

# Japanese Activity in collaboration with the international ocean literacy survey

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**1. Ocean Literacy Movement in the world**

The grass-roots movement for Ocean Literacy started in 2002 in the United States with informal scientists, and formal and informal education, seeking their vision to include ocean sciences in the school curriculum. They resulted in a two-week online workshop and extensive follow-up dialogue between hundreds of U.S. ocean sciences and education stakeholders in 2004 (Fauville et al., 2011).

This community discussion process resulted in seven overarching ideas called the essential principles of Ocean Literacy (OOL) (Ocean Literacy - Summary Video in this poster) and 46 fundamental concepts for the 2015 revision, an additional concept was added, resulting in the final of 47 that articulate each principle.

Supported by Intergovernmental Oceanographic Commission (IOC) of UNESCO, UNESCO also published a book entitled by 'Ocean Literacy for all: a brief' and IOCL/UNESCO began operating the 'Ocean Literacy Project' website in 2018.

In Japan, in order to promote the ocean education in the national standard course of study of schools, the ocean education group was established in 2019.

**2. International Ocean Literacy Survey (IOLS) Project**

In the U.S., aiming to serve as a community-based measurement tool that allows the comparison of levels of ocean knowledge across time and location, the 'International Ocean Literacy Survey (IOLS)' has been started since 2018. Version 4 (IOLS Ver.4) published the results from IOLS Version 2, and the English version IOLS Version 3, and the English version IOLS Version 4.

**3. IOLS Ver.4 field testing in Japan**

In Fall of 2019, the Marine Learning Center sent a letter to JGS requesting an official support for promoting IOLS Version 4 project in Japan. JGS accepted the proposal as considering that IOLS is expected to help much promoting the ocean literacy in Japan, and officially sponsored IOLS Version 4 field testing together with the Marine Learning Center. In January 2020, members of the Marine Learning Center and IOLP/UNESCO started field testing in Japan.

**4. What we learn from IOLS Ver.4 field testing in Japan -Preliminary report-**

We analyzed the data obtained by the Japanese version of IOLS Version 4 field testing conducted during February and March in 2020, and presented by the organizer. While the nominal number of participants was 101, the obtained total number of participants is 499. The total number of questions in the original data was 89 in which 41 questions required selecting one from 4 options, and

Fig. 1 Number distribution of participants  
 Fig. 2 Age distribution of participants  
 Fig. 3 Distribution of participants by region

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## OCEAN LITERACY - SUMMARY

[VIDEO] <https://www.youtube.com/embed/MNXqOuXg9g4?feature=oembed&fs=1&modestbranding=1&rel=0&showinfo=0>  
Ocean Literacy – Summary (<http://oceanliteracy.wp2.coexploration.org/>) from College of Exploration

## 2. INTERNATIONAL OCEAN LITERACY SURVEY (IOLS) PROJECT

In the U.S., aiming to serve as a community-based measurement tool that allows the comparison of levels of ocean knowledge across time and location, the International Ocean Literacy Survey (IOLS) project (<https://www.geraldinefauville.com/international-ocean-literacy-survey>) has been started since 2015. Fauville et al. (2019) (<https://doi.org/10.1080/13504622.2018.1440381>) published the results from IOLS Version 2, and the English version IOLS Version 4 was finalized after reviewing the English IOLS Version 3 by IOLS Advisory Board consisting of international marine researchers, communicators, teachers, and psychometricians.

The English version of the IOLS Version 4 was translated into 14 languages (Catalan, Chilean, Dutch, Greek, Italian, Japanese, Korean, Polish, Portuguese, Simplified Chinese, Spanish, Tagalog, Thai, and Traditional Chinese) and its field testing was conducted during February and March 2019 with nominal 6945 participants worldwide including nominal 567 participants from Japan.

Using the US data of the IOLS Version 4 field testing, Chen et al. (2020) ([https://static1.squarespace.com/static/5970e07ad2b857f9aa5f153f/t/5dbb5b027bb30152d476edce/1572559620727/IOLS+EN\\_AERA2020](https://static1.squarespace.com/static/5970e07ad2b857f9aa5f153f/t/5dbb5b027bb30152d476edce/1572559620727/IOLS+EN_AERA2020)) presented the question system of the IOLS Version 4 as a measurement tool of ocean literacy with Rasch measurement model, and reported their results at the American Educational Research Association (AERA) annual meeting. They concluded that the English version of the IOLS is a psychometrically sound instrument with good measurement properties including internal consistency reliability, construct validity, goodness of fit structure, item level characteristics, and absence of gender DIF.

## 1. OCEAN LITERACY MOVEMENT IN THE WORLD

The grass roots movement for Ocean Literacy started in 2002 in the United States with concerned scientists, and formal and informal educators raising their voices to include ocean sciences in the school curriculum. This resulted in a two-week online workshop and extensive follow-up dialogue between hundreds of U.S. ocean sciences and education stakeholders in 2004 (Fauville et al., 2019 (<https://doi.org/10.1080/13504622.2018.1440381>)).

This community discussion process resulted in seven overarching ideas called the essential principles of Ocean Literacy (watch 'Ocean Literacy - Summary' Video in this poster) and 44 fundamental concepts (In the 2013 revision, an additional concept was added, resulting in the total of 45) that elaborate each principle.

Supported by Intergovernmental Oceanographic Commission (IOC) of UNESCO, Santoro et al. (2018) (<https://unesdoc.unesco.org/ark:/48223/pf0000260721>) published a book entitled by 'Ocean literacy for all: a toolkit', and IOC/UNESCO began operating the Ocean Literacy Portal (<https://oceanliteracy.unesco.org/home/>) website in 2018.

In Japan, in order to promote the ocean education in the national standard course of study at schools, the ocean education group was established in the oceanographic society of Japan (JOS) (<https://kaiyo-gakkai.jp/jos/en/>) in 2003. Responding with the ocean literacy movement in the US, the group started the ocean science café twice a year in 2008, investigated the Ocean Literacy in Japan in 2007-2009, and changed its name as Ocean Literacy and Education Panel (<http://jos-edu.jp/>) (OLEP) in 2010.

JOS and 34 other academic societies/committees gave a proposal entitled, "On the Setting up of a class named, 'the role of Ocean' in the national standard course of study for the 4th grade students in the elementary science education" to the Ministry of Education, Culture, Sports, Science and Technology (MEXT) in April 2016.

The NPO Marine Learning Center (<https://www.marinelearning.org/mare/index.html>) (MLC) was established in 2005 to deal with research on oceans as well as to promote marine/ocean science education in Japan. As one of its activities, the MLC has disseminated the Marine Activities, Resources, and Education (MARE) developed at Lawrence Hall of Science, University of California, Berkeley (<https://www.lawrencehallofscience.org/>).

The Ocean Policy Research Institute (OPRI), (<https://www.spf.org/en/opri/profile/>) The Sasakawa Peace Foundation, established in 1975 at first as the Japan Foundation for Shipbuilding Advancement, began promoting the ocean education in Japan under the name of the Ocean Policy Research Foundation in 2005-2015 with strong collaboration with high-school teachers and educational researchers and ocean scientists in universities.

### 3. IOLS VER.4 FIELD TESTING IN JAPAN

In Fall of 2018, the Marine Learning Center sent a letter to JOS requesting an official support for promoting IOLS Version 4 project in Japan. JOS accepted the proposal as considering that IOLS is expected to help much promoting the ocean literacy in Japan, and officially sponsored IOLS Version 4 field testing together with the Marine Learning Center. In January 2019, members of the Marine Learning Center and OLEP/JOS worked hard in correcting the original Japanese draft of IOLS Version 4.

In February 2019, IOLS Version 4 started worldwide, and JOS sent the invitation letter to several tens organizations such as JpGU and other academic societies of various kinds of ocean science research, societies of science educators, and associations of museum, aquarium, and zoo. JOS opened a website and show public the background of IOLS Version 4. The Marine Learning Center also opened a website and show high-school teachers a guide for participation to IOLS Version 4 field testing.

On the day of the first dead line of IOLS Version 4 field testing, the nominal number of participants in the Japanese version of IOLS Version 4 reached 567.

## 4. WHAT WE LEARN FROM IOLS VER.4 FIELD TESTING IN JAPAN -PRELIMINARY REPORT-

We analyzed the data obtained by the Japanese version of IOLS Version 4 field testing conducted during February and March in 2019, and provided by the organizer. While the nominal number of participants was 567, the cleaned total number of participants is 469. The total number of questions in the original data was 86 in which 41 questions request selecting one from 4 options, and another 45 questions request answering false or true. In this study, we analyzed answers to the same questions as adjusted by Chen et al. (2020) ([https://static1.squarespace.com/static/5970e07ad2b857f9aa5f153f/t/5dbb5b027bb30152d476edce/1572559620727/IOLS+EN\\_AERA2020](https://static1.squarespace.com/static/5970e07ad2b857f9aa5f153f/t/5dbb5b027bb30152d476edce/1572559620727/IOLS+EN_AERA2020)) in which 40 questions (Q1-40) request selecting one from 4 options, and another 42 questions (Q41-82) request answering false or true. The list of questions and answers are shown in Chen et al. (2020) ([https://static1.squarespace.com/static/5970e07ad2b857f9aa5f153f/t/5dbb5b027bb30152d476edce/1572559620727/IOLS+EN\\_AERA2020](https://static1.squarespace.com/static/5970e07ad2b857f9aa5f153f/t/5dbb5b027bb30152d476edce/1572559620727/IOLS+EN_AERA2020)). From the data of 469 (cleaned) persons, the data of 7 persons are rejected in this report because they answered to none of the questions.

While we made many works for promoting the field testing, participants are living in the limited 19 out of 47 prefectures (Fig. 3). Figure 4 shows that participants are learning or working mainly in the high-schools which had fisheries course in its origin (Fig. 4), suggesting that the education for ocean literacy is not attractive for students and teachers at the general high-schools. However, it gives us hope that 154 persons learning or working in the high-schools without ocean-relating course participated the IOLS field testing.

It should be emphasized that only 378 (81.8 %) out of 462 respondents answered all 82 questions (Fig. 5). The correct answer ratio, the percentage of persons who selected correct answer out of all persons who responded to the same question, may indicate what question many respondents do not understand well. From Fig. 8, five questions in Q1-40 and three questions in Q41-82 are identified to have relatively low correct answer ratio. These give us what item we should focus on in the ocean education. The number of persons who selected no answer to individual question shown in Fig. 9 may indicate the reason why respondent selects no answer to some questions, which should be elucidated in future study.

## AUTHOR INFORMATION

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## ABSTRACT

The ocean plays important roles not only in the global climate system but also in the global material cycling through biogeochemical processes, and has close relationships with the daily lives of people through fisheries, marine energy and resources, ocean transportation, marine sports, ocean relaxation activities, and others. The Ocean Literacy movement began in the U.S. in the early 2000s, and has recently become international as shown by the Ocean Literacy Portal website operated by IOC/UNESCO. In Japan, the present national standard course of study at elementary school has not given any room for ocean education while the Oceanographic Society of Japan (JOS) and 34 other academic societies/committees gave a proposal entitled, "On the Setting up of a class named, 'the role of Ocean' in the national standard course of study for the 4th grade students in the elementary science education" to the Ministry of Education, Culture, Sports, Science and Technology (MEXT) in April 2016. In the U.S., aiming to serve as a community-based measurement tool that allows the comparison of levels of ocean knowledge across time and location, the International Ocean Literacy Survey (IOLS) project has been started since 2015. Fauville et al. (2018, <https://doi.org/10.1080/13504622.2018.1440381>) published the results from IOLS Version 2, and the English version IOLS Version 4 was finalized after reviewing the English IOLS Version 3 by IOLS Advisory Board consisting of international marine researchers, communicators, teachers, and psychometricians. The English version of the IOLS Version 4 was translated into 14 languages (Catalan, Chilean, Dutch, Greek, Italian, Japanese, Korean, Polish, Portuguese, Simplified Chinese, Spanish, Tagalog, Thai, and Traditional Chinese) and its field testing was conducted during February and March 2019 with nominal 6945 participants worldwide including nominal 567 participants from Japan. In collaboration with IOLS Version 4 field testing, JOS and the Marine Learning Center took part in correcting the original Japanese draft of IOLS Version 4, sponsored IOLS Version 4 field testing, and made a wide campaign to high-school teachers through sending recommendation letters to academic societies and other ocean-related organizations.



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