge. By cultivating their awareness of building a strong maritime country, we can leverage their radiation effect to drive the improvement of the whole nation's marine awareness and create a positive cycle of "educating one person and influencing a group".

In sum, strengthening the cultivation of university students' awareness of building a strong maritime country in the new era is of far-reaching significance in shaping their patriotic spirit, establishing their maritime belief, enhancing their maritime security awareness, enriching their marine cultural knowledge, expanding their innovative vision, and elevating public ocean literacy. It bears on national economic prosperity and security, as well as long-term development and the enhancement of

international competitiveness.

### **3. Important Role of Oceanography Instruction in Cultivating University Students' Maritime Power Consciousness**

In universities, the cultivation of university students' maritime power consciousness lies in fully exploring the educational potential of classroom teaching. Systematic classroom instruction in ocean-related knowledge can expand students' cognitive horizons in the marine field and lay a solid foundation for the formation and development of their maritime power consciousness. Currently, helping undergraduates acquire a holistic, three-dimensional understanding of the ocean, update traditional perceptions, and consolidate their maritime-power consciousness has become an important task for ideological and political courses and the ideological and political construction integrated into professional courses.

*Oceanography* is a compulsory professional basic course for students majoring in marine-related fields in Chinese universities. Its content covers key modules such as the physical and chemical properties of seawater, the distribution and variation characteristics of seawater, the laws of seawater movement, ocean-atmosphere interactions, acoustic and optical phenomena in the ocean, and marine biology. It not only spans multiple fields of natural sciences but also is closely linked to social sciences and humanities. Through studying this course, students can not only master solid theoretical knowledge of marine science but also develop a comprehensive and in-depth understanding of the ocean. They can understand the ocean's crucial role in global climate regulation, biodiversity maintenance and resource supply, as well as recognize the complexity and fragility of the marine environment. Furthermore, they can even learn to interpret the ocean's profound impact on human society from historical and cultural perspectives. The formation of this series of cognition helps students to establish a sense of awe towards the ocean, strengthen their sense of responsibility for marine protection, foster their awareness of ecological protection, and enhance their recognition and pride in marine culture. In conclusion, the study of the *Oceanography* course plays a crucial role in cultivating college students' awareness of building a strong maritime country.

### **4. Integration of Maritime Power Consciousness into Oceanography Teaching Practice**

#### **4.1 Integration and Implementation of Maritime Rights and Interests Awareness**

The awareness of maritime rights and interests is an important component of maritime power consciousness. In recent years, with the implementation of China's maritime power strategy, the marine economy has flourished, the scale of the marine industry has continuously expanded, marine scientific and technological innovation has yielded fruitful results, and the marine infrastructure has been steadily improved. However, countries such as the United States, Japan and India have implemented targeted containment strategies that constrain China's maritime development. And China's maritime rights and interests have always faced severe challenges. Cultivating university students' maritime rights consciousness will help them clarify the inherent connection between national territory and sovereign interests, elucidate China's fundamental positions and core claims, and reinforce students' sense of responsibility and mission to safeguard national maritime rights.

The awareness of maritime rights and interests can be seamlessly integrated into the teaching content of "Continental Margins" in Section 3, Chapter 1 ("Seabed Geomorphic Features"). In the teaching process, instructors can first put forward the problem of the division of maritime boundaries, systematically popularize the principles of the division of the sea areas such as the inner sea, the territorial sea, the contiguous zone, the exclusive economic zone and the relevant provisions of sea power to the students. Combined with the United Nations Convention on the Law of the Sea (UNCLOS), it can be analyzed that a country has the exclusive right to the exploration and exploitation of marine resources and the exclusive right to trade and transportation between ports within its territorial seas, and that it also enjoys sovereign rights and jurisdiction over the exploration, exploitation, conservation and management of natural resources in its exclusive economic zone (EEZ). Meanwhile, it should be clarified that other countries must abide by the basic norms of the laws and regulations of the coastal state when conducting activities in the relevant maritime areas. Subsequently, Students are assigned to groups to debate the disputes over the ownership of the Diaoyu Islands, Huangyan Island and the South China Sea Islands. And historical archives, official statements, and legal instruments are displayed via multimedia platforms. At last, students were guided to deeply

understand China's position and claims in maritime rights and interests' disputes.

In addition, during the teaching of contents such as "branches of marine science" in the introduction and "distribution, development and utilization of marine biological resources" in Chapter 8, issues related to marine rights and interests can be appropriately introduced. For example, topics like 'the relationship between marine resource development, military activities at sea, and marine rights and interests' and 'measures to protect our country's rights and interests in marine resource development' can be discussed. By displaying photos and videos showing Chinese fishermen being illegally interfered with by foreign ships in the waters around the Diaoyu Islands and the South China Sea, as well as Chinese coast guard vessels lawfully protecting the legitimate rights of fishermen in sensitive areas, students can be guided to think deeply. This can subtly strengthen their understanding of marine rights and interests, cultivate a sense of national awareness and responsibility, and inspire a firm determination to safeguard the country's marine rights and interests.

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#### **4.2 Integration and Implementation of Maritime Economy Awareness**

Throughout the history of the world, all maritime powers have taken the ocean as a link to expand their development space and achieve national prosperity by managing and developing maritime affairs [2]. A thriving ocean brings national prosperity and people's well-being; a declining one leads to national weakness and people's poverty. Coastal countries have relied on the ocean to achieve economic development, which has become a development pattern tested by practice. As an important strategic engine, the development quality of the marine economy directly affects the overall development level of the national economy. Cultivating university students' awareness of the marine economy is to hinge on sharpening their appreciation of the ocean's exploitable value and its vast economic potential and thereby inspiring them to advance maritime development both intellectually and practically.

In the teaching of *Oceanography*, marine economy-related content can be integrated into multiple chapters. In the introduction, to elaborate on the epochal significance of marine research, instructors can analyze its supporting role in national economic growth and consolidate students' foundational understanding of marine economy by combing the development status of marine industries such as marine resource development, marine transportation, marine fishery and marine tourism. The 21st-Century Maritime Silk Road initiative is then used to illustrate the significance of deeper maritime cooperation, the liberalization and facilitation of maritime trade, the connectivity of maritime infrastructure between China and other countries and regions along the route, to clarify the strategic positioning of the marine economy in the high-quality development of the global economy. In Chapter 3 "Physical Properties of Seawater" instructors draw on Fujian's ocean-based economy to show how temperature, salinity and density gradients directly determine the development of marine fisheries, maritime transportation, marine tourism, and marine equipment manufacturing, which highlights the driving role of marine economy in regional economic transformation and upgrading and the strategic support value for national economic development. In Chapter 5 "Ocean Circulation and Current Distribution", we can focus on the internal relationship between ocean circulation and marine economy, and systematically discuss the impact of ocean current movement on the spatial distribution of marine fishery resources, ocean shipping route planning and operating cost control by analyzing the coupling relationship between the four major fishing grounds in the world and ocean circulation, so that students can intuitively understand the economic value of ocean circulation. Finally, In the teaching of "distribution, development and utilization of marine biological resources" in Chapter 8, the important contribution of the marine biological resources to GDP can be discussed around the quality and efficiency improvement of marine fisheries and the transformation of marine drug, which further strengthen students' awareness of marine economy.

In sum, by systematically integrating the above-mentioned content and cases into the course teaching, it can not only effectively stimulate students' interest in exploring the field of marine economy, but also cultivate their economic thinking and innovative awareness, thereby reserving high-quality professional talents for the high-quality development of China's marine economy.

#### 4.3 Integration and Implementation of Maritime Culture Awareness

Promoting China's transformation into maritime power requires not only the support of strong hard power such as marine economy and science and technology but also the synergistic empowerment of soft power, particularly the awareness of marine culture. Enhancing the marine awareness of the whole nation and flourishing marine culture has become an urgent task for the development of maritime undertakings in the new era. Marine culture refers to the cultural forms associated with the ocean. It is here understood as the totality of spiritual, behavioral, social and material expressions that arise from humanity's sustained engagement with the sea<sup>[3]</sup>.

Tidal culture is an important component of marine culture. In ancient China, the study of tides was once at the forefront of the world. During the Eastern Han Dynasty, Wang Chong first associated the cause of tides with the movement of the moon, which laid a scientific foundation for the research of tides. In the Tang Dynasty, Dou Shumeng applied astronomical calculation methods to accurately determine a tidal cycle of 12 hours, 25 minutes, and 12 seconds, summarized the semi-monthly, monthly and annual cycles of tides, identified the phenomenon of equinoctial tides, and compiled an intuitive astronomical tide table. The Qiantang River tidal bore, a world-famous natural spectacle, gave rise to a unique tide-viewing culture, including ancient tide-viewing poems, tidal-watching festivals, and other folk activities. Moreover, coastal residents developed marine fisheries culture, port culture, and shipping culture through activities such as fishing based on tides, sea salt production, ship navigation in and out of ports, and cargo handling, all of which fall under the cultivation of marine cultural awareness. The above content can be organically integrated into the teaching of "Tides" in Chapter 7, where the combination of historical cases and cultural phenomena serves to highlight the profound heritage of China's marine culture.

Secondly, in the teaching of introductory section "the course of human understanding of the ocean", instructors can focus on strengthening students' recognition of the splendid marine culture in ancient China. In the Ming Dynasty, Zheng He's seven maritime expeditions to the Western which navigated as far as the Arabian Sea for trade purposes and pioneered the world-famous 'Maritime Silk Road of Porcelain', represented a remarkable feat in the history of navigation in China and even the world. The elaboration of this historical case not only enhances students' national pride and self-confidence but also guides them to comprehend the profound implication of "learning from history". It helps students recognize the significance of attaching importance to maritime rights and strengthening the nation through maritime development, then enables them to grasp the mission entrusted to young people by the times from a national strategic perspective.

In addition, marine cultural elements can be explored and incorporated into the teaching of such topics as "the ocean's carbon dioxide absorption capacity" in Chapter 4, "the role of ocean currents in global climate change" in Chapter 5, and "marine ecosystem conservation" in Chapter 8. By drawing on and absorbing the achievements of outstanding human marine civilizations and delivering the content to students through diverse approaches (e.g., storytelling and online resource demonstrations), this pedagogical practice can help college students in the new era establish a sound view of marine culture and nurture their profound affection for caring about and cherishing the ocean.

#### 4.4 Integration and Implementation of Maritime Ecological Protection Awareness

Rapid expansion of marine-based industries and pressures of human activities have escalated both frequency and intensity in ocean warming, acidification, biodiversity loss, harmful algal blooms, and coastal erosion. Given the accelerating deterioration of marine ecosystems, fostering university students' ocean-literacy and ecological stewardship is therefore an educational imperative. Within the *Oceanography* curriculum the teaching content which refers to the ocean's modulation of global climate, marine resources and environment, biodiversity and its conservation, and the coordinated development of humans and the ocean, furnish a rich repository of evidence-based teaching materials and compelling case studies for cultivating university students' awareness of marine ecological protection.

When explaining the distribution of ocean temperature and salinity in Chapter 3 "Physical Properties of Seawater", instructors can guide students to investigate the drivers and impacts of global climate change, encourage them to explore the observed effects of global warming on the marine environment, species distributions and biodiversity, and further interrogate the observed effects of global warming on the marine environment, and then prompt an in-depth consideration of the scientific connotations and practical significance of "carbon emissions" and "carbon neutrality". These can

enable students to fully appreciate China's major actions, substantive contributions and demonstrated responsibility in addressing global climate change.

Similarly, when teaching marine chemical pollution in Chapter 4 "the Marine Chemical Properties", instructors can organize student to debate on current issues such as "the impacts of Japan's discharge of nuclear-contaminated wastewater on marine ecosystems and the global environment", thereby guiding them to correctly evaluate the ecological consequences of marine-resource exploitation, to deeply recognize the importance of marine ecological protection, and to accurately grasp the connotation of a "Marine Community with a Shared Future".

In Chapter 8 "Marine Biology", the bleaching and decline of coral reefs is employed to illustrate the present status of ocean acidification, while recurrent harmful algal blooms are used to demonstrate the influence of anthropogenic activities on marine eutrophication. The ecological concept of "lucid waters and lush mountains are invaluable assets" is transmitted through these cases, and students are motivated to consciously participate in marine protection. Meanwhile, taking the Huidong Sea-Turtle Nature Reserve and its species-specific conservation program as an example, the course can demonstrate the government's determination and capacity to build an ecological civilization, thereby strengthening students' sense of agency.

In summary, the course should deeply explore typical cases, supplemented with high-definition images, documentaries, short videos, and other multimedia methods to evoke emotional resonance. It should encourage students to independently engage in conservation practices, expand the influence, promote a pattern of collaborative governance across society, gather public wisdom, and jointly build a better future for the oceans.

#### **4.5 Integration and Implementation of Maritime Science and Technology Innovation Awareness**

Marine science and technology constitute the primary productive force driving marine development <sup>[4]</sup>. Establishing a strong marine strategic science and technology force and seizing the initiative in technological innovation have become a strategic consensus among major maritime powers in the world to win maritime discourse power. The prosperity of marine science and technology hinges on vigorous innovation. Innovation has always been an important driving force for the progress of human society <sup>[5]</sup>. As the backbone of social development, contemporary university students must fully recognize the critical importance of innovation and embrace the principle that "only innovators advance, only innovators grow strong, and only innovators prevail". Building a world-leading marine science and technology nation requires students to cultivate the courage to forge ahead and the vigor to create the future, together with the responsibility to challenge, question, and overcome difficulties.

In recent years, with China's continuously strengthening awareness of marine science and technology innovation, its technological capabilities have improved markedly. Milestones such as the commissioning of the independently developed icebreaker *Xuelong 2*, the completion of China's first immersed-tube undersea tunnel, and the successful launch of ocean-observing satellites from the Jiuquan Satellite Launch Centre signal that China's marine science and technology capacity has undergone a qualitative transformation. Within the *Oceanography* curriculum, these exemplary cases can be appropriately incorporated to emphasize to students the core role of scientific exploration and the spirit of innovation in advancing marine technology, thereby fostering their scientific inquiry mindset and craftsmanship spirit.

When teaching active continental margins in Chapter 2, instructors can organize in-depth discussions centered on the historical trajectory of human exploration of the hadal zone. In 1875, Britain's HMS Challenger used wireline sounding to confirm the existence of the Mariana Trench and recorded the first bathymetric data. In 1960, the bathyscaphe *Trieste* carried out the first human descent to 10,916 m and launched the direct investigation of the hadal zone. Sixty years later, China's *Fendouzhe* mission set a national record of 10,909 m during seafloor docking. This achievement institutionalized routine 10,000-m-class scientific dives and returned critical rock and biological samples. Based on this temporal framework, instructors can systematically sort out the phased leaps and technological innovation breakthroughs in the scientific exploration of the hadal zone. Highlighting China's breakthroughs in hadal-zone technology can enable students to perceive the nation's high priority on independent R&D in science and technology, strengthen their national pride, and inspire their courage to confront challenges and difficulties.

When addressing seawater composition in Chapter 4 and fouling organisms in Chapter 8, instructors can adopt problem-based teaching approach by posing the question: "Reinforced concrete,

the primary material in marine infrastructure construction, frequently suffers insufficient durability because of electrochemical corrosion, biological fouling and wave erosion. How can efficient protection be achieved?" This not only stimulates students' patriotism and commitment to the field of marine engineering construction but also embed the craftsmanship values of "dedication, excellence, concentration, and innovation." in the process of knowledge imparting and competence development. Meanwhile, it guides students to integrate marine chemistry and biology knowledge into career planning and motivates them to establish a career goal of serving the national strategy of building a maritime power with their academic expertise.

In the teaching of "thermohaline circulation and the significance of ocean currents to the global climate system" in Chapter 5, instructors can use "the evolution of human understanding and observation of ocean circulation" as the narrative thread, and lead students on a chronological journey "from drift bottles to digital twin oceans". This enables students to intuitively experience the technological trajectory from theoretical modelling through single-point measurements to global networked observations and ultimately to intelligent digital twins, and further underscore China's transition from rule-taker to rule-maker in global ocean governance. It enhances their pride in national marine science and technology achievements and inspires them to assume leadership roles in future maritime-power initiatives.

## 5. Conclusion

In response to the strategic demands of global ocean competition and China's maritime-power initiative, university *Oceanography* course has evolved from mere knowledge transmission to an integrated platform that simultaneously conveys knowledge, cultivates skills and shapes values. This paper constructs a three-in-one teaching mode of " knowledge imparting, ability training and value shaping " by deeply integrating the five dimensions of marine power consciousness of marine rights and interests, marine economy, marine culture, marine ecological protection and marine science and technology innovation with the core knowledge points of the course. Through immersive cases and interdisciplinary inquiry, students not only master concepts such as thermohaline circulation and the global conveyor belt but also experience a cognitive-affective transition from "knowing the sea" to "valuing the sea" and "advancing the sea".

Going forward, the teaching of *Oceanography* course still needs to continuously optimize the education system, enrich case resources, innovate teaching methods, improve the evaluation mechanism, and continuously improve the depth and breadth of the integration of maritime power consciousness. It is expected that a replicable and promotable practical paradigm will be provided for the construction of ideological and political education in marine-related courses in colleges and universities. This will help cultivate more marine talents with solid professional quality, strong national feelings and open global vision that can build a solid talent foundation for the implementation of China's maritime power strategy and feed sustainable momentum into national rejuvenation.

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