



Figure 1: Enjoying some slack time watching the fish trawl coming in.

What do we gain from cruise-based teaching in marine science university education?

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The key findings:

- Ship-based fieldwork is effective for consolidating and learning to apply theoretical knowledge.
- Students received sound training of soft skills necessary for their future careers.
- Cruise-based teaching scores highly in student self-perceived learning and is an important recruitment tool into marine sciences.

The problem:

Fieldwork is a popular component in university courses but expensive. We investigated whether ship-based fieldwork plays an outstanding role in facilitating learning in marine science courses compared to classroom-based teaching.

The setting:

In 2018, three marine science courses at UiT The Arctic University of Norway courses conducted a shared multi-day teaching cruise onboard RV Helmer Hanssen:

- *Ocean Climate*, BSc level, 32 students, course leader and a teaching assistant (TA)
- *Marine Ecology*, BSc level, 36 students, course leader, 5 lecturers and six TAs
- *Production and Growth in Polar Areas*, MSc level, 13 students, same course leader as Marine Ecology, two lecturers and two TAs.

All courses otherwise based on lectures, seminars, laboratory exercises.

The methods:

- anonymous online surveys, answered by 47% of the students
- semi-qualitative interviews with three undergraduate and two graduate students
- interviews with the course leaders and three TAs

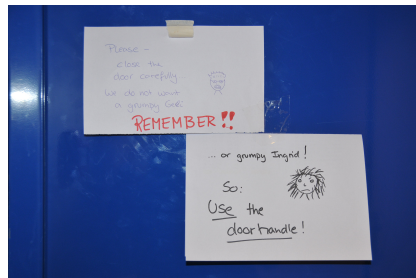


Figure 3: Learning to deal with challenging environments and teachers...

Students' self-perceived learning:

Cruise-based teaching addresses the students' preference for hands-on learning, but well structured and conducted lectures with active learning components can be equally efficient for knowledge transfer.

Integration of different course components is crucial for effective teaching and learning.

Table 1: How much did the students learn during the different sections of the three courses? (Numbers = % of students that chose that answer.)

	Ocean Climate			Marine Ecology			Production and Growth		
Lectures	59	41		60	33		33	50	
Seminar	29	53		50	50		50	50	
Laboratory exercises	35	59		60			1		
Cruise	47			53	40		80		
Essay writing		1			1		50	33	

¹(not included in the survey)

Teaching and learning on different levels:

Undergraduate students benefitted strongly from the opportunity to consolidate and apply the knowledge from the lectures and seminars. Discussions with 24/7 available teachers facilitated the learning greatly.

Graduate students benefitted most from independent work such as designing, carrying out and evaluating an experiment onboard.

The teaching cruise mimicked a research cruise with watch system, round-the-clock activity, a large number of participants, and at times adverse weather conditions. The students received thorough training in soft skill required to handle challenging environment and work tasks such as cruise report writing in a big group. Undergraduate students were not always aware of this learning, but graduate students appreciated the opportunity.

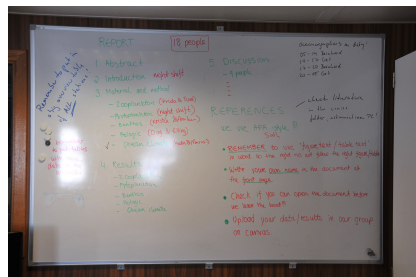


Figure 4: An unpopular task that trains soft skills: writing the cruise report. Planning and discussion is essential in big groups as these students discover.



Figure 2: Hands-on learning by dissecting fish stomachs or running the hydrographic measurements.



Table 2: Where have the students experienced learning during the cruise? (Numbers = % of students that chose that answer.)

	Ocean Climate			Marine Ecology			Production and Growth		
Hands-on experience with instruments/ sampling/ lab work	41	59		67	33		67	33	
Working with R as a plotting software	24	29	41				1		
Planning the experiment							50	33	
Discussions with teachers (24/7 available)	29	59		53	40		50	50	
Writing of cruise report	35	41	24	40	33	27	50	50	
Discussions with fellow students		59	29		73		33	67	

¹(not included in the survey)