



# Tasting the ocean: How to increase ocean literacy using seafood heritage with a visceral approach

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## ABSTRACT

This contribution explores the growing interest in ocean literacy and sustainable seafood consumption through the lens of transdisciplinary and visceral research methods. It illustrates a series of experimental, marine-focused workshops, carried out during the Covid-19 pandemic for Irish students aged between 15 and 18. The empirical body builds on a series of questionnaires completed prior, during and at the end of the workshops as well as direct observations of feedbacks and interactions. By offering to the students creative and playful methods which included cooking classes, coastal explorations and information about their coastal cultural heritage, we argue that transdisciplinary and visceral methods can facilitate how ocean literacy and sustainable eating is understood and operationalised—in both educational programmes and policy frameworks.

## 1. Introduction

This contribution explores the growing interest in ocean literacy and sustainable seafood consumption through the lens of transdisciplinary research methods. At the same time, it reflects on the broad assumptions on what disciplines and approaches dominate the policy realm linked to sustainable consumers behaviour and suggests multisensory/visceral methods as a feasible approach for change.

Seafood consumption is considered a key element for food security and for nutrition policy considerations [4]. However, the increasing demand for protein intake from the marine environment puts additional pressure on the already impacted ecosystem with unforeseen consequences on climate change, dwindling biodiversity and increased pollution [28,43]. Still, seafood is frequently marketed as being the healthy food option for human consumption and for preserving the environment. This leaves consumers mostly unaware of the environmental impact of their seafood intake, due in part to a lack of ‘ocean literacy’ as well as an inability to translate knowledge into action via the so-called ‘marine citizenship’, meaning reducing negative impacts via collective behaviour changes [14,26].

Improving public awareness of the ocean can undoubtedly benefit the environment, economy, and society. By and large, contemporary human society has little awareness for how food practices affect animal

welfare, climate change, biodiversity, and even the appearance and beauty of landscapes. In an island nation like Ireland (the specific case discussed in this paper) domestic seafood consumption mainly focuses on top-level fish such as cod, tuna [5] and mono-farmed salmon [6], which are considered unsustainable choices [27]. This is despite Irish waters being some of the richest fishing grounds in Europe providing exceptional diversity of seafood far beyond the popular predatory species. Common reasons for not eating a more diverse seafood diet are an absence of recipes and access to this diversity through specialised shops, as well as a lack of knowledge of the sustainability, historical and ecological information of the seafood [36]. It follows that the role of seafood is not broadly understood, sufficiently protected, and is largely ignored in the policy and academic discussions around sustainable food systems and food security [4].

Against this backdrop, this paper delivers an approach for the development of actions utilising marine heritage and multisensory/visceral methods to encourage ocean literacy and sustainable seafood consumption on a broad level. On a specific level, it presents qualitative data on a workshop series carried out with adolescents from Dublin, Ireland, applying multisensory methodologies on and around the topic of sustainable seafood consumption in the domestic setting.

The study is based on a series of bespoke workshops designed to encourage local, sustainable seafood consumption in young people and

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to raise awareness towards the local coast in the city of Dublin, Ireland. The empirical body of this article builds on a series of questionnaires completed by students aged between 15 and 18 prior, during and at the end of the workshop series carried out during the Covid-19 pandemic. Results of verbal, virtual and visual communication, and observations on the interaction between the students are included in the present discussion alongside the data collected from the questionnaires.

The five experimental workshops were conducted online in connection with the Food Smart Dublin project, which aimed to encourage interest and pro-environmental behaviour among the local society by identifying historical, local seafood practices from around the Dublin Bay Biosphere. The project argued that a shift in the consumption of seafood to lower trophic levels is a way to both encourage more sustainable consumption of seafood, as well as revitalising forgotten cultural practices, cementing meaningful relationships with local ecosystems, and even supporting local business [36].

Engaging the youth with creative and playful methods using coastal cultural heritage as a leverage, could have far-reaching effects on both education and policy design. By presenting insights from these experimental workshops, we aim to show how transdisciplinary methods could reframe assumptions about knowledge and behaviour change around sustainable food and pro-environmental behaviour. To provide a theoretical framework for our empirical findings, key studies in the fields of ocean literacy, sustainable behaviour, pro-environmental policy, visceral methods, and heritage will be discussed in the following section.

## 2. Theoretical framework

Ocean literacy is possibly best defined as the understanding of the ocean's influence on you and your influence on the ocean [10]. The concept of ocean literacy spread in the USA in 2004, where representatives from various ocean-related fields organised a series of workshops to respond to the lack of public awareness around the oceans [11]. Since then, publications on the complex human-ocean relationship critically reviewed by authors such as Elspeth Probyn in her 2016 bestselling book *Eating the Ocean*, gained popularity and several initiatives and studies were carried out aiding the development of ocean literacy movements. For instance, there has been a surge of scholarship focused on environmental humanities pedagogy with the aim of teaching the humanistic study of the sea, or what is increasingly called the *blue humanities* [22].

The humanistic study of the sea presents unique entry-points to encourage environmental awareness in people by investing in their social and cultural relationships with the marine environment. This innovative educational approach in students is topical, given that the United Nations declared 2021–2030 the Decade of Ocean Science for Sustainable Development. The Ocean Decade provides a common framework to mobilise the ocean community behind ideas of sustainable development and to ensure that ocean science can fully support countries to achieve these goals [35].

Despite these recent developments, there is a lack of transdisciplinary initiatives which highlight the nexus between academic research and innovative and experimental learning practices linked to the sea, and in particular to the food that it could provide [45]. Although seafood is frequently marketed as the better diet for human and the environment, if not outright benefitting it, young generations are mostly unaware of the environmental consequences of their seafood intake.

For marketing psychologists, [45], “unlike typical consumer decision making, which classically focuses on maximizing immediate benefits for the self, sustainable choices involve longer-term benefits to other people and the natural world” (p.24). Educating young people can thus lead to a more successful sustainable behaviour change because their habit formation is less developed than that seen in adults. In general, existing research which focuses on humanistic approaches for sustainable behavioural changes is scant and research into, for example, nudge strategies is restricted to disciplines such as economics and psychology.

In her seminal work for a new environmental research agenda, Shove

[39], stresses precisely how disciplines such as micro-economics and psychology have dominated the pro-environmental policy discussions in the last decades. This greatly restricts the possibility for inter-disciplinary collaboration and innovation which are “potentially useful and influential resources of a vast range of social theory that lies beyond the dominant paradigms of economics and psychology” (p.1274).

The transdisciplinary case presented in the present contribution encouraged us to look beyond sustainable consumption framings. Although young students could be engaged in the phase of habit formation, during the workshops we came soon to realise that they do not hold much responsibility for seafood consumption. Moreover, as Shove [39] rightly points out, framing environmental issues as a mere matter of human behaviour marginalizes and excludes meaningful engagement with other potential analyses, including those grounded in social theories of practice.

Because of its transdisciplinary nature, the present contribution draws upon more useful framings coming from geography, landscape, and anthropology literatures on food and the more-than human and the visceral. A growing body of literature in these fields has focused on the ‘visceral’, which can be defined as “the sensations, moods, and ways of being that emerge from our sensory engagement with the material and discursive environments in which we live” ([25], p.334). The contributions to the visceral fields are spurring from the social sciences, particularly from human geographers, with the intention to open a much-needed debate against the dominance of discursive and visual methods in the practice of academic research.

Hayes-Conroy and Hayes-Conroy contributed greatly to the field with their methodological and empirical approaches [18,19] and brought forward the idea that ‘feeling’ at a sensory level is an indispensable tool to enhance political action and progressive politics [20]. Especially the scholarship researching food in this sense, cannot afford to focus on discourse alone to advance our understanding in the field [17]. Yet, in a recent critical review Sexton et al. [37], noted that despite these recent efforts there is a continued dominance of discursive and visual methods because the “discussion of exactly how to go about this type of research remains limited and often does not include in-depth reflections on its practicalities” (p.201). The present contribution aims to directly respond to this call.

Another useful approach to understand the relationship between young students and seafood is the discussion around edibility, in particular Emma Roe's concept of “things becoming food” [32]. With this concept, the author argues for a closer exploration of the relationship between humans and non-humans. Throughout the analysis of organic food consumers, the author maps the embodied practices that transform “things” into “food”. These practices are made of constant “negotiations and relations between persons, other organisms, objects and events”, which should draw attention to “the value of the cultural in domestic food practices” (p.108).

In the workshops discussed here, we sought to focus precisely on the cultural aspect of seafood. This was operationalised by guiding students into a multi-sensory journey to rediscover the creatures inhabiting the Irish coasts and to give them a life beyond the consumers' plate, and with that, remind the students of the broad and personal definition of ‘seafood’.

In this sense, Borghini & Engisch [7] are of the opinion that sharing recipes and informing consumers about food in innovative ways, may it be through new or old media, [24] will always be an important part in shaping and in reintroducing culinary cultures [40]. Rawson & Shore [31], moreover, suggest that eating venues can facilitate knowledge transfer around food and culinary practices.

At the same time, food and landscape generate share representations, an identity that often enhances value creation to improve the attractiveness of a certain territory, especially in urban contexts [34]. Food and landscape is an emerging cross-disciplinary area of research, starting from the idea that “local food cultures evolve from the interactions

between people and the food that is grown as a result of particular environmental conditions and people's culinary practice" [33]. As visceral scholars remind us, however, in some instances certain food and culinary traditions are kept over time whilst in other cases they are lost. In a study on the different perceptions on the edibility of kangaroo meat in Australia (considered more sustainable), Waitt [44] suggests a link to geographical differences as well as general unfamiliarity with its taste as barriers for consumption. In this paper, we argue that more sustainable culinary habits can be reinstated by focusing precisely on heritage.

Heritage, in its broader sense, is directly connected to citizenship formation for its collective nature and prominent role in identity formation [41]. Lamentably, the potential role of heritage in connection with sustainable eating has not been explored to its full potential. A great amount of literature focuses on the concept of place attachment for pro-environmental behaviours, but mainly through the lenses of the natural/physical places [3,9,16,30]. The relationship between culture, history, and place is ever evolving, and while heritage is part of culture, it also supports and transmits culture and history. Research in psychology argues that if natural place attachment is encouraged among community members, this will produce pro-environmental behaviour [42]. "Ecopsychologists" in particular, argue that pro-environmental actions are strictly connected to the individuals' relationship with nature. Regaining the connection with nature should thus promote in turn pro-environmental stewardship [1].

Heritage includes both tangible and intangible forms of heritage (or unmaterial and material). As rightly pointed out by Howard and Pinder [21], however, the distinction is blurred in coastal zones. Besides the traditional tangible landmarks such as landscapes, sites, monuments and artefacts, coastal areas present many more things that are passed through generations: "The field of "activities" or "ways of life" is of enormous scale, ranging from language, through diet and drink, to customs and games, to the performing arts. [...] The heritage of the coastal zone includes the entire culture of how to use it" (p.61). For the remainder of this paper, we will use the expression coastal/marine heritage interchangeably to encapsulate both its tangible and intangible dimensions.

### 3. Methods

#### 3.1. Study context, visceral approach & blended learning

The Food Smart Dublin workshops were designed prior to the Covid-19 pandemic and were thus envisaged to be conducted in person, especially since they included an explorational trip to Dublin Bay UNESCO Biosphere and a final cooking workshop with a professional seafood chef. However, many restrictions were put in place by the Irish government in autumn 2020 due to the pandemic, one of them being the shutdown of schools across the country, resulting in students having to stay at home and studying through virtual media [13].

For the planned workshops, this meant that all activities had to be moved to the digital screen and partly redesigned by the team. Still, we wanted to design a highly interactive, experimental online workshop experience where students could feel engaged beyond the visual and discursive realms of their screen. As the government and health department introduced and changed restrictions on a weekly basis, the design of our interactive workshops was challenging. The fieldtrip to the shores of Dublin Bay for instance, had to be cancelled a few days before it took place as a new regulation enforced a mandatory 5 km maximum moving limit from home. With this perspective we adopted a visceral approach in the attempt to move beyond the visual and discursive senses offered by the online media used by the students. This was especially important for us given the specific scope of the workshops: to give students the chance to reconnect with their coastal, territorial heritage and with the non-human creatures inhabiting it. Experiencing the ocean involves all our senses. Hearing the rolling waves, smelling the sea air, and feeling it on our skin and under our feet, tasting the delectable

things the ocean has to offer. Our aim was to transmit this multisensory experience to the students at least partially.

To enhance interest and active participation despite the physical distance, the team adopted a mix of blended learning methods to create an experimental workshop experience for the students. Blended learning can be defined as the integration of face-to-face and online instruction learning [15]. The traditional classroom approach is enhanced by Information and Communication Technology (ICT) to broaden understanding of a new topic. It is a widely adopted method across higher education and schools in course delivery [29] which empowers both teachers and students to improve learning outcome in an interactive and engaging learning strategy. The concept gives scope for collaborative and constructive learning as well as computer assisted learning [23]. It is also said that blended learning develops a feeling of cooperation among students [38]. There are many types of blended learning, and we opted for the online driver that model delivers all training via a digital platform. This model is referred to as remote learner training and is a chance for those who cannot attend classes, e.g., due to illness. It is the model with the most flexibility for the learning schedule [8]. This was not necessarily done by choice, but due to the restrictions that came along with the outbreak of the Covid-19 pandemic.

#### 3.2. The Food Smart Dublin workshops: content and recruitment

The workshops were associated with the research project Food Smart Dublin, which aimed to promote sustainable seafood consumption by building on both the tangible and intangible coastal cultural heritage of the biosphere of Dublin Bay on Ireland's East coast [36]. The five workshops were carried out on a weekly basis via Microsoft Teams between September 24th and October 30th 2020 in collaboration with Ireland's environmental and youth organisation ECO-UNESCO [12]. The workshop series targeted young Irish students between the age of 15 and 18, recruited via ECO-UNESCO's recruitment scheme. For this, the organisation promotes environmental activity events on their website and through their social media targeting students in high schools nationwide. The organisation also collaborates with teachers in several public and private secondary schools across Dublin and the wider region (Counties Dublin, Meath, Kildare, Wicklow). The teachers pre-selected students who showed a general interest in environmental topics. ECO-UNESCO then contacted the students to invite them to participate in the sustainable seafood workshops. Recruitment of students also happened by word of mouth by the students themselves. A total of 13 students signed up for the workshops with most of them resident in County Dublin. Two joined from the middle of the country (West Meath and Tipperary) and one student joined from Sligo (Ireland's West coast). The five workshops are described in more detail as follows:

##### Workshop 1

In the first workshop "Sustainable Seafood," the students learned about sustainable seafood by exploring the seafood pyramid with the concept of different trophic/energy levels [2] and the basics of the structure and functioning of the marine environment. Different fishing techniques and how the fishing industry works in general were also discussed. Furthermore, the students explored the meaning of sustainability and what it could possibly mean regarding seafood in an open oral discussion and through the chat function of Microsoft.

##### Workshop 2

The second workshop "Ireland and its Seafood," dove into Ireland's rich seafood history and the cultural and traditional relationship with different kinds of seafood, such as salmon, lobster, and oyster. The students explored the use of different seafood resources in the past and with that the reconstruction of territorial histories. At this point, the participants had the opportunity to share their own stories and impressions from what they knew about Ireland's fishing history whether they gained them through stories told to them by their parents or someone they knew or by reading about the topic, watching programmes, or visiting local museums. After this, the participants were

introduced to the EU Common Fisheries Policy (CFP), what it is and what it stands for and what the challenges are for the different types of fishing businesses (local and small-scale, international and large-scale, etc.). Within this introduction, the quota system, and problems of discard and by-catch were explained. At the end of the introduction, the students had to divide into two teams and perform a role-play: A large-scale and a small-scale fisher argued their corner on the repercussions of tightening the CFP rules.

#### Workshop 3

The third workshop, “On Our Shores,” investigated the seasonality of seafood and the types of seafood that can be found on Dublin shores at different times of the year. The students were encouraged to imagine a few seafood recipes with species from lower levels of the marine food-web, such as primary producers (seaweed) and primary consumers (periwinkles). The highlight of this workshop was the planning of an imaginative seafood festival that accounted for local seafood seasonality and sustainability. The students had to split into teams to organise this imaginative seafood festival. Each team had to pitch their chosen title, target audience, present a few dishes they would serve at this festival and tell the other teams whom they would seek funding from and why.

#### Workshop 4

The fourth workshop “Training for Coastal Foraging” consisted of a virtual trip exploring a stretch of Dublin Bay biosphere - Sutton Strand. The research team shot short video clips of various kinds of marine life that commonly live on Dublin’s shores and explained their names and roles in the local, coastal ecosystem. The clips were shown to the students during the Microsoft Teams meeting who were encouraged to safely explore their own shores with family members in their own time and space by adhering to Covid-19 restrictions while reporting back to the workshops’ organisers with short videos and images reflecting on what they explored. This was done in a WhatsApp group that had been created for this purpose.

#### Workshop 5

In the fifth and final “Cooking Workshop,” participants were guided through cooking a whole seafood menu of four dishes remotely. The recipes of this seafood menu were based on the historical and sustainable recipes previously unearthed by the Food Smart Dublin research team. The cooking workshop was facilitated by the food industry partner of the project, a celebrity seafood chef and his sous-chef. To make this possible, a seafood kit with all necessary ingredients and written recipes was delivered to the students’ homes. Through Microsoft Teams the chefs guided the students through all four seafood recipes step-by-step within the space of 4 h. The full menu consisted of seaweed soda bread, Dublin Bay prawns on toast, pan-fried megrim sole with lemon butter and carrageen moss pudding. The students had the opportunity to ask questions and get feedback through the chat or by asking directly with the microphone option. One research team member was the designated person to ensure all questions were answered.

### 3.3. Workshop questionnaires

The research team developed a set of online questions to evaluate the workshops and the learning process of the participating students. A consent form outlining both the ethical and data management details regarding the study connected to the workshops was delivered and signed by the student’s parents/guardians upon subscription to the workshops. All online questions were answered anonymously via a shared google drive excel spreadsheet. Four different types of online questionnaires were developed for the students over the course of the workshop series and contained both open-ended and closed-ended questions. The full set of questionnaires and the questions asked can be found in Annex A.

Feedback was received at different stages of the students’ participation, with questionnaires usually shared following each workshop. For clarity, [Table 1](#) presents the identification title for each questionnaire, together with details on its distribution time, the number of

**Table 1**  
Overview of workshop questionnaires.

| Questionnaire Title        | Distribution time                               | Number of responses | Type of questionnaire  |
|----------------------------|---|---------------------|--|
| Pre-workshop Questionnaire | Upon subscription to workshops series           | 12                  | Pre-workshop: (Participants’ knowledge, motivation and habits) |
| Learner Diary 1            | After first workshop “Sustainable Seafood”      | 13                  | Feedback questionnaire on specific workshop                    |
| Learner Diary 2            | After second workshop “Ireland and its Seafood” | 8                   | Feedback questionnaire on specific workshop                    |
| Learner Diary 3            | After third workshop “On Our Shores”            | 12                  | Feedback questionnaire on specific workshop                    |
| Cooking Questionnaire      | After fifth “Final cooking workshop”            | 9                   | Feedback questionnaire on specific workshop                    |
| Overall Feedback           | After completion of workshop series             | 9                   | Final workshops evaluation                                     |

respondents among the participating students and details on the type of questionnaire.

Feedbacks on the workshops were received not only through the questionnaires but also throughout the different activities and interactions. These interactions were carefully observed by the research team and took place in a variety of forms, including oral feedback by microphone, and written comments in the chat function of Microsoft Teams or on WhatsApp. The cooking workshop (details in 3.3.3) also offered visual and verbal feedback on the students’ appreciation of the experience. In the next sub-sections, we are going to outline more precisely the timing, nature, content, and questions of the feedbacks received from the students.

#### 3.3.1. Pre-Workshop questionnaire

Before the workshop series kicked-off, the students were asked to complete a set of pre-workshop questions for the research team to gather some background information and to gauge the baseline knowledge of the topic. It also helped the team to understand whether any tweaking of the following questionnaires was required. These questions were asked:

- How much do you know about seafood?
- How did you/your parents find out about the workshops?
- Why did you join the Food Smart 2020 programme?
- Which part of Dublin are you from? (Dublin 1,2 etc.)

#### 3.3.2. Learner diaries

To get consistent information from the students after each of the first three workshops a learner diary was created containing the same questions each time. The questions were a mix between simply requiring ‘yes’ and ‘no’ answers and open questions requiring a more elaborate answer by the student. Specifically, the questions were as follows:

- I learnt something new today
- The most interesting thing I learnt was...
- The most surprising thing I learnt was...
- The most confusing thing I learnt was...
- Did you find anything challenging about today? If yes, please state what and how we might help you
- The information in the workshop is interesting
- I think that other young people should know this information
- I will tell other people what I learnt today
- Any other comments or observations?

The intention of these learner diaries was to assess the students’ experience and acquired knowledge and investigate how engaged they were with the topics addressed in each workshop.

### 3.3.3. Coastal exploration

As mentioned, the trip to the coast was restricted due to Covid lockdown regulations, and the team ended up shooting video clips of a stretch of the Dublin coast for the students. They then ventured to their own nearest beach or coastline to explore it with their parents' consent while adhering to the pandemic restrictions. The students were encouraged to take short video clips and photos of their local coastal life themselves with no specific questions or tasks to accomplish but to actively exchange with their peers and the support team in real time. A WhatsApp group was created in which the students could share and comment on their own short video clips and photos accompanied by instant feedback from the team. Some students were well informed and knew their seaweed, molluscs, and seabirds. Others had questions about pictures they took of specific coastal species which were answered by the team where possible. This workshop was not followed up by a learner diary request since some of the students could not visit the coast while the Covid-19 mandatory 5 km from home moving limit was still in place.

### 3.3.4. Cooking questionnaire

The cooking workshop had different questions to all previous workshops. We decided, upon direct request from some students, to offer both a vegetarian and fish option. To start off, in the questionnaire we asked how many students had opted for the vegetarian option. Other questions entailed the level of difficulty of the recipes that were cooked, if the students would cook the recipes again, and how they rated the cooking experience overall. All questions were given a 5-level scale for the students to choose from 1- extremely likely 5 – not at all likely. Not everyone of the 13 students who participated in the cooking workshop also completed the online questions.

### 3.3.5. Overall feedback

Generally, the post-workshop questionnaire was intended to detect which components of the workshops were especially interesting for the students whilst testing their knowledge, motivation, and habits regarding coastal heritage and sustainable seafood. Many of the questions employed in the questionnaires were intentionally open-ended, asking about personal experiences. Others were presented as Likert scale, multiple choice, or sought concrete yes or no responses. To this extend, the questionnaires employed a mix of qualitative and quantitative tools, to generate more structured insights into the participants' learning experience. The data presented here are not expected to represent a specific group or population. They are simply descriptive of the participants' sentiments about the information conveyed during the workshops, including whether they found the information welcome and instructive or perhaps challenging and unfamiliar. The specific questions were the following:

- I learnt something new with the FSD workshops
- The information in the workshops was interesting
- The information in the workshops was clear and understandable
- I think that other young people should know this information

## 4. Results

### 4.1. Pre-workshop questionnaire

In the pre-workshop questionnaire, the motivation and level of knowledge on the topic of the students prior to the workshops was gauged with open questions. Among the 12 students responding to the motivations that led them to subscribe to the workshops, answers included “to try something new”, “to learn more about sustainability and seafood”, “to learn how to help the environment” or to “lead a sustainable life”, “because I love cooking and learning things about food and nutrition”, and to “find out more information about the food I eat and how to eat more sustainably”. The data revealed that the students were keen to learn new ways about their lifestyle and that most of them

were eager to know more about sustainability and sustainable consumption. One participant pushed this motivation even further by explaining their motivation: “to find out how to get people to transition to a more environmentally sustainable diet and lifestyle”.

The questionnaire also revealed the knowledge gaps that the students seemed to have on sustainable seafood. When asked “How much do you know about seafood?” more than three quarters of the participants initially admitted to knowing either “not much,” “not a lot,” “not as much as I would like,” or “honestly not that much” whilst the remaining responses included “a bit”, “my knowledge is limited”, or “some things”. None of the respondents indicated good or strong knowledge on sustainable seafood. One participant highlighted that despite studying fishing and living in close proximity to a fishing port: “I know about food in general, but not a lot about seafood. I studied fishing as part of the junior cert geography course and live very close to a fishing port.” The knowledge gaps of the students on this topic will be discussed in more detail below.

### 4.2. Learner diaries

The Learner Diaries (LD 1–3) after workshops 2, 3 and 4, responded to by 13, 8 and 12 students, respectively, demonstrated that the workshops enabled the students to fill their knowledge gaps around sustainable seafood. The statement “I learnt something new today”, was responded to with 100% agreement and none of the students disagreed. The overall feedback of the workshops content and information was positive. In response to the statement “The information in the workshop is interesting” 77% strongly agreed, and 23% agreed in Learner Diary 1, whilst the students either strongly agreed and agreed in Learner Diary 2 (37,5% for both) and 25% remained neutral. In Learner Diary 3 most students strongly agreed with 83.3% and 16.7% agreed.

The students responded positively to the idea of sharing the acquired knowledge with others. The statement “I will tell other people what I learnt today”, received feedback of 53.8% in strong agreement, and 30.8% in agreement, respectively in LD1 (“Sustainable Seafood”) with a 15.4% remaining neutral and no one disagreeing. In LD2 (“Ireland and its seafood”), the feedback to the statement was more divisive. Here, half of the students (four) strongly agreed, one student agreed, one disagreed, and two were neutral. Yet, in LD3 (“On our Shores”) the students displayed great enthusiasm for its content with 91.7% (eleven students) strongly agreeing and 8.3% (one student) agreeing to the same statement.

The statement “I think that other young people should know this information”, triggered a positive response by all students. In DL1, the students strongly agreed or agreed with the statement with 75% and 25%, respectively. In DL2 seven out of eight students either strongly agreed or agreed while one student was neutral. In DL3, eleven out of twelve students either strongly agreed or agreed (76.9% and 15.4%, respectively) with one student again being neutral.

Summarising the response by the students to DL1–3, it is obvious that the students expressed a positive attitude towards the workshops 1–3 and a great curiosity for the topics covered. The open-ended answers lent themselves to this conclusion as well (see Annex for details). In workshop 1, the majority of the students stated that the most interesting thing they learnt was the food pyramid of the sea and where the different types of seafood were placed. Some found it eye-opening that most of the fish commonly eaten was so close to the top of the food pyramid (requiring so much energy to grow) and that especially the shrimp fishery has such a high carbon footprint.

Workshop 2 triggered more mixed responses. Some participants found the historical part most interesting, e.g. [that] “Lobster used to be everywhere in Ireland”, “Oysters were a fast food”, “Lobsters were the poor man's chicken”. Some found the CPF topic most interesting and were surprised “that the CFP, something I had previously heard mostly good things about, has so many disadvantages and opposers, e.g. the number of small fishermen going out of business”.

In workshop 3 the thing that stood out most was the surprise about how many native seaweed species there were in Ireland, how versatile they are and how deeply connected the Irish were/are with seaweed. For example, one respondent claimed: “I didn’t realise the practice was so crucial to people’s livelihoods and wasn’t aware of the adverse effects that giving licenses to other companies would have on them.” There was genuine interest to introduce seaweed into their sustainable diets with the knowledge they gained. All students responded to the open questions “Will the information learnt in the workshop influence the way you eat seafood in the future? If yes, how?” with that they will try to eat (more) seaweed.

#### 4.3. Coastal exploration

Given the pandemic related restrictions to visit outdoor spaces, there are no data from a Learner Diary. We observed reactions and peer-exchange. When the participants were shown the short video clips during the Microsoft Teams meeting to introduce them to a stretch of Dublin’s coast (Sutton beach) they were highly motivated to join the game “guess the wildlife shown”. Most of the engagement took place in the chat option of the virtual meeting software. The students identified sandfleas, crabs, blennies, lichens, and some types of seaweed. A highlight was the identification of a scorpion fish the team had found. The guessing game nearly turned into a competition in the chat option and participants expressed their delight through emojis and were cheered on by their peers when they were the quickest to type out the correct species name.

During their own explorations to a local stretch of coast the students shared photos and videos eagerly. For example, one student shared over 30 photos and took 5 short video clips while commenting and asking questions about everything they had seen. It was clear that they wanted to apply the newly gained knowledge and share it with the workshop team. In [Image 1](#) we present some of the screenshots to illustrate the interactive exchange between the coast exploring students and the

support team in the WhatsApp group.

##### 4.3.1. Cooking questionnaire

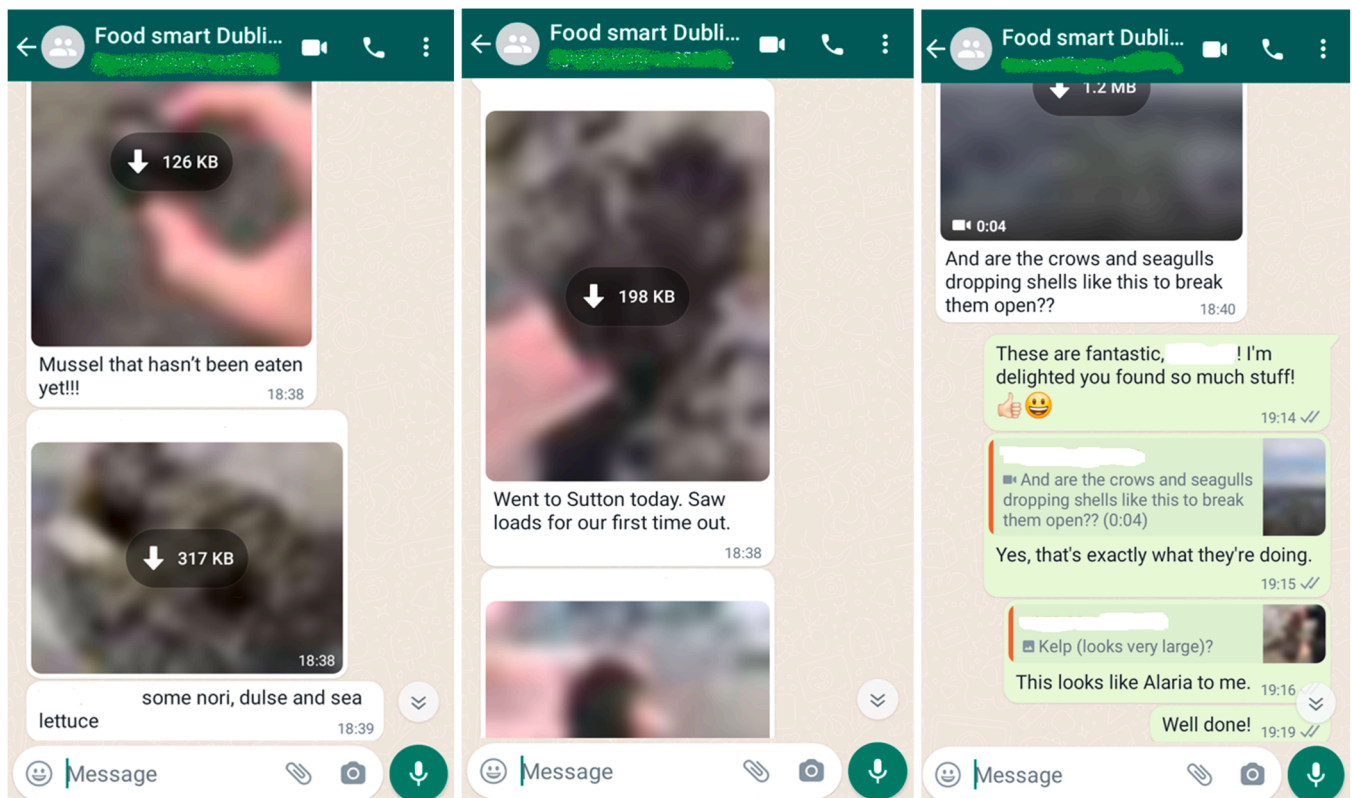
Not everyone of the 13 students who participated in the cooking workshop submitted an online questionnaire at the end. The cooking questionnaire had a positive output overall. From the nine respondents two went for the vegetarian option. Two students rated their cooking experience “good”, four found it “very good” and five marked it “excellent” (see [Fig. 1](#)). While the rating of the level of difficulty cooking the recipes ranged between “not at all difficult” to “very difficult” (see [Fig. 2](#)) all participants were very clear in their answers on what they liked about the recipes. Four students liked the taste, three liked that they were different/new and simple to make and two liked the way seaweed was included. [Images 2 and 3](#).

An interesting result was the answers to the question “What are the main obstacles for you in consuming more seafood?”. Four out of nine respondents saw the main obstacle in not being in charge of the cooking in their household. Two believed lack of specialised shops prevented them to consume more seafood, two did not want to eat fish or other animal seafood as they were vegetarians/vegans and only one thought there were no obstacles (see [Fig. 3](#)). When asked how likely they were to prepare the learnt recipes again four of them indicated neutrality, while three said “very likely” and two thought it was “extremely likely” that they would cook the recipes again.

During the cooking workshop we observed a high element of fun and engagement from the students. Instantly, they got on well with Niall Sabongi, the chef and while they listened very attentively to his instructions some had also dressed up with chef hats and aprons. Banter was also observed in the chat option and a lot of laughter was detected through their microphones.

##### 4.3.2. Overall feedback

The overall feedback in the final questionnaire showed that 100% of respondents learned something new from participating in the



**Image 1.** Screenshots (edited for privacy) of the interactive exchange between the coast exploring students and the support team in the WhatsApp group.

Overall, how would you rate your cooking experience?

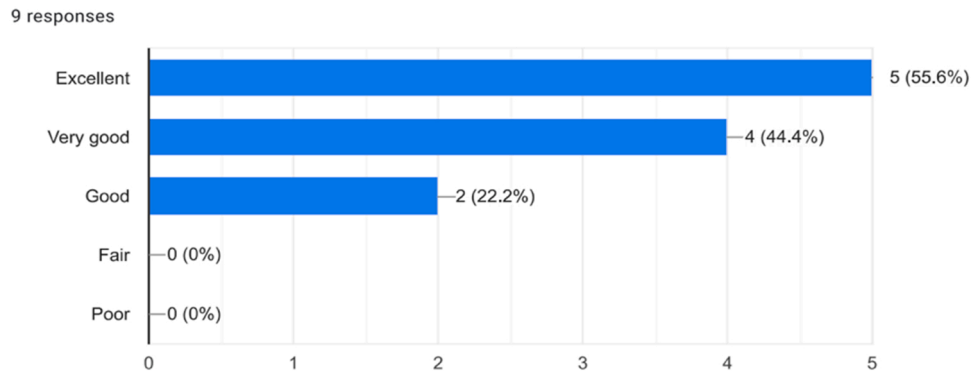


Fig. 1. Responses to the cooking workshop experience by 9 out of 13 students.

How difficult did you find cooking the recipes?

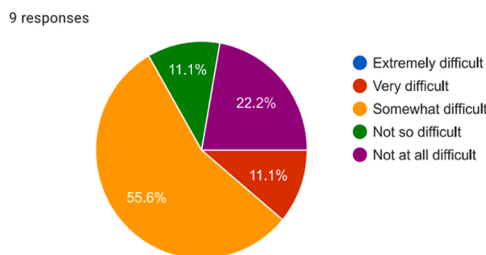


Fig. 2. Responses on the difficulty level of the cooking tasks from 9 students.



Image 2. Seafood chef celebrity Niall Sabongi and his sous-chef Adam in the cook along workshop with the students via online media.

workshops. Even when students encountered unfamiliar topics or assignments, such as the difficulty of cooking recipes everyone agreed that the information conveyed in the workshops was interesting. In response to the statement “I think that other young people should know this information”, 100% of respondents agreed. Moreover, every participant strongly agreed and agreed, (66.7% and 33.3%, respectively) that the information in the workshops was clear and understandable. The students’ experience of the sustainable seafood workshop series overall was rated very good (77.8%) and good (22.2%) (Fig. 4).

One final question that was important to the team at the end of the workshop series was to understand how connected the students felt to the sea. This question was asked because we wanted to find out if there was scope for active marine stewardship and marine cultural heritage for the local Irish coast. Five participants stated in the final

questionnaire that they felt strongly connected to the sea, 3 students felt neutral (neither connected nor disconnected), and one student felt not very connected to the sea (Fig. 5). It is interesting to note how ‘feeling the sea’ should not be taken for granted even for the inhabitants of an island nation. This is well testified by the responses received from the pre-workshop questionnaire, where more than three quarters of the participants initially admitted to not knowing much about seafood.

While the workshops show room for improvement, (e.g. some students would have liked to see vegan dishes in the cooking workshop, others would have like to have more concrete advice on how to eat seafood sustainably or more clarity on the marine food pyramid), there was no negative or neutral feedback in the final questionnaire. This indicates that the workshops achieved their aim of imparting information and generating ongoing interest. Responses given during the five workshops were generally positive. Although some students were more enthusiastic and engaged with the topic of the workshops than others, obvious by their comments, answers to questions on interest and likelihood of sharing information, as well as the value of the information, demonstrated that all participants were engaged and benefited from the structure and rubric of the workshops.

### 5. Discussion and conclusion

New transdisciplinary approaches to improve ocean literacy, to protect our oceans and to reduce the environmental impact of food consumption and transportation are urgently needed. With this paper we outline some innovative, playful ways to engage with the young generation around the topic of sustainability and marine heritage by applying mixed methods including a visceral approach.

Despite logistical challenges imposed by the Covid-19 pandemic, and some unfamiliarity with the topics themselves, students rated their experience highly in the aggregate, with promising outcomes for future workshops on sustainable seafood consumption and coastal heritage in general. Indeed, all students showed great engagement and interest, with some being highly engaged demonstrated by their reflective comment beyond the bounds of the workshops. According to our empirical material, all of them gained new knowledge after each workshop and showed motivation to implement what they had learned into their consumption behaviour. In this sense, the digital delivery of the workshops with its visceral and blend-in approach was successful in closing knowledge gaps, understanding of the marine environment, and spurring curiosity in students.

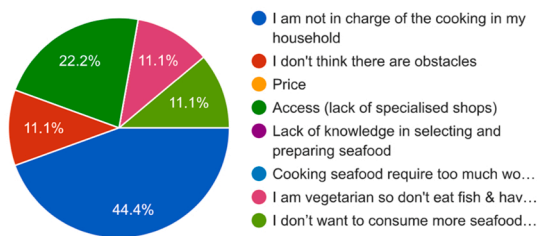
Arguably, the participating students were already inclined to be interested in this topic due to the way they were recruited. From the responses received in our pre-questionnaires, however, more than 75% of the participants did not know much about seafood or did not feel strongly connected with the sea (see section 4.1.5). In turn, this is somewhat justified by the fact that young students are not yet in charge



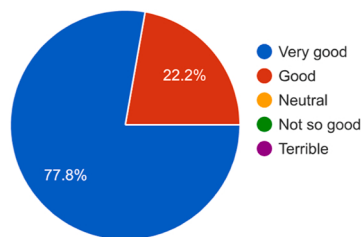
**Image 3.** Pictures of the four seafood dishes cooked and shared on the WhatsApp group by the students. From left to right: Kombu Soda Bread, Dublin Prawns on Toast, Megrim Sole and Carageen Moss pudding with red berry compote.

What are the main obstacles for you in consuming more seafood?

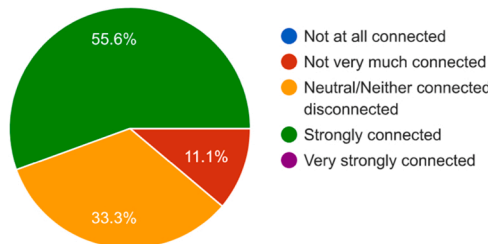
9 responses



**Fig. 3.** Responses on the main obstacle that prevent the students from eating more seafood.



**Fig. 4.** Responses on the overall experience with the workshop series.



**Fig. 5.** Responses to the feeling of connect with the sea by the Irish students.

of their household consumption decision. Still, as shown by the results, this particular group of young people was interested in their consumption practices, in their local heritage, biodiversity, and in experimenting with new tastes.

If widely applied across the educational sector, the visceral/multi-sensory approach utilised in the workshops could offer adolescents the chance to reconnect with their local heritage in a playful way. The Covid-19 pandemic and related travel restrictions in this sense, may have influenced the participants' interest in such territorial identities. Because of the limitation on travel to only a few kilometres from home,

perhaps the students paid more attention to what is available at their doorsteps.

In any case, the responses received demonstrate that there is an appetite for the topic on sustainability and seafood. Therefore, consideration should be given to actions aimed at improving ocean literacy at eating venues to disseminate this seafood knowledge. Sharing recipes [7] and informing consumers about food in innovative ways such as the interactive workshops introduced in this paper could potentially play a key part in shaping and in reintroducing culinary cultures [40]. Visceral approaches like the one described in this paper, can in this sense facilitate how ocean literacy and sustainable eating is understood and conceptualised—in both educational programmes and policy frameworks. The present contribution outlines a practical approach to successfully utilise visceral methods in learning.

In addition, the innovative approach presented in this article demonstrates a clear connection between pro-environmental awareness and marine heritage. A key to achieving this is combining different disciplines to intertwine and melt into each other, such as history, ecology and sociology. In this way, the workshop approach did not only provide and transfer knowledge to students, but effectively managed to co-create knowledge and trigger emotions of belonging. This meant avoiding top-down approaches for changing individual behaviour but managing instead to establish interest and attachment to a certain place through different senses.

Based on the positive results of our case study, marine heritage and multisensory/visceral approaches should be used as entry points to encourage ocean literacy and sustainable seafood consumption more broadly. To this end, we look forward to seeing a more humanistic approach being considered in pro-environmental policy design. This should be based on providing historical, cultural, territorial and ecological information in educational programmes by building on the material and immaterial heritage of the targeted population. To be successful, we argue that this kind of approach should be scaled-up to be included and tested in wider pro-environmental policy actions.

**CRedit authorship contribution statement**

**Agnese Cretella:** Conceptualization, Methodology, Investigation, Funding acquisition, Writing - original draft, Writing - review & editing. **Cordula Scherer:** Conceptualization, Methodology, Writing – review & editing, Investigation, Project administration. **Poul Holm:** Conceptualization, Writing – review & editing, Funding acquisition, Supervision.

**Declaration of Interest**

None.

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## Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.marpol.2023.105476.

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