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A Study on the Integration of Marine Education Into Water Sports to Enhance the Local Identity of University Students: A Case Study of Canoeing in the Tamsui River

Wen-Her Chen*

Office of Physical Education, Tamkang University

*Corresponding Author: Wen-Her Chen
Address: No. 151, Yingzhuan Rd., Tamsui Dist., New Taipei City 251, Taiwan (R.O.C.)
E-mail: 137540@mail.tku.edu.tw
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Abstract

Research Background and Motivation: This study delves into the potential of integrating marine education into water sports to enhance university students' sense of place identity. The Tamsui River, with its rich biodiversity and cultural significance, serves as the perfect backdrop for this investigation. The study aims to enhance students' connection to the local environment through hands-on experience, promoting marine conservation and environmental responsibility. The importance of this research lies in its potential to foster a deeper understanding and appreciation of the local environment among students, which could lead to more proactive efforts in marine conservation. Research Methods and Tools: The study adopts a single-group pretest-posttest quasi-experimental design. The subjects of this study are 20 students enrolled in a water recreation practice course. The course curriculum is designed to include self-rescue and canoeing technique training in the swimming pool, followed by outdoor canoeing activities in the Tamsui River. This combination of theoretical knowledge and practical experience aims to provide a comprehensive learning experience for the students. To measure the effectiveness of the course, learning motivation scales and place identity scales are used for pretest and posttest evaluation. Research Results: The study yielded promising results . After participating in the marine education course, students' sense of place identity significantly improved, especially their sense of place attachment. This suggests that hands-on experience in a local environment can foster a stronger connection to the place. In addition, the scores of the marine education cognition test also significantly improved, indicating that the course effectively enhances students' marine knowledge. Recommendations: Based on the findings of this study, it is recommended that water sports

and marine education courses be further developed and promoted against the backdrop of the Tamsui River. This approach provides students with a deeper understanding of the local environment and fosters a sense of responsibility toward marine conservation. By doing so, it is hoped that students will gain a deeper appreciation for the Tamsui River and become more motivated to learn and protect the marine environment. Furthermore, exploring other teaching methods or tools to enhance students' cognition of marine education is suggested. This could include using digital technologies or field trips to other marine environments.

Keywords: 12-year basic national education, rural education, environmental education

I. Introduction

Marine education includes coasts, water currents, rivers, and lakes, and closely relates with the people. Therefore, some scholars have suggested that “marine education” is an educational activity that explores the people, events, times, places, and things related to the ocean. It is closely related to the rural and environmental education , and it simultaneously includes nature and the humanities (H.-M. Lin, 2007).

The content of the marine education issues in the 12-year National Basic Education Curriculum Outline of the Republic of China is divided into five main aspects: “marine leisure,” “marine society,” “marine culture,” “marine science and technology,” and “marine resources and sustainability” (Lwo, 2018). However, for a long time, the marine education curriculum in primary and secondary schools has mainly been integrated into various subjects, and apart from specialized maritime-related departments, there is a lack of standalone courses dedicated to marine education in higher education institutions. This has led to a significant and growing disconnect between the public and the ocean, neglecting the importance of understanding and valuing the marine environment. Wu and Peng (2014) pointed out that Taiwan lags in marine education and research compared to other countries. While some marine education content has been incorporated into elementary to high school curricula, there appears to be a lack of comprehensive integration, resulting in fragmented knowledge. Additionally, because marine-related topics are not emphasized in exams, many university students lack basic knowledge about marine ecology and fundamental concepts related to maritime boundaries, continental shelves, and marine rights. At the university level, marine-related knowledge is only accessible through general education courses or by organizing specific marine-related activities. Although universities have the autonomy to offer marine education courses according to their needs, the reality is that marine-related disciplines in Taiwan are mostly specialized fields, and the teaching staff is primarily concentrated in schools with maritime-focused departments. Consequently, apart from institutions with maritime-related programs, general universities offer few courses related to marine education. This situation hinders the continuation of integrating and expanding the marine-related knowledge learned during primary and secondary school into university education (Ministry of Education, 2017).

The history of development in the Tamsui area of Taiwan is rich and diverse. The Tamsui River estuary has nurtured a diverse ecological environment and natural landscape, attracting numerous scholars to conduct research. This has led to the

emergence of a meaningful field of study known as "Tamsui studies," which explores a wide range of topics. The research in this field has yielded abundant results and has seen active involvement from government agencies and private historians.

Furthermore, Tamsui Port has historically played a crucial role in Taiwan's economic integration with the international community. Many renowned trading companies established overseas trade bases in the Tamsui area (C.-R. Lin, 2012). Overseas scholars have also researched this region, leading to many research outputs covering a broad spectrum of themes.

Based on the summary of topics presented in C.-R. Lin's (2010) paper titled "*Danshuixue yanjiu de huigu yu zhan wang*," these topics include central and local history, military defense, biographical studies, settlement development, Tamsui's impressions, ecological environment, the Sino-French War, historical architecture, Tamsui from an international perspective, the Tamsui River and its surroundings, education, religion, culture, arts, field surveys, cultural heritage, and economic industries. Tamsui Studies encompasses a diverse range of research areas.

Localities serve as spaces for storing human memories, imagination, identity, and meaning generation, and they are the base for practical actions C. -C. (Chen, 2010). Therefore, cultivating students' sense of social responsibility should begin with establishing a connection between them and their environment. The relationship between people and their environment is an abstract concept that influences human behavior. Local identity refers to people's subjective understanding, feelings, and descriptions about a place, encompassing the overall connections between people and their environment (C.-N. Lin & Hsu, 2007). Pred (1983, in the opening discussion of local identity) emphasized the formation of local identity, stating that it "requires human habitation and involvement in regular activities in a place; it is built up through processes of intimacy and memory; it is given meaning through imaginative thought and symbols; it is made 'real' through meaningful experiences or significant events, and through individual or community feelings of identity, security, and care, a space is transformed into a 'place' (p. 49)."

Hence, interactions between people and their environment play a significant role in developing local identity, leading to complex social networks. These networks leverage intimacy between individuals, social cohesion, moral commitments, and temporal continuity to discover, examine, and resolve community issues.

While most research on local identity has focused on terrestrial environments, marine systems have been less studied (Gurney et al., 2017). Extensive research on

coastal landscapes and communities covers topics from resource reliance (Marshall et al., 2012) to resilience and climate change (Clarke et al., 2018; Marshall & Marshall, 2007; Metcalf et al., 2015). However, marine local identity and attachment have received limited attention (Jacobsen, 2010). Existing studies primarily focus on the recreational and touristic use of ocean spaces, such as the Great Barrier Reef (Wynveen et al., 2010) and Western Australia's Ningaloo Marine Park (Tonge et al., 2013).

Promoting ocean awareness through education aims to enhance public knowledge, change attitudes, and improve marine environmental quality (Huang, 1999). However, in university education, the link between marine knowledge and behavior may weaken (Tang, 2011; Wang, 2014). Despite this, it is still crucial to emphasize marine-related knowledge to foster positive actions towards the ocean (C.-K.Wu, 2011).

This study highlights the integration of marine education with water sports, using the Tamsui River area's rich history and ecology. It uses canoeing as an interactive medium, offering firsthand experiences of the river's beauty and cultural history. This approach deepens students' connection to their local environment, promotes marine conservation, and fosters a strong local identity and environmental responsibility.

Fries-Gaither (2009) points out that the public's understanding of the ocean is often limited to activities along the shoreline, visits to marine museums, and the influence of movies and media. Their knowledge and concepts related to the ocean tend to be fragmented and superficial, lacking a holistic and comprehensive understanding. Therefore, in addition to formal marine education, enhancing the ocean literacy of citizens can be achieved through practicing and promoting marine education using the experiential learning cycle (ELC) proposed by Kolb (1984), which involves experiencing, reflecting, generalizing, and applying knowledge. This approach helps people get closer to the ocean, reducing fear and seeing it as a barrier.

Given the unpredictable nature of the sea, engaging in ocean activities requires careful planning. Activities such as surfing, sand sculpting, swimming, canoeing, sailing, and navigation provide stimulating, adventurous, and creative experiences that align with the preferences and habits of citizens living on islands (Lwo, 2012). Currently, in water sports, many countries prioritize the development of the leisure industry by promoting aquatic tourism and recreation. Taiwan's maritime areas are rich in wildlife, plants, geology, and topography resources. By combining activities like swimming, surfing, snorkeling, sailing, canoeing, jet skiing, parasailing, fishing, and intertidal zone exploration, Taiwan can

promote water-based tourism and recreation activities and enhance waterfront access facilities. This includes efforts to develop recreational fishing harbors and fishing villages and establish two systems to manage water-based tourism and recreation activities effectively.

Marine environmental education at the university level varies across institutions, depending on each school's specific needs. Although current university students may have been introduced to marine education earlier, their exposure to marine-related content has been limited, especially if their institutions do not offer relevant courses. With increasing academic specialization, implementing marine and outdoor education at the university level becomes challenging unless students are enrolled in marine-related programs or courses.

This study selected canoeing as the focus due to the rich ecological environment and natural landscape of the Tamsui River estuary and its significant role in Taiwan's economic integration. These factors provide students with valuable learning opportunities. Canoeing activities effectively combine marine education with field teaching, allowing students to learn water self-rescue techniques and understand the history and ecology of the Tamsui River through hands-on experience. This enhances their sense of local identity and environmental awareness. Therefore, the Tamsui River is ideal for marine education and local identity research. Canoeing offers great convenience in river tourism, enabling in-depth exploration of various parts of the river, thereby boosting students' learning motivation and sense of place.

Marine education is an essential but often neglected part of education. Using innovations in curriculum and pedagogy to incorporate marine education elements into physical education programs can effectively integrate local educational elements with life experiences, and this study aims to deepen its content by using canoes as a medium for outdoor instruction and integrating them with Vale's marine education curriculum. This study aims to increase students' understanding of marine education in Tamsui River, enhance their marine awareness, and further strengthen their local identity related to the Tamsui River.

II. Method

This study utilized a one-group pretest-posttest quasi-experimental design with 20 students enrolled in the Aquatic Recreation Practicum course. The students enrolled in the Aquatic Recreation Practicum course during the first semester of 2023. The primary course of study during this semester was canoeing. The foundational part of the course included learning water self-rescue

and canoeing techniques in the school's swimming pool. It was supplemented with an outdoor canoeing program on the Tamsui River. The primary instructional tool was the canoe, and marine education was integrated into the teaching.

The canoeing course began with instructors teaching students the techniques in the classroom. This was reinforced with instructional videos on canoeing available on the teaching platform. Students had access to multimedia canoeing lessons and received feedback on their learning from the instructors during practical sessions. The aim was to achieve the objectives of multimedia-assisted teaching. Additionally, the study incorporated historical teaching videos related to the Tamsui River. Students were required to preview these videos before class and submit assignments based on them. During outdoor teaching sessions on the Tamsui River, important landmarks were explained and guided by the teaching platform's course materials and the instructor's explanations.

As the primary teaching activity in this study was the canoeing course, this study refers to the sea education curriculum designed by W.-H Chen and Chen (2021) as the curriculum structure of this study. Students were provided instructional videos for pre-learning and online assignments before the canoeing sessions. Supplementary video materials related to the course content were also provided. After completing relevant topics, assignments or quizzes were conducted. Before outdoor teaching, students underwent self-rescue training (second week), canoe paddle handling, kayaking rescue techniques, and life-saving training in the school's swimming pool. Subsequently, they were assessed on their technical skills, and a checklist was established for canoeing technique assessment (See Annex for details of the course structure).

Regarding learning outcomes, knowledge was evaluated through regular assignments and a Tamsui River marine education cognitive test to assess the effectiveness of learning. Skills were assessed based on water safety, self-rescue, and canoe handling skills in the swimming pool and the Tamsui River. Attitudes were assessed using the Learning Motivation Scale and the Place Identity Scale to measure the differences between the pre- and post-implementation of the program.

Due to the first two weeks being the add-drop period, this study conducted a pre-test after confirming the course list in the third week. Before starting the third week's classes, a pre-test questionnaire on local recognition, learning motivation, and marine education awareness of the Tamsui River was administered. The aim was to assess students' cognition of marine education cognition, sense of local identity, and learning motivation before participating in the course.

A post-test was conducted after the outdoor teaching course ended in the fifteenth week. The purpose was to evaluate the changes and progress in students after participating in the course.

The Place Identity Scale in this study is based on the Tamsui Local Identity Scale developed by Zhang (2014) as a testing tool. The overall scale reliability coefficient is tested with the internal consistency coefficient (Cronbach's α value) of .85. The reliability of each sub-item is .712 (local attachment construct), .687 (local dependence), and .731 (local identity construct), respectively. The ARCSS (Attention, Relevance, Confidence, Satisfaction Survey) Learning Motivation Scale was created by Keller (1999). This study cites C.-H. Chen's (2005) revised ARCSS, which is suitable for measuring student learning motivation. The reliability of each sub-item is .80 for attention, .75 for relevance, .72 for confidence, .83 for satisfaction, and the overall reliability is .90, indicating that both scales have good internal consistency.

Data analysis used descriptive statistics to calculate various research variables' means and standard deviations. A dependent sample *t*-test was employed to analyze the differences in students' local identity scale and marine education cognitive test scores before and after the course. An independent sample *t*-test was used to analyze differences in local identity and between students with high and low marine education scores , with a significance level set at $p < .05$.

III. Result

i. Through Marine Education, What Are the Differences in Students' Local Sense Before and After?

An analysis using a dependent sample *t*-test revealed that students significantly improved their Sense of place after the marine education course, $t(19) = -2.33$, $p = .030$, $d = -0.470$. The post-test scores ($M = 4.14$, $SD = 0.61$) were significantly higher than the pre-test scores ($M = 3.80$, $SD = 0.82$).

Furthermore, when dividing the local sense into three subcategories, local attachment, local dependence, and local identity, only local attachment showed a significant difference, $t(19) = -2.81$, $p = .011$, $d = -0.7.36$. The post-test scores for local attachment ($M = 4.40$, $SD = 0.55$) were significantly higher than the pre-test scores ($M = 3.86$, $SD = 0.88$).

Upon further investigation into individual items, it was found that within the local attachment category, there was a significant difference in the item "If I leave the Tamsui area, I will begin to miss it," $t\ (19) = -3.70$, $p = .001$, $d = -0.684$. The post-test scores ($M = 4.33$, $SD = 0.91$) were significantly higher than the pre-test scores ($M = 3.57$, $SD = 1.28$). Additionally, in the local identity category,

the item "The Tamsui area is very meaningful to me" showed a significant difference, $t(19) = -2.26$, $p = .035$, $d = -0.536$. The post-test scores ($M = 4.38$, $SD = 0.59$) were significantly higher than the pre-test scores ($M = 3.95$, $SD = 0.97$).

ii. What Are the Differences Between the Pre and Post-Tests of Marine Education Cognition in Their Freshwater Rivers Through the Learning Process of Marine Education?

A dependent sample *t*-test analysis revealed that students' Ocean Education Awareness Test scores increased significantly after going through the ocean education program, $t(19) = -9.07$, $p = .000$, $d = -2.265$, and the posttest score ($M = 74.05$, $SD = 10.68$) was significantly more significant than the pretest ($M = 46.67$, $SD = 13.35$) (Table 2).

iii. Analysis of the Differences in the Sense of Place and Learning Motivation Between the High and Low Scores of the Marine Education Awareness Group

If the marine education awareness scores are divided into high and low scores groups, using the median (75) as a benchmark, below the median (0–75) as the low scores group, and above the median (76–100) as the high

Table 1 Dependent Sample *t*-test Analysis of the Marine Education Cognition Test (MECT) Pre- and Post-Test

Subject	Pre-test $M \pm SD$	Post-test $M \pm SD$	*df*	*t*-value	*p*-value	Effect size
Marine Education Awareness Test	46.67 ± 13.35	74.05 ± 10.68*	19	-9.07	.000	-2.265

*$p < .05$.

Table 2 Differences in the Sense of Place and Learning Motivation Between High and Low Scores in Marine Education Awareness.

Project	High Group $M \pm SD$	low group $M \pm SD$	*df*	*t*-value	*p*-value	Effect size
Sense of place	3.71 ± 0.46	4.47 ± 0.50*	19	3.56	.002	1.572
Place attachment	4.04 ± 0.56	4.67 ± 0.38*	19	3.07	.006	1.357
Place dependence	3.52 ± 0.38	4.39 ± 0.71*	19	3.34	.003	1.465
Place identity	3.58 ± 0.61	4.37 ± 0.64*	19	2.86	.010	1.260
Motivation	3.75 ± 0.25	4.09 ± 0.28*	19	2.97	.008	1.270
Attention	3.82 ± 0.24	4.09 ± 0.34	19	2.05	.055	0.894
Relatedness	3.77 ± 0.25	3.99 ± 0.32	19	1.75	.097	0.752
Self-confidence	3.76 ± 0.30	4.30 ± 0.46*	19	3.03	.007	1.348
Satisfaction	3.65 ± 0.39	4.03 ± 0.35*	19	2.32	.032	1.034

*$p < .05$.

score group, and then the two groups are analyzed for the differences in their sense of place and motivation to learn, the results are as follows:

The results of the independent *t*-test analysis are shown in the Table 3. The results showed a significant difference in the overall sense of place between the high and low groups, $t(19) = 3.56$, $p = .002$, $d = 1.572$. The low group ($M = 4.47$, $SD = 0.50$) had a significantly higher sense of place than the high group ($M = 3.71$, $SD = 0.46$). Secondly, when the sense of place was divided into three subcategories: place attachment, place dependence, and place identity, there were significant differences in all three categories: place attachment $t(19) = 3.07$, $p = .006$, $d = 1.357$, place dependence $t(19) = 3.34$, $p = .003$, $d = 1.465$, and place identity $t(19) = 2.86$, $p = .010$, $d = 1.260$. Attachment low group ($M = 4.67$, $SD = 0.38$) was significantly greater than the high group ($M = 4.04$, $SD = 0.56$). The low place dependence group ($M = 4.39$, $SD = 0.71$) was significantly larger than the high group ($M = 3.52$, $SD = 0.38$). The low place identity group ($M = 4.37$, $SD = 0.64$) was significantly larger than the high group ($M = 3.58$, $SD = 0.61$).

In addition, for motivation, an independent *t*-test analysis revealed a significant difference in overall motivation between the low and high groups, $t(19) = 2.97$, $p = .008$, $d = 1.270$. The low group ($M = 4.09$, $SD = 0.28$) was significantly more likely to be motivated than the high group ($M = 3.75$, $SD = 0.25$). Secondly, when learning motivation was categorized into four subcategories: attention, relatedness, self-confidence, and satisfaction, there were significant differences in self-confidence $t(19) = 3.03$, $p = .007$, $d = 1.348$ and satisfaction $t(19) = 2.32$, $p = .032$, $d = 1.034$, with the low-percentage group in self-confidence ($M = 4.30$, $SD = 0.46$) being significantly higher than the high-score group ($M = 3.76$, $SD = 0.30$), and the low satisfaction group ($M = 4.03$, $SD = 0.35$) was significantly larger than the high group ($M = 3.65$, $SD = 0.39$).

IV. Discussion

i. Exploration of the Results of the Sense of Place Analysis

Marine education reflects the most realistic environmental issues in students' lives, and it is worthwhile to advocate the development of marine education cases based on a sense of place. As a framework for the preparation and implementation of marine education cases, the "12-Year Basic National Education Curriculum Outline for Marine Education" does not explicitly mention a sense of place and its cultivation goals, but in its preamble, the basic philosophy of the curriculum, ideas for curriculum design, curriculum objectives, content standards, and suggestions for implementation, many of its

Table 3 Analysis of Pre-Posttest Dependent Sample *t*-Tests for a Sense of Place

Composition	Subject	Pre-test $M \pm SD$	Post-test $M \pm SD$	*df*	*t*-value	*p*-value	Effect size
Sense of place (1–11 questions)		3.80 ± 0.82	4.14 ± 0.61*	19	-2.33	.030	-0.470
Local attachment (1–3 questions)		3.86 ± 0.88	4.40 ± 0.55*	19	-2.81	.011	-0.736
	I am having fun in Tamsui.	4.14 ± 0.73	4.48 ± 0.60	19	-1.58	.130	-0.509
	I feel very relaxed in the Tamsui area.	3.86 ± 1.15	4.38 ± 0.67	19	-1.80	.086	-0.553
	I will start to miss it when I leave Tamsui.	3.57 ± 1.28	4.33 ± 0.91	19	-3.70	.001	-0.684
Place dependence (4–6 questions)		3.81 ± 0.96	4.02 ± 0.73	19	-1.05	.308	-0.246
	If I could, I would like to spend more time in Tamsui.	3.86 ± 1.24	4.05 ± 0.92	19	-0.75	.463	-0.174
	For the uniqueness of Tamsui, I do not think there is any other place that can replace Tamsui.	3.90 ± 0.94	4.24 ± 0.83	19	-1.58	.130	-0.383
	I think the activities in Tamsui are better than other monuments and tourist attractions.	3.67 ± 1.15	3.76 ± 0.94	19	-0.38	.705	-0.086
Local recognition (7–11 questions)		3.73 ± 0.89	4.02 ± 0.73	19	-1.98	.610	-0.356
	Tamsui is very meaningful to me.	3.95 ± 0.97	4.38 ± 0.59*	19	-2.26	.035	-0.536
	The Tamsui area gives me a special feeling	3.81 ± 1.17	4.33 ± 0.73	19	-2.06	.053	-0.533
	My activities in the Tamsui area help me to explore and express my inner	3.71 ± 1.01	3.76 ± 1.00	19	-0.22	.825	-0.050
	Tamsui has taught me what kind of a person I am.	3.38 ± 1.32	3.52 ± 1.17	19	-0.57	.576	-0.112
	Understanding the story of Tamsui's historical changes can help me recognize Tamsui more.	3.81 ± 1.29	4.14 ± 0.79	19	-1.43	.167	-0.309

*$p < .05$.

contents point to the requirements of a student with a good sense of place. For example, in the learning theme and substantive content, “to know the water environment and industries in their hometowns or neighborhoods,” “to understand the relationship between marine folk activities, religious beliefs, and life,” “to know the common rivers and marine resources in their hometowns and to cherish the natural resources,” “to understand the importance of the natural resources,” “to understand the importance of the natural resources” and “to understand the importance of the natural resources.” cherish natural resources,” “know about aquatic products that are common in our daily lives,” and “know about pollution in our hometown’s waters or oceans,” are consistent with local knowledge, local dependence, local attachment, and local identity in the sense of place. The results of the analysis are discussed as follows. Therefore, the results of the analysis are discussed as follows:

“Sense of Place” is an inclusive and dynamically changing concept that refers to a universal emotional connection capable of meeting people’s basic needs. It is a significant research area in modern human geography (Sheng & Yang, 2015). In categorizing the sense of place, Jorgensen and Stedman (2001) established a sense of place model based on three dimensions: place identity, place attachment, and place dependence, while studying the sense of place of property owners along the northern shoreline of Wisconsin. Table 1 demonstrates that participating in a freshwater canoeing marine education program can enhance students’ overall sense of place regarding freshwater.

Steele (1981) contends that a “Sense of Place” is an experiential phenomenon that emerges from people’s experiences in a particular location, formed through the interactive process between individuals and the place itself. Pred and Pred (1986) also propose that a sense of place originates from the long-term intimate connection individuals establish in specific spaces, representing their genuine feelings about residing or engaging in activities there. This, in turn, leads to the development of identification and care for that place. In this study, we integrated relevant freshwater marine education topics into regular coursework and introduced outdoor historical tours to enhance student interaction and the local environment. Relph (1976) suggests that a sense of place is a response formed through human emotions and the environment, resulting in an attachment to the place.

Furthermore, concerning the subcategories of place dependence, place attachment, and place identity, only place attachment showed a higher post-test score than the pre-test. The academic community has complex definitions of place attachment. However, this study adopts the commonly used definition,

which views place attachment as satisfying psychological needs through interactions between individuals and the environment. It involves building an emotional connection with a specific place, expressing a tendency to stay there, and feeling comfortable and secure in that psychological state. This emotional connection can motivate repeated behavior (Zhu & Liu, 2011). Our curriculum incorporated videos on important marine education topics in the freshwater region into weekly assignments, allowing students to better understand the area's cultural and ecological resources. Through outdoor education and interactive games, students gained a deeper insight into the unique cultural characteristics of the area, resulting in a significant difference in their place attachment post-test scores. Place attachment enables individuals to develop a profound emotional connection and resonance with the awareness of human-environment relationships, serving as a link in cultivating a sense of place.

Moving on to place dependence involves an individual's awareness of a place's resource conditions, facility status, and functional attributes and the extent to which these satisfy their needs during the cognitive process of place recognition. When specific areas are perceived as having unique capabilities compared to other regions, providing greater satisfaction for individuals or groups, or if individuals have experiences of satisfaction in those areas, it can lead to repeated behavior or guide individuals to visit a place for authentic experiences (Zhu & Liu, 2011). In our study, we found no significant differences in this variable, possibly because students only had exposure to videos on the cultural and ecological resources of the freshwater region through post-assignment work. During outdoor education and interactive games, their interactions with various sites were brief, preventing a deep understanding of the cultural significance. Place dependence directly reflects the relationship between individuals and a specific geographical environment within a sense of place. It establishes a direct connection between cognitive awareness of a place. It fosters emotional development and practical abilities, making it a pivotal element in the formation and development of a sense of place. Future post-assignment plans could involve on-site reports to increase students' understanding of the historical context of the freshwater region.

Lastly, examining place identity is the socialization process where individuals or groups construct their roles and positions in society through their interactions with a place to enhance their self-identity. It involves a sequence of observing, recognizing, and understanding a place, and once a strong connection is established, confirming one's position within that place leads to emotional attachment. The formation and development of place identity transform a place from

being a backdrop for cognitive processes, behaviors, and emotional contemplation into an integral part of self-awareness, serving as a symbol and signifier of self-expression (Ma & Yuan, 2017). As most students come from areas outside of Tamsui, aside from regular coursework, they may have limited opportunities for community service work. Consequently, in terms of self-exploration, they may have difficulty forming a solid connection with the local area. Therefore, beyond learning about Tamsui through marine education, the curriculum could include service courses related to local engagement, allowing students to apply their acquired knowledge to serve the community, potentially enhancing their sense of place and identity.

ii. Analysis of Freshwater Marine Education Cognitive Test Results

In the pre-test of the freshwater marine education cognitive test in this study, the average score was 46.67, indicating that students generally had a low awareness of marine education. Although universities have the autonomy to offer marine education-related courses based on their needs, marine-related disciplines in Taiwan are primarily specialized, with faculty concentrated in maritime-related institutions. As a result, apart from maritime-related schools or departments, general universities typically offer few courses related to marine education. This limitation prevents continuing and extending previously acquired marine-related knowledge during university education (Ministry of Education, 2017). Consequently, marine-related knowledge can only be acquired through general education courses or the planning of some marine-related activities. Therefore, universities need to emphasize the continuity of marine education and enhance the basic marine literacy of college students.

Through one semester of marine education courses, the selection of materials for assignments in regular coursework was based on real-life situations. The course used materials such as news events compiled by government agencies and non-governmental organizations, magazine features, related books, documentaries, etc., to encourage students to explore topics from diverse perspectives and cultivate critical thinking and reflection. However, students may have had limited familiarity with local issues in Tamsui, which could have affected their ability to provide in-depth responses when discussing their viewpoints in assignments assessing emotional aspects. Nevertheless, through practice in weekly assignments, the post-test score reached 74.05, indicating that developing a dedicated Tamsui marine education (local education, environmental education) curriculum could lead to a more profound understanding of Tamsui among students.

iii. Analysis of Differences in Sense of Place and Learning Motivation Between High and Low Cognitive Groups in Marine Education

The results of this study revealed that the low cognitive group in marine education had significantly higher levels of sense of place and learning motivation than the high cognitive group. This phenomenon may be attributed to the course incorporating marine education into water-based activities. It is possible that students in the low cognitive group were primarily interested in acquiring water-related skills, leading to higher motivation due to their enthusiasm for water-based sports. Consequently, this higher motivation may not have translated directly into higher scores in marine education cognition. Conversely, students in the high cognitive group may have had the opposite situation.

Related research indicates a moderate positive correlation between college students' marine environmental knowledge and attitudes. Marine environmental attitudes and behaviors are positively correlated but to a lower degree. Additionally, there is a slight negative correlation between marine environmental knowledge and behavior, which does not reach statistical significance (Tan, 2011). Wang (2014) study also demonstrates a low negative correlation between college students' knowledge of marine environmental pollution and their behavior. Even though students possess relevant knowledge about marine environmental pollution, it may not necessarily manifest in their behavior.

Wu and Li (2005) propose that the essence of marine education should encompass three dimensions: cognition, emotion, and action. "Cognition" refers to acquiring knowledge and concepts about the marine environment. "Emotion" entails expressing emotions and fostering care for the ocean. "Action" involves critical thinking, reflection, and concrete practices related to marine issues. Constructing the essence of marine education from the perspective of marine knowledge subjects allows learners to understand marine knowledge comprehensively. However, this approach may make educators overly focused on subject knowledge, potentially neglecting marine education's emotional and action-oriented dimensions (C.- K. Wu, 2011). C.- K. Wu (2011). argues that while increasing knowledge may not necessarily lead to more positive behaviors, transmitting marine-related knowledge remains essential for fostering pro-environmental actions.

The implications of some studies are significant, suggesting a correlation between students' learning motivation and the use of cognitive strategies. Notably, students tend to employ higher-level cognitive strategies when they experience positive emotions such as happiness and pride. This finding could explain why the learning motivation

of the low cognition group surpasses that of the high cognition group, as they might have encountered more positive emotions during the learning process (Acosta-Gonzaga & Ramirez-Arellano, 2021). Another study reveals practical differences in learning strategies between high-cognition and low-cognition groups. It underscores that attitude and motivation are two key factors differentiating high academic-achieving students from their low academic-achieving counterparts. This finding suggests that even students with lower cognitive abilities can attain commendable academic performance if their learning motivation is sufficiently high (Yip, 2007).

All the above results show the effectiveness of the marine education program. Still, due to the limited sample size, we cannot be sure these results broadly apply to a larger group of students. In addition, with a control group design, we can see more clearly the effects of the marine education program relative to traditional teaching methods. Since this course addresses both marine education knowledge and water-based sports skills, further research is needed to explore the extent to which a sense of place and learning motivation are influenced by marine education. Therefore, we suggest that future studies may consider increasing the sample size and control group design to validate these results further.

V. Conclusion and Recommendations

i. Conclusion

1. Enhanced Sense of Place Identity

By participating in water sports and marine education courses set against the backdrop of the Tamsui River, students' sense of place identity was significantly enhanced, particularly regarding their sense of place attachment.

2. Cognitive Enhancement of Marine Education

Students' cognitive scores improved significantly after the course, showing that integrating marine education into outdoor activities can effectively improve students' understanding of marine knowledge.

3. Association Between Learning Motivation and Sense of Place

The study found that student groups with lower awareness of marine education scored higher on sense of place and learning motivation, which may be related to their interest in water sports.

ii. Recommendations

1. Enhancing Sense of Place Identity

Further development and promotion of water sports and marine education courses

set against the backdrop of the Tamsui River can significantly enhance students' sense of place identity, especially their attachment to the locale.

2. Improving Marine Education Cognition

Integrating marine education into outdoor activities should continue to enhance students' understanding of marine knowledge effectively. Additionally, exploring other teaching methods or tools can improve students' cognition of marine education.

3. Association Between Learning Motivation and Sense of Place

For student groups interested in water sports who have lower cognition of marine education, more attractive courses can be designed to enhance their learning motivation and sense of place. Furthermore, the relationship between learning motivation and a sense of place can be further studied to understand how to enhance students' learning outcomes effectively.

References

1. Acosta-Gonzaga, E., & Ramirez-Arellano, A. (2021). The influence of motivation, emotions, cognition, and metacognition on students' learning performance: A comparative study in higher education in blended and traditional contexts. *Sage Open*, *11*(2), 1-10. https://doi.org/10.1177/21582440211027561
2. Chen, C.-C. (2010). The discourse pattern of localization in the context of globalization:Constructing the rainbow culture of the Plural sense of place. *Prospect Quarterly*, *11*(4), 43–96. https://doi.org/10.7063/PQ.201010.0043
3. Chen, C.-H. (2005). The impacts of information technology integrating into physical education on motor skills learning and learning motivation for the 5th Grade elementary school students [Unpublished master's thesis]. Taipei Physical EducationCollege.
4. Chen, W.-H., & Chen, H.-C. (2021). Application of Integrating mareine education issues into water sports courses for university: Taking canoeing in Tamsui River as an example. *Sports Research Review*, *158*, 23-24. https://doi.org/10.6162/SRR.202109_(158).0003
5. Clarke, D., Murphy, C., & Lorenzoni, I. (2018). Place attachment, disruption and transformative adaptation. *Journal of Environmental Psychology*, *55*, 81–89. https://doi.org/10.1016/j.jenvp.2017.12.006
6. Fries-Gaither, J. (2009). *Common misconceptions about oceans*. Beyond Penguis and Polar Oceans. http://beyondpenguins.ehe.osu.edu/issue/polaroceans/common-misconceptions-about-oce
7. Gurney, G. G., Blythe, J., Adams, H., Adger, W. N., Curnock, M., Faulkner, L., James, T., & Marshall. (2017). Redefining community based on place attachment in a connected world. *Proceedings of the National Academy of Sciences*, *114*(38), 10077–10082. http://

doi.org/10.1073/pnas.1712125114

8. Huang, C.-Y. (1999). Envisioning for the marine education of Kaohsiung: Discussed from the viewpoint of environmental education, science education, and agenda 21. *Research and Development in Science Education Quarterly*, *15*, 39–48.
9. Jacobsen, A. L. L. (2010). *Steam trawling on the south-east continental shelf of Australia: an environmental history of fishing, management and science in NSW, 1865–1961* [Unpublished doctoral dissertation]. University of Tasmania, Australia.
10. Jorgensen, B. S., & Stedman, R. C. (2001). Sense of place as an attitude: Lakeshore owners attitudes toward their properties. *Journal of Environmental Psychology*, *21*(3), 233–248. https://doi.org/10.1006/jevp.2001.0226
11. Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice Hall.
12. Lin, C.-N., & Hsu, Y.-H. (2007). Toward a clarification of people-place relationships: The role of "sense of place," "place attachment" and "community attachment, in the environment-related research. *Journal of Environmental Education Research*, *5*(1), 41–71. https://doi.org/10.6555/JEER.5.1.041
13. Lin, C.-R. (2010, November 14). *Danshuixue yanjiu de huigu yu zhanwang* [Paper presentation]. 2010 7th Taipei Studies and 9th Beitou Studies Conference—The Construction of Taiwan Studies, Taiwan.
14. Lin, C.-R. (2012). Cong "Dansuixue" dao "Tai wanxue" jiantan difang xue yang jiu zhi yiyi. *The Journal of Taiwan Historical Association*, *13*, 3–12.
15. Lin, H.-M. (2007). *A study on competence indicators of ocean education for elementary schools* [Unpublished master's thesis]. National Taiwan Ocean University.
16. Lwo, L.-S. (2012). Quanmin haiyang jiaoyu qihang. *Science Development*, *475*, 6–13.
17. Lwo, L.-S. (2018). 12 nian guomin jiaoyu haiyang jiaoyu yitirongru ge lingyu. *Taiwan Education Review Monthly*, *7*(10), 8–16.
18. Ma, X.-X., & Yuan, X.-T. (2017). Chuzhong didlijiaoxue zhongxuesheng difanggan de peiyang. *Geography Teaching*, *2017*(10), 12–15.
19. Marshall, N. A., & Marshall, P. A. (2007). Conceptualizing and operationalizing social resilience within commercial fisheries in northern Australia. *Ecology and Society*, *12*(1), Article 1. https://doi.org/10.5751/ES-01940-120101
20. Marshall, N. A., Park, S. E., Adger, W. N., Brown, K., & Howden, S. M. (2012). Transformational capacity and the influence of place and identity. *Environmental Research Letters*, *7*(3), Article 034022. https://doi.org/10.1088/1748-9326/7/3/034022
21. Metcalf, S. J., van Putten, E. I., Frusher, S., Marshall, N. A., Tull, M., Caputi, N., Haward, M., Hobday, A. J., Holbrook, N. J., Jennings, S. M., Pecl, G. T., & Shaw, J. (2015). Measuring the vulnerability of marine social-ecological systems: A prerequisite for the identification of climate change adaptations. *Ecology and Society*, *20*(2). Article 35. https://doi.org/10.5751/ES-

07509-200235

22. Ministry of Education. (2017). *Haiyang jiaoyu zhengce baipishu*. https://ws.moe.edu.tw/001/Upload/3/relfile/6315/55805/40f900df-a70b-4e1f-847f-e53ed94b4c77.pdf
23. Relph, E. C. (1976). Place and placelessness. Pion.
24. Pred, A. (1983). Structuration and place: On the becoming of sense of place and structure of feeling. *Journal for the Theory of Social Behaviour*, *13*(1), 45–68. https://doi.org/10.1111/j.1468-5914.1983.tb00461.x
25. Pred, A., & Pred, A. R. (1986). *Place,practice and structure:Social and spatial transformation in southern Sweden: 1750–1850*. Polity Press.
26. Sheng, T.-T., & Yang, J. (2015). Progress and insights of sense of place research in overseas countries. *Human Geography*, *30*(4), 11–17.
27. Song, S. H., & Keller, J. M. (1999). *The ARCS model for developing motivationallyadaptive computer-assisted instruction* (ERIC Document Reproduction Service No.ED436181). University of Florida, College of Education.
28. Steele, F. (1981). *The sense of place*. CBI.
29. Tang, M.-R. (2011). *Study on the knowledge, attitude and behaviors of marine environment of university students* [Unpublished master's thesis]. National Taichung University of Education.
30. Tonge, J., Moore, S. A., Ryan, M. M., & Beckley, L. E. (2013). A photo-elicitation approach to exploring the place meanings ascribed by campers to the Ningaloo coastline, north-western Australia. *Australian Geographer, 44*(2), 143–160. https://doi.org/10.1080/00049182.2013.789591
31. Wang, S.-C. (2014). *A study on the college students' knowledge, attitude and behavior toward the pollution of the marine environment* [Unpublished master's thesis]. University of Taipei.
32. Wu, C.-C., & Peng, S.-C. (2014). *Marine education* (2nd ed.). New Wun Ching.
33. Wu, C.-K. (2011). A study on the teaching content of "marine education" in elementary school teacher education programs. *Educational Resources and Research*, *102*, 111 –140.
34. Wu, J.-G. & Li, H.-C. (2005). Comparing elementary school textbooks for oceanic education: A project of curriculum study in the field of arts and humanities. *Oceanic Culture Journal*, *1*, 201–236.
35. Wynveen, C. J., Kyle, G. T., & Sutton, S. G. (2010). Place meanings ascribed to marine settings: the case of The Great Barrier Reef Marine Park. *Leisure Sciences*, *32*(3), 270–287. http:// doi.org/10.1080/01490401003712705
36. Yip, M. C. W. (2007). Differences in learning and study strategies between high and low achieving university students: A Hong Kong study. *Educational Psychology*, *27*(5), 597–606. http://doi.org/10.1080/01443410701309126
37. Zhu, H., & Liu, B. (2011). analysis and research implications Concepts sense of place, place attachment and place identity. *Journal of South China Normal University (Natural Science Edition)*, *2001*(1), 1–8.

Annex 1 Curriculum Planning

Week	Content	Teaching Design and Supplementary Materials	Corresponding Detailed Topics
1	Course Introduction, Brief on Water Activities, and Overview of Water Safety (classroom session)	1. Water safety lecture (slides) followed by a water safety awareness test. 2. Homework: Watch a video on water self-rescue and survival, then complete the assignment.	Water Recreation
2	Water Safety and Self-Rescue (Pool Session)	1. Pre-class preparation: Lifesaving strokes video. 2. In-class practice: Self-rescue methods, lifesaving strokes. 3. Homework: What are the four types of lifesaving strokes and their appropriate timing and functions?	Water Recreation
3	Introduction to Canoe Equipment and Paddling Methods in Water (Pool Session)	1. Pre-class preparation: Canoe teaching video (equipment introduction, paddling in water). 2. In-class practice: (1) Pre-test questionnaire on local recognition and learning motivation questionnaire. (2) Pre-test on marine education awareness of Tamsui River. (3) Paddling principles, equipment, gear introduction, getting in and out of the canoe, in-water paddling practice (forward, backward, turning, side paddling), and capsizing recovery practice. 3. Homework: Briefly describe the canoe equipment and paddling skills.	Water Recreation
4	Canoe Water Rescue Techniques Practice (Pool Class)	1. Pre-class preparation: Tamsui River water area-related terrain, tides, canoe rescue techniques video. 2. Classroom explanation: Offshore currents, tides, and tidal changes. 3. Classroom practice: Canoe water rescue techniques practice (throwing rope rescue, dummy dragging, diving), and group discussion on effective rescue techniques and experience sharing. 4. Post-class homework: Watch videos on Tamsui River water area-related terrain, tides, and rescue techniques, then answer homework questions. (1) According to the New Taipei City Water Activity Management Regulations, what are the prohibited areas for water activities in the Tamsui River?	1. Water Recreation 2. Marine Geography and Geology 3. Marine Economic Activities 4. Marine History

Week	Content	Teaching Design and Supplementary Materials	Corresponding Detailed Topics
		(2) How can we plan the time and place for launching water in the Tamsui River? (3) When you fall into the water while boating, how do you swim to the shore if you are the person who fell into the water? (4) Please check the tide time of the Tamsui River on the website and take photos of the change of the sandbar on the river surface during the high and low tides of the Tamsui River. The canoe route from Tamsui to Bali was planned according to these photos. (5) What were the Japanese government's planned uses of the sandbars on the Tamsui River during the Japanese rule?	
5	Non-Powered Water Sports Learning (Pool Class)	1. Pre-class preparation: Water-based Leave No Trace tourism. 2. Classroom explanation: Explain the environmental impact of non-powered water activities and introduce suitable non-powered sports for Tamsui River (snorkeling, SUP, windsurfing), leading to the connection between non-powered water sports and ecological conservation, guiding students to care about Tamsui River ecology and pollution issues. 3. Classroom practice: Snorkeling, SUP practice. 4. Post-class homework: Watch videos on Tamsui River ecological resources and related pollution news reports, then answer homework questions. (1) What are the common fish species in freshwater rivers? (2) What are the sources of pollution in freshwater rivers? (3) What is the role of mangroves in the ecological conservation of the estuary? (4) Please design a simple tour program for the Freshwater River, including what kind of equipment to use, where to go up and down the river, and what to introduce.	1. Water Recreation 2. Marine Food 3. Biological Resources 4. Environmental Protection and Ecological Conservation

Week	Content	Teaching Design and Supplementary Materials	Corresponding Detailed Topics
6	Non-Powered Water Sports Learning (Pool Class)	1. Pre-class preparation: Maritime trade during the Age of Exploration. 2. Classroom explanation: Cargo transportation by sampan after the opening of Tamsui. Since the Qing Dynasty, there have been various types of boats for transportation, cargo landing, fishing boats, cargo, and passenger barges, with the most common being bamboo rafts and sampans, used as guide boats or for carrying passengers (SUP practice), teaching students how to operate paddling techniques when carrying passengers. A brief introduction to the history of Tamsui's opening as a port. 3. Classroom practice: SUP practice and passenger relay race. 4. Post-class homework: [Taiwan Public Construction Archives - Port Construction: Tamsui River System Ports] Watch the video and answer homework questions. (1) What rivers flow together to form the Tamsui River? (2) Please briefly explain the reasons for naming the Fort San Domingo and the origin and history of its construction. (3) What were the conditions for Monga to become a distribution center for goods in the Taipei Basin? (4) What were the primary export commodities during the opening of Tamsui? What were the most important ones? (5) The Beituan Line was the first railroad extension in Taiwan, built during the Japanese rule era. What was the purpose of building this railroad? (6) The Tamsui River in the early days of northern Taiwan had considerable shipping value, but nowadays, the Tamsui River has almost no shipping value, what is the main reason for this?	1. Marine History 2. Marine Economic Activities 3. Marine Law and Policy

Week	Content	Teaching Design and Supplementary Materials	Corresponding Detailed Topics
7–8	Visit to Wooden Handcrafted Boat (The courses will be centralized to the weekends)	1. Pre-class preparation: The Ark of Dahmu 2. Classroom explanation: Visit Bali's water hibiscus wooden handcrafted boat and understand marine culture and art through shipbuilding craftsmanship. 3. Post-class assignment: After watching related paintings and poetry collections of Tamsui, answer the following questions: (1) Search for poetry collections or prose describing boats on the Tamsui River and create a report. Report format: title of the poetry collection or prose, author introduction, quoted text, and source. (2) Search for paintings depicting boats on the Tamsui River and create a report. Report format: title of the painting, author introduction, image of the painting, and source. (3) What is the origin of the Wangye's Boat Burning Festival at the Suifu Wangye Temple?	1. Marine Literature 2. Marine Art 3. Marine Folk Beliefs and Festivals
9	Canoeing and Water Rescue Techniques Comprehensive Test	1. Comprehensive test of water rescue techniques: Check students' skills using the water rescue skills checklist. 2. Canoeing skills test: Check students' skills using the canoeing skills checklist. 3. Homework: Answer the homework questions after watching a documentary on Tamsui River boating. (1) "The Battle of Cixi Fan" is a famous battle during the Sino-French War, one of the rare victories for the Qing dynasty. The use of sampans to sink ships with stones was key to victory. Explain why the Tamsui River estuary's geography favored sampans over larger ships in combat. (2) As a port town, Tamsui has a deep relationship with river transportation, forming the center of economic activity. After the opening of Tamsui to foreign trade, the Qing government designated the area from Sanmin Street to Fort San Domingo as a residential area for foreigners, called "Putop". Name some significant buildings constructed due to maritime trade needs in "Putop".	1. Water Recreation 2. Marine Art 3. Marine History

Week	Content	Teaching Design and Supplementary Materials	Corresponding Detailed Topics
		(3) From ancient times to the present, the ocean has been a mysterious and dangerous image for humans, deeply influencing human beliefs and culture. What is the earliest temple related to marine beliefs in Tamsui? (4) Sampans, simple wooden boats used in rivers, are common in the Tamsui River and a characteristic of Tamsui. What do the eyes painted on fishing boats symbolize based on their direction?	
10	No lessons during midterm week		
11–14	Outdoor Canoeing Lesson - Tamsui River	1. Pre-class preparation: Introduction to the Tamsui River's aquatic environment, safety briefing, and related ecology. 2. Outdoor teaching practice: Conduct canoeing instruction based on actual water conditions, integrate lessons from the previous eight weeks, and discuss in groups how to operate canoes effectively under appropriate water conditions, completing related paddling techniques. 3. Adventure game: Use Line Developer's chatbot to design a Tamsui adventure map, providing information about various spots and using novelty to engage students. The interface will include a graphic menu, clarifying tasks and introducing points of interest, allowing students to explore and learn more about local culture while visiting each spot. 4. Post-class assignment: Canoeing learning reflection (describe difficulties in paddling, interaction with nature, thoughts on Tamsui's cultural history, and ecological learning).	1. Water Recreation 2. Marine Ecotourism 3. Marine Economic Activities 4. Marine History 5. Marine Folk Beliefs and Festivals 6. Biological Resources 7. Environmental Protection and Conservation
15	Course Conclusion	1. Conducting learning motivation and local identity post-test questionnaires 2. Post-test of Freshwater Marine Education Awareness Test. 3. Final course summary: Students were asked to draw their reflections on the courses they have learned during the semester using mind maps. Students can extend their independent learning during the course through the modularized curriculum design.	
16–18	Other outdoor teaching not included in this study		

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海洋教育融入水域運動對提升大學生地方認同之研究：以淡水河獨木舟為例

陳文和 *
淡江大學體育事務處

*通訊作者：陳文和
通訊地址：251 新北市淡水區英專路 151 號
E-mail: 137540@mail.tku.edu.tw
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摘　要

研究背景與動機：本研究探討將海洋教育融入水上運動，以提升大學生的地方認同感。以淡水河的獨木舟活動為例，旨在通過實地體驗，增進學生對當地環境的連結，推動海洋保育及環境責任感。研究方法及工具：採用單組前後測準實驗設計，對象為 20 名修讀水上休閒實務課程的學生。課程包括游泳池內的自救及獨木舟技術訓練，並在淡水河進行戶外獨木舟活動。使用學習動機量表及地方認同量表進行前後測評估。研究結果：學生在參與海洋教育課程後，地方認同感顯著提升，尤其是地方依附感。此外，海洋教育認知測驗分數也顯著提高，顯示課程有效增進學生的海洋知識。建議：建議進一步發展和推廣以淡水河為背景的水上運動及海洋教育課程，以增強學生的地方認同感和學習動機。同時，探索其他教學方法或工具，以進一步提升學生的海洋教育認知。

關鍵詞：十二年國民基本教育、鄉土教育、環境教育