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Ocean Literacy across the Mediterranean Sea basin: Evaluating Middle School Students' Knowledge, Attitudes, and Behaviour towards Ocean Sciences Issues

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Ocean Literacy across the Mediterranean Sea basin: Evaluating Middle School Students' Knowledge, Attitudes, and Behaviour towards Ocean Sciences Issues

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Table S1. Knowledge scale (the correct answers are indicated with bold letters).

Questions	Answers
1) Imagine you are travelling on a ship with limitless fuel: could you reach every part of the ocean?	A. Not at all
	B. Yes, every part of the ocean
	C. Only some parts of the ocean
	D. Only the Atlantic Ocean
	E. I don't know
2) If you walk in the mountains and see a rock containing fish fossils, it means that	A. the fish once lived in the mountains
	B. humans transferred the rock with the fish fossils from the sea to the mountains
	C. the fish fossils are ordinary pieces of rock
	D. the rock with the fish fossils was formed long time ago in a sea or lake
	E. I don't know
3) First living organisms on earth lived	A. in the lakes
	B. in the sea
	C. in the mountains
	D. in the woods
	E. I don't know
4) Marine environment is home to	A. the same animals everywhere under water
	B. different animals depending on sea depth
	C. different animals only near the coast
	D. many animals only in high seas
	E. I don't know
5) Most of the rainwater falling on land originally came from	**A. the tropical ocean**
	B. the sea closer to the land
	C. the land after a previous rain
	D. nearby rivers and lakes
	E. I don't know
6) The ocean is home to	**A. organisms of many different species**
	B. organisms of few different species
	C. less number of species than on the land
	D. mainly jellyfish and seaweeds
	E. I don't know

Continued

Table S1 continued

Questions	Answers
7) Which of the following environment is the least explored?	A. The Moon
	B. The Amazon forest
	C. The Himalayas
	D. The deep sea
	E. I don't know
8) The deep sea that is always in the dark	A. has many different species of organisms
	B. there is no life in the deep sea
	C. has few different species of organisms
	D. has the same species as the illuminated part of the sea
	E. I don't know
9) The Aegean or Adriatic or Tyrrhenian Sea is connected to	**A. all parts of the ocean**
	B. only the Mediterranean Sea
	C. only the Atlantic Ocean
	D. only the rivers pouring into it
	E. I don't know
10) Which of the following is the main source of the oxygen that living beings breath?	**A. Marine photosynthetic organisms**
	B. Tropical forests
	C. Prairies
	D. Mountain woods
	E. I don't know
11) The largest animal that ever lived on Earth is	A. *Tyrannosaurus rex*
	B. blue whale
	C. an elephant
	D. giant squid
	E. I don't know
12) The form of the coastline is modified mainly by	A. sea water composition
	B. sea water motions
	C. marine animals
	D. marine plants
	E. I don't know
13) How would the climate of a coastal area be if there were no Sea?	**A. Hotter summer and colder winter**
	B. Colder summer and warmer winter
	C. The same climate as now
	D. There would be no seasons
	E. I don't know
14) Most of world goods are transported	A. by trains
	B. by airplanes
	C. By trucks
	D. by ships
	E. I don't know
15) Most of the water on the Earth is	**A. in the ocean**
	B. in lakes and rivers
	C. underground
	D. frozen in Polar ice caps
	E. I don't know

Continued

Table S1 continued

Questions	Answers
16) Which of the following ocean resource is most at risk of being exhausted?	A. Salt
	B. Fish
	C. Water
	D. Tourism
	E. I don't know
17) Scientists think that climate change will cause	A. sea level fall
	B. sea level rise
	C. coral reef growth
	D. biodiversity increase
	E. I don't know
18) The sea influences the life of people living	A. only near the sea
	B. only far away from the sea
	C. only in big cities
	D. everywhere around the world
	E. I don't know
19) Do we need to study the ocean?	A. No, it has already been completely explored,
	B. No, its resources are completely exhausted
	C. Yes, so that we will be able to sustainably use its resources
	D. Yes, so that we can better exploit its unlimited resources
	E. I don't know
20) Whatever I throw in the sink	A. influences only river/lake organisms
	B. influences only marine organisms
	C. influences freshwater and marine organisms as well as humans
	D. has no influence on organisms whatsoever
	E. I don't know
21) The sea provides	A. much wealth but few jobs
	B. much wealth and many jobs
	C. little wealth but many jobs
	D. little wealth and few jobs
	E. I don't know

Table S2. Mean values (± standard deviation) of the attitudes scale (abbreviations stand for: HR: Croatia, CY: Cyprus, EG: Egypt, GR: Greece, IT: Italy, MT: Malta, ES: Spain, TR: Turkey).

a/a	Attitude Statements	HR		CY		EG		GR		IT		MT		ES		TR	
		mean	(±sd)	mean	(±sd)	mean	(±sd)	mean	(±sd)	mean	(±sd)	mean	(±sd)	mean	(±sd)	mean	(±sd)
1	I believe that human life is inextricably connected to the ocean	3.71	*1.16*	3.72	*0.99*	3.52	*1.19*	3.67	*0.97*	3.64	*0.97*	3.85	*1.12*	3.59	*1.11*	3.12	*1.16*
2	I feel frustrated about the overexploitation of the marine limited resources (e.g., fish stocks)	3.54	*1.19*	4.47	*0.81*	3.74	*1.04*	4.15	*0.92*	3.91	*0.96*	3.80	*1.06*	3.94	*1.18*	3.79	*1.18*
3	I am concerned that human activities on land (e.g., industries building, agriculture) greatly affect the health of marine environments	4.04	*1.15*	4.22	*1.06*	3.88	*1.05*	3.97	*1.04*	4.23	*0.97*	4.15	*1.03*	3.75	*1.22*	3.68	*1.20*
4	I am frustrated when the leaders of world nations postpone taking the necessary actions to protect the ocean	4.23	*2.44*	3.69	*1.42*	3.51	*1.28*	3.59	*1.26*	3.93	*1.11*	4.10	*1.02*	3.07	*1.48*	3.43	*1.25*
5	I am frustrated as fragile marine ecosystems will be lost if humans will not change their behaviour towards the ocean	4.05	*1.11*	4.36	*0.97*	3.64	*1.09*	4.24	*0.93*	4.21	*0.98*	4.15	*1.05*	4.20	*1.05*	3.67	*1.23*
6	I believe that humans are responsible for the extinction of many marine species	4.08	*1.03*	4.45	*0.84*	3.75	*1.16*	4.11	*0.96*	3.99	*1.02*	4.12	*0.95*	4.15	*1.10*	3.80	*1.25*
7	I believe that all of us regardless of where we live, near the sea or far away, we are responsible for caring for the ocean	4.03	*1.05*	4.54	*0.73*	3.74	*1.02*	4.17	*1.03*	3.89	*1.05*	4.12	*1.05*	4.30	*1.10*	3.82	*1.29*
8	I feel a personal responsibility to protect the ocean	3.72	*1.10*	3.85	*1.05*	3.72	*1.18*	3.27	*1.12*	3.70	*0.97*	3.90	*1.03*	3.91	*1.00*	3.66	*1.16*
9	I would like to get to know better the ocean and the sea, in order to protect and sustain it for the future	3.90	*1.97*	3.92	*1.06*	3.74	*1.14*	3.73	*1.02*	3.79	*0.99*	3.88	*0.99*	4.17	*0.98*	3.69	*1.20*
10	I'd like to contribute to the protection of marine environment but I feel like I can't do much as an individual	3.82	*1.12*	3.79	*1.10*	3.64	*1.17*	3.73	*1.02*	3.79	*1.06*	3.81	*1.11*	3.96	*1.09*	3.38	*1.20*

Table S3. Mean values (± standard deviation) of the behaviour scale (abbreviations stand for: HR: Croatia, CY: Cyprus, EG: Egypt, GR: Greece, IT: Italy, MT: Malta, ES: Spain, TR: Turkey).

a/a	Behaviour statements	HR		CY		EG		GR		IT		MT		ES		TR	
		mean	**(±sd)**	**mean**	**(±sd)**	**mean**	**(±sd)**	**mean**	**(±sd)**	**mean**	**(±sd)**	**mean**	**(±sd)**	**mean**	**(±sd)**	**mean**	**(±sd)**
1	I try to reduce my environmental impact with my everyday actions (with my life style) in order to protect the ocean	3.70	*1.15*	3.68	*1.00*	3.49	*1.32*	3.38	*0.95*	3.69	*1.04*	3.81	*0.94*	3.90	*1.00*	3.29	*1.24*
2	I participate in organized community activities like a beach clean-up	2.81	*1.23*	3.06	*1.25*	3.57	*1.09*	3.05	*1.18*	3.31	*1.09*	3.05	*1.09*	3.12	*1.19*	3.13	*1.23*
3	I collect my garbage when I spend time on the beach	4.23	*1.14*	4.48	*0.85*	3.59	*1.06*	4.37	*0.96*	4.29	*0.95*	4.14	*0.97*	4.47	*0.94*	3.85	*1.26*
4	I avoid playing with marine animals even just for few minutes	3.47	*1.30*	3.84	*1.29*	3.51	*1.20*	3.63	*1.16*	3.48	*1.26*	3.69	*1.16*	3.81	*1.16*	3.04	*1.30*
5	I recycle plastic (as it has a huge negative impact on marine ecosystems)	3.89	*1.29*	4.08	*1.11*	3.78	*1.06*	3.84	*1.19*	4.18	*1.04*	4.25	*0.85*	4.29	*0.99*	3.61	*1.15*
6	I oppose to the building activities near shore as it impacts coastal and marine environments	3.66	*1.18*	3.75	*1.13*	3.62	*1.15*	3.21	*1.21*	3.53	*1.15*	3.75	*1.06*	3.69	*1.10*	2.97	*1.21*
7	I explore the diversity of life in the sea when I have an opportunity to do so	3.39	*1.32*	3.76	*1.01*	3.76	*1.12*	3.51	*1.05*	3.42	*1.06*	3.72	*1.01*	3.48	*1.14*	3.21	*1.31*
8	I encourage my family and friends to learn more about the sea and how to protect it	3.09	*1.22*	3.65	*1.05*	3.68	*1.17*	3.23	*1.11*	3.22	*1.06*	3.41	*1.04*	3.38	*1.14*	3.39	*1.25*
9	I know enough about the ocean and its problems but I still don't change my every day habits to protect the sea	3.03	*1.31*	2.98	*1.29*	3.51	*1.19*	2.88	*1.15*	2.48	*1.15*	3.05	*1.09*	3.11	*1.16*	2.87	*1.16*
10	I urge my fellow students to learn more things about how to protect the ocean	2.83	*1.24*	3.44	*1.11*	3.58	*1.25*	3.14	*1.16*	3.12	*1.14*	3.30	*1.14*	3.47	*1.15*	3.23	*1.29*

Table S4. Pearson r correlation coefficients between knowledge, attitudes, and behaviour and background factors effect on them (e.g., t-test, one-way ANOVA) (abbreviations stand for: HR: Croatia, CY: Cyprus, EG: Egypt, GR: Greece, IT: Italy, MT: Malta, ES: Spain, TR: Turkey, ns: non-significant difference).

			HR		CY		EG		GR		IT		MT		ES		TR	
	p-level			*p*-level		*p*-level		*p*-level		*p*-level		*p*-level		*p*-level		*p*-level		
Pearson r	**Knowledge-Attitudes**		0.40	0.010	0.38	0.010	0.14	0.050	0.40	0.010	0.34	0.010	0.50	0.010	0.31	0.010	0.34	0.010
	Knowledge-behaviour		0.11	0.050	0.06	ns	0.11	ns	0.17	0.010	0.26	0.010	0.32	0.010	0.15	0.010	0.16	0.010
	Attitude-behaviour		0.59	0.010	0.48	0.010	0.71	0.010	0.52	0.010	0.57	0.010	0.44	0.010	0.58	0.010	0.61	0.010
Gender	**K**	**Females**	11.18	ns	10.52	ns	5.98	ns	10.60	ns	10.72	0.008	11.00	ns	10.78	ns	7.07	ns
		Males	11.16		10.11		5.29		10.46		11.55		10.14		10.42		6.63	
	A	**Females**	4.00	0.001	4.26	0.002	3.62	ns	3.95	0.001	4.04	0.001	4.09	0.036	4.01	0.001	3.58	ns
		Males	3.72		3.91		3.76		3.76		3.78		3.84		3.79		3.56	
	B	**Females**	3.42	ns	3.70	ns	3.51	0.049	3.49	0.012	3.56	0.003	3.65	ns	3.73	0.016	3.23	ns
		Males	3.36		3.58		3.70		3.35		3.38		3.61		3.61		3.36	
EE program	**K**	**Yes**	11.61	0.007	10.87	ns	5.58	ns	10.80	ns	11.36	0.015	10.51	ns	10.75	ns	7.63	0.050
		No	10.22		9.21		5.72		10.05		10.50		10.92		10.39		6.84	
	A	**Yes**	4.04	0.001	4.13	0.002	3.62	ns	3.88	ns	3.93	ns	4.01	ns	3.97	0.003	3.60	ns
		No	3.51		4.06		3.79		3.80		3.81		3.94		3.80		3.58	
	B	**Yes**	3.46	0.007	3.70	ns	3.50	0.005	3.43	ns	3.51	0.049	3.65	ns	3.73	0.002	3.34	ns
		No	3.19		3.61		3.77		3.42		3.35		3.60		3.58		3.22	
NGO member	**K**	**Yes**	11.78	ns	10.93	ns	6.26	0.050	10.93	ns	12.55	0.036	10.50	ns	9.54	0.042	6.41	ns
		No	11.11		10.32		5.05		10.51		11.06		10.72		10.69		7.14	
	A	**Yes**	3.96	ns	4.31	ns	3.70	ns	4.08	0.018	3.99	ns	4.48	0.032	3.87	ns	3.70	ns
		No	3.87		4.08		3.66		3.84		3.90		3.96		3.90		3.58	
	B	**Yes**	3.43	ns	3.62	ns	3.59	ns	3.62	0.033	3.71	ns	3.76	ns	3.64	ns	3.47	ns
		No	3.38		3.68		3.61		3.40		3.46		3.63		3.67		3.24	

Continued

Table S4 continued

			HR	*p*-level	CY	*p*-level	EG	*p*-level	GR	*p*-level	IT	*p*-level	MT	*p*-level	ES	*p*-level	TR	*p*-level
Coastal area	**K**	**Yes**	10.22	0.001	9.87	0.045	5.66	ns	9.55	0.001	11.40	0.046			11.07	0.001	7.21	0.003
		No	11.99		11.15		5.61		13.40		10.78				9.99		5.51	
	A	**Yes**	3.84	ns	3.97	0.005	3.68	ns	3.81	0.001	3.87	ns			3.96	0.009	3.63	0.008
		No	3.92		4.27		3.70		4.00		3.94				3.81		3.28	
	B	**Yes**	3.38	ns	3.67	ns	3.59	ns	3.40	ns	3.47	ns			3.71	ns	3.27	ns
		No	3.40		3.63		3.63		3.49		3.48				3.61		3.16	
Grade	**K**	**1st grade**	9.69		9.97		4.58		10.81		10.88		10.48		11.15		6.57	
		2nd grade	12.28	0.001	11.32	ns	6.44	0.001	10.58	ns	10.77	0.001	12.04	ns	11.00	ns	8.47	0.001
		3rd grade	11.72		11.64		6.21		11.76		12.58		11.20		11.07		7.76	
	A	**1st grade**	4.10		4.01		3.43		3.82		3.88		3.71		3.90		3.53	
		2nd grade	3.83	0.026	4.11	ns	3.80	0.001	3.91	ns	3.78	0.018	4.28	0.001	3.89	ns	3.80	0.044
		3rd grade	3.81		4.27		3.83		3.85		4.00		3.98		3.93		3.71	
	B	**1st grade**	3.69		3.81		3.40		3.55		3.43		3.64		3.70		3.28	
		2nd grade	3.38	0.001	3.61	ns	3.61	0.003	3.32	0.011	3.38	0.035	3.56	ns	3.66	ns	3.33	ns
		3rd grade	3.23		3.58		3.81		3.41		3.56		3.69		3.61		3.12	

Continued

Table S4 continued

			HR		CY		EG		GR		IT		MT		ES		TR	
	p-level			*p*-level		*p*-level		*p*-level		*p*-level		*p*-level		*p*-level		*p*-level		
Fathers' education level	**K**	**Primary school**			8.40		4.00		9.65		6.00		4.00		9.08		6.98	
		Middle school	9.64		8.73		4.59		10.92		10.36		10.26		9.72		6.60	
		High school	10.72	0.030	10.71	ns	5.55	ns	10.47	ns	11.49	0.002	9.56	ns	10.65	0.001	6.99	ns
		University	11.90		11.08		5.94		10.38		11.15		11.03		11.14		7.88	
		Post graduate	11.05		10.45		6.60		10.98		11.83		11.29		11.22		8.08	
	A	**Primary school**			3.94		3.58		3.86		4.47		2.60		3.70		3.50	
		Middle school	3.50		3.73		3.34		3.78		3.87		3.87		3.88		3.51	
		High school	3.80	0.004	4.16	0.034	3.59	0.022	3.84	ns	3.96	0.050	3.88	ns	3.86	ns	3.66	ns
		University	4.04		4.36		3.81		3.87		3.85		4.15		3.97		3.69	
		Post graduate	3.77		4.03		3.85		3.97		4.20		4.07		3.95		3.78	
	B	**Primary school**			3.50		3.65		3.55		2.60		3.00		3.48		3.16	
		Middle school	3.26		3.25		3.28		3.39		3.45		3.55		3.63		3.25	
		High school	3.37	ns	3.66	ns	3.41	0.003	3.39	ns	3.48	ns	3.87	ns	3.67	0.031	3.26	ns
		University	3.48		3.75		3.77		3.43		3.50		3.72		3.67		3.33	
		Post graduate	3.05		3.77		3.79		3.52		3.66		3.68		3.83		3.09	

Continued

Table S4 continued

			HR		CY		EG		GR		IT		MT		ES		TR	
	p-level			*p*-level		*p*-level		*p*-level		*p*-level		*p*-level		*p*-level		*p*-level		
Mothers' education level	**K**	**Primary school**			5.00		2.50		8.30		10.17		14.00		9.11		7.34	
		Middle school	9.64		10.50		5.34		10.25		10.26		10.58		9.56		6.44	
		High school	10.72	0.030	10.48	ns	5.78	ns	10.54	ns	11.13	ns	9.61	0.037	11.06	0.001	7.10	0.035
		University	11.90		10.52		5.70		10.68		11.52		9.80		10.77		7.79	
		Post graduate	11.05		10.71		5.86		10.82		12.21		12.65		11.39		9.00	
	A	**Primary school**			2.80		3.08		3.54		3.88		4.80		3.84		3.61	
		Middle school	3.50		3.60		3.62		3.82		3.91		4.02		3.87		3.44	
		High school	3.80	0.004	3.89	0.017	3.75	ns	3.77	0.018	3.89	ns	3.65	ns	3.91	ns	3.69	ns
		University	4.04		4.22		3.74		3.96		4.00		3.97		3.89		3.78	
		Post graduate	3.77		4.10		3.48		3.95		3.97		4.05		4.01		3.86	
	B	**Primary school**			3.00		2.85		3.46		3.53		3.30		3.63		3.22	
		Middle school	3.26		3.74		3.59		3.49		3.35		3.66		3.61		3.25	
		High school	3.37	ns	3.42	0.149	3.57	ns	3.36	ns	3.46	ns	3.46	ns	3.63	ns	3.26	ns
		University	3.48		3.69		3.68		3.44		3.49		3.74		3.66		3.35	
		Post graduate	3.05		3.80		3.59		3.51		3.64		3.61		3.81		3.41	