

Annual Report 2021



Content

Annual report 2021.....	2
Students as partners - the bioHIVE	9
Appendix 1 Focus area and action report 2021	11
Table 1. Learning culture action plan	12
Table 2 Innovative teaching	18
Table 3 Practical training	24
Table 4 Outreach.....	26
<i>bioCEED Personnel 2021.....</i>	<i>27</i>
<i>Feedback from site visit 2021</i>	<i>27</i>
APPENDIX 2 Overview of dissemination and outreach activity	28
<i>The bioCEED community and beyond – seminars, workshops, courses</i>	<i>28</i>
Table 6 bioCEED seminars 2021	28
Table 7 bioCEED Professional development activities 2021	28
Table 8 bioCEED student meetings and seminars 2021	29
<i>bioCEED reaching out - conferences, events, meetings and seminars</i>	<i>30</i>
Table 9 Presentations at scientific conferences (peer reviewed) 2021	30
Table 10 Presentations at seminars, workshops, conferences, etc 2021	30
<i>bioCEED publications 2021</i>	<i>32</i>
<i>bioCEED online and in the media</i>	<i>34</i>
<i>bioCEED platforms.....</i>	<i>35</i>
<i>Awards</i>	<i>36</i>
Appendix 3 - Accounting 2021 and budget 2022-2023	37
Appendix 4 Externally funded bioCEED - projects	39
Table 11. Full list of externally funded projects with bioCEED involved (granted) 2014-	43

Front page photos: Jonathan Soule/bioCEED, Tina Dahl, Anne Kristin Eilrich, Lars Martin Myhre, and Anne Bjune.

Annual report 2021

Executive summary 2021

In **2021**, bioCEED has continued to develop biology education to fill future needs in science and society, and to facilitate the scholarship of teaching and learning across higher education in Norway and beyond.

Our activities are guided by **our four focus areas – learning culture, innovative teaching, practical training, and outreach**. We experienced many highlights in each of these focus areas in 2021:

Establishing and maintaining a scholarly and collegial **learning culture** continues to be a top priority for all engaged in bioCEED. For many “friends of bioCEED,” this is the beginning and end of their involvement with the Centre, but for most it is simply the introduction to innovative teaching, practical training and/or outreach. Either path leads to meaningful engagement, and Centre leaders and staff are committed to ensuring this learning culture persists and grows post-SFU funding and beyond our host departments. Learning-culture and educational leadership highlights include:

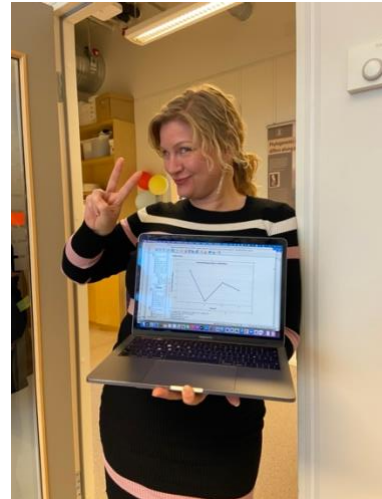
- The UNIS [Learning Forum](#) gathering 95 participants (80 on-site and 15 online, participants and presenters) from all UNIS departments as well as a group of 10 students. bioCEED staff and students from Bergen also attended the forum. Learning Forum 2021 was all about assessment, digital tools, academic culture and development of teaching and UNIS educational offer. In addition to a very successful forum, bioCEED staff from UNIS and UiB met onsite for the first time in 2 years and were able to discuss and workshop current and future priorities.
- We have prioritized building our early-career-researcher (ECR) community. *The ECR community* now includes **bioHIVE**, a learning community involving our Students as Partners in the Centre, and **bioBERG**, a research group, akin to a journal club, designed to support researchers involved in STEM education. For both bioHIVE and bioBERG, our hope is that participants will have: an increased sense of community (or *relatedness*, in motivational terms); the conviction that their work is part of something larger (i.e., what they are doing is *broadly relevant* and meaningful); greater self-efficacy regarding research abilities (for those specifically engaged in research); and critically, more and better products. Other projects in support of ECRs include IMPRINT, a MN-UiB-centered proposal, recently submitted to the NFR, aiming to study academic supervision throughout the faculty at UiB, and ultimately beyond.
- We continue to offer project funding and support to stimulate collegial SoTL-based teaching development. We are especially proud of the student-initiated projects that include the student research conference [SCOPE](#)¹ (Student-led Conference on Polar Environment), at UNIS, and the development, implementation, and assessment of an [escape room](#) for the paleoecology course at UiB. The student-led, peer-reviewed journal [bikuben](#) published its first articles, and several more are in various stages of review and revision.
- The digital teachers’ meetings continued to provide an arena for collegial sharing, conversations, and support for BIO and UNIS teachers, with contributions from the teachers, as well as invited speakers. Meetings covered topics such as digital tools, learning



¹ <https://bioceed.uib.no/dropfolder/LearningForum/2021/SCOPE.pdf>

platforms, cooperative learning, and how to [encourage student participation during remote instruction](#).

- We develop and offer professional development courses, including those that are growing (the BIO and UNIS teaching assistant, or [TA/PhD course](#)), being reimagined (expanding the scope of the TA course), and entirely novel (the [Leading Educational Change](#) course).
- On a national level, bioCEED is partnering with MATRIC director and Nordic Journal of STEM Education (NJSTEME) editor Thomas Gjesteland (as well as faculty from NTNU, UiS, and Lund U) to lead a [workshop](#) for scientists interested in developing their STEM-education work for publication in [NJSTEME](#). Further, several other ongoing initiatives involve national collaborations (e.g., the recently funded [DEVELOP](#) project).
- BioCEED expertise has been sought in many areas, including contributing to building knowledge and supporting the development and implementation of pedagogical merit systems across Norway. We have also advised on the development of proposals for new SFUs under the current HK-dir call. We are active in the ongoing debates and give input to policy development in Norwegian Higher Education (see Appendix 2).



*One happy PhD candidate with some very cool data! Anja Møgelvang.
Photo: bioCEED.*

Exciting new collaborations - The past year saw significant growth in our cross-institutional, cross-STEM, and cross-SFU collaborations. These initiatives include leading (with UiA, UiS, NTNU, and Lund University) efforts to revive the Nordic Journal of STEM Education, developing a study of sense-of-belonging in geosciences (with iEarth and the University of Minnesota), developing a study of assessment practices in Norwegian Higher Education (with MATRIC/UiA), initiating the work relevance project DEVELOP (Table 4, A22) with IMR, Norce, UiO and UiT, and the recent NFR submission (with CCSE and iEarth) of the PROBE proposal, which aims to study open-source, course-based research experiences across Norway and eventually, much further. Our IMPRINT project, focusing on mentoring, is embedded at the faculty level and led by the Vice-Dean of Education--therefore decidedly cross-STEM. We also collaborated with our colleagues at partner SFUs to give input on the proposed two-sensor law for Norwegian Higher Education, and have developed a joint course, with iEarth, on Leading Educational Change. bioCEED deputy leader Steve Coulson led the National Expert Body for biology (Nasjonalt fagråd for biologi, UHR) in 2021, with bioCEEDs Tina Dahl as secretary, offering an opportunity to get input from biology educators across Norway, developing joint proposals, as well as presenting and sharing the resources bioCEED have developed.

Box 1 Exciting new collaborations

Despite (or perhaps because of) the continued challenges imposed by COVID, we were quite active in the **innovative teaching** focus area. These highlights include:

- We continue to develop and support bioSKILLS' platforms [bioST@TS](#), [bioWRITE](#), [bioSKRIV](#) and [bioPITCH](#), which have become central teaching resources in more than a dozen biology courses at BSc and MSc levels, including three of the five major intro courses in the BSc programme at BIO. An emerging collaboration with NTNU faculty promises to make bioST@TS more broadly applicable.

- bioCEED staff led the work to furnish new student-active learning spaces at UNIS. These learning spaces will be an important and necessary contribution to improve the student's learning environment, generic skill development and student-active research opportunities.
- We were excited to be able to offer our Student Poster Session in person [on campus in fall 2021](#), after being offered [digitally in spring 2021](#). In sum, over 300 students from 9 courses participated in these two sessions, gaining valuable experience in science communication. All posters are digitally available at [bioPITCH](#).
- The [FieldPASS](#) project proceeds according to plan. Digital-, certification- and reflection tools are being developed and tested in 2021. Further, tools developed and tested at UNIS are now being used and tested at UiB and UiO, and a multi-pronged dissemination plan (presentations, manuscript) is underway. Because of this effort, field-course engagement and assessment is being reimagined in several courses.
- Two of our externally funded projects ([VuggetilGrad](#) and [\(re\)Design](#)) overlap in their programme-wide emphasis on constructive alignment (via Intended Learning Outcomes, or ILOs) and the development of transferable skills and student active research' (e.g., authentic research skills). In 2022, our 4X-postponed teachers retreat will stress getting faculty input on these ILOs and a curriculum-mapping exercise.



Responding to feedback. In September, bioCEED had a site visit with HKdir and appointed external expert Siri Fjellheim. The site visit report gave important feedback that was largely positive and indicated bioCEED is mostly on track to fulfill our objectives in the four focus areas (see Appendix 2). However, we also had some productive discussion about our outreach efforts, suggesting that we could think more creatively about how best to reach our colleagues working in, and teaching, biology beyond UiB, UNIS, and our regular collaborators. We have taken this feedback seriously, and are currently developing the **bioCEED Toolkit**, a satellite of our bioSKILLS platform designed to share our innovations with practitioners. Resources to be shared include directions for how to build a student-led tutoring program (biORAKEL), how to assess and incentivize student skills mastery via a certification process, and how to set up cooperative-learning groups in a remote environment. We have also, with HKdir support through the Work Relevance program, initiated the [DEVELOP project](#). This project will strengthen our efforts towards societal relevance and practical training, also asked for in the site visit feedback. [DEVELOP](#) is also cross-SFU and cross-STEM, involving colleagues from iEarth at UiT and faculty in BIO at UiO and UiB, and relies on partnership with NORCE and IMR.

Box2 Responding to feedback

Practical training has always been emphasized in bioCEED efforts, even with the constraints—on both field and lab work—imposed by COVID. Due to significant overlap with innovative teaching, much of this work is discussed above, but additional highlights include:

- We aim to scale up practice courses at our host institutions. In this way, more students have high-impact educational experiences through internships (and the associated courses—[BIO 298](#) and [AB-208](#) and authentic research experiences with a faculty mentor

(often alongside a companion course, [BIO 299](#) and [AB-207](#)). The new [DEVELOP project](#), discussed elsewhere, builds on the existing BIO 298 structure.

Our fourth focus area is **outreach**, which includes several types of dissemination in addition to, primarily, educating hundreds of critical thinkers who will take 21st-century knowledge and skills to their future communities. Much of our outreach has been presented elsewhere (see Appendix 1-2), but includes our newsletter, our social-media presence, several manuscripts published and in progress in the peer-reviewed literature, presentations across Norway and beyond (see Appendix 2), and the bioCEED Toolkit, currently in development. In sum, the impact of bioCEED continues to grow, reaching our communities and our colleagues in higher education--beyond biology, and beyond Norway.

The most palpable **challenge** we have faced thus far is the COVID pandemic, which has altered many of our plans by moving teaching and meetings strictly online, thus curtailing progress in some areas (e.g., the (re)Design project, which relies on in-person discussions with BIO faculty). We are pleased with how we have risen to the challenges imposed by COVID, for example with our digital teachers' meetings, which have provided resources for faculty transitioning to remote instruction. Looking ahead, a challenge we need to address strategically is that of *sustainability*—either of bioCEED or something similar in its place. Through our activities and products we have transformed BIO at UiB, UNIS, and beyond, and the loss of these resource to our staff would be significant. Therefore, we are in discussion with our department and faculty administration about ways we can start moving toward Centre sustainability. We continue to welcome input from the Centre Board, and HKdir, on how best to proceed.

bioCEED Centre Board – bioCEED met with our Centre Board (Box 3) on 24 February to review the past year. During the meeting, we gave a summary of highlights from 2021, discussed some plans for the coming year, and solicited input on sustainability strategies for bioCEED after the formal SFU period ends. A key take-home message is that the members expressed a shared interest in bioCEED sustainability and encouraged us to consult different models, in partner institutions, at different levels of organization. From these models, we will craft several possible scenarios for bioCEED 2.0 to share with leadership and start working toward a viable sustainability plan. Developing these plans inform a significant part of our priorities for 2022.

bioCEED Centre Board. The Board has representatives from all the centre partners, in addition to student representatives. The Board leader is appointed by the host institutions (UiB). From 2022 the Board consist of the following members²: Yael Harlap (Board leader, UiB), Anne Bjune (Head of Education, BIO UiB), Jøran Moen (Director, UNIS), Kjersti Lea (Head of Department, IPED UiB), Kjell Nedreaas (IMR), Rebecca Gorniak (student representative, UNIS) and Pernille Eyde Nerlie (student representative, UiB). The secretary for the Board is bioCEED director Sehoya Cotner and coordinator Oddfrid Førland. HKdir joins the Board as observers.

Box 3 bioCEED Centre Board

Priorities for 2022 – plans have been made (Action plan phase II), proposals have been submitted, grants have been given, new PhDs will start, and exciting collaborations initiated (see Box 1-2, Table 1-3 Appendix 1). This will add to the already ongoing projects and

² Abbreviated affiliations: BIO UIB: Department of Biological Sciences, UiB; UNIS: University Centre in Svalbard; IPED UiB: Department of Education, UiB; IMR: Institute of Marine Research

activities. In addition, an important priority will be to develop a sustainable plan for bioCEEDs continued activity after SFU-funding and status ends. As the Covid-years have left us with a financial surplus, as well as delayed progress in some areas, the possibility of extending the SFU period is something we are currently considering. We have grants that extend beyond our SFU-period, and a continued commitment to the development of the learning environment and professional development activities that benefit both our host institutions and the wider community.

Comments on results compared to the application and center plan

To address the specific questions posed in the template for an SFU annual report, we will here give succinct replies and point to further information in this report and other documentation available.

1. Results compared to the application and centre plan:

1.1 How does the vision of the centre, the work packages/ focus areas and activities fit together?

This questions was addressed during the mid-term evaluation process where we redesigned our work packages into focus areas, clarified our vision, and developed an [Action Plan for phase II](#) (2019-2023).

bioCEED's vision is to develop relevant biology educations that fill future needs in science and society by connecting scientific knowledge, practical disciplinary and transferable skills, and societal applications. These connections should guide the development of curricula as well as teaching and learning methods throughout course portfolios and programmes.

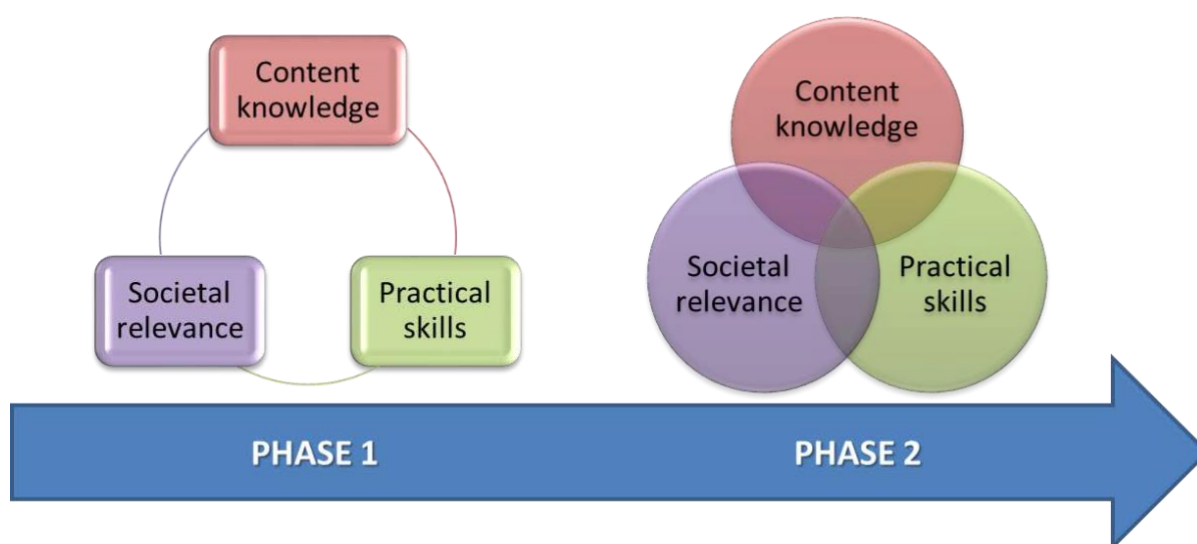


Figure 1. The evolution in how the bioCEED triangle has been understood and used – from the early-stage focus on interlinking three different and distinct aspects within the domain of biology, to the later-stage more holistic approach expanding the scopes of each of the three aspects, while also integrating and linking them more closely with each other (from Self-evaluation, 2017).

A prerequisite for achieving this vision is a scholarly, inclusive and collegial *Learning culture* (Fig 2). After all, it is the students, teachers, and educational support staff that will do the work of developing *Innovative teaching* and ensuring relevant and authentic learning experiences through *Practical training*. In this work, bioCEED is a catalyst, initiating projects that facilitate the corners of the biological triangle, biological theory, practical skills, and societal relevance (Fig. 1). The interactions have created tensions and feedback loops, which have facilitated content curriculum development (i.e., a movement towards a more integrated triangle; Phase 2, Fig. 1). bioCEED has thus progressed from a focus on “how” to teach and learn biology towards a focus that also concerns “what” biology education is and should be.

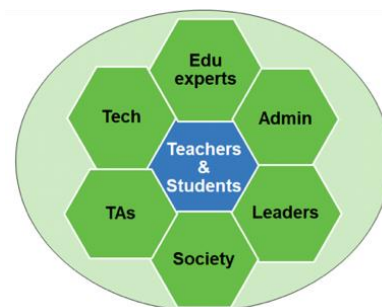


Figure 2 Excellence can only be achieved if all relevant stakeholders in teaching and learning being involved, included and informed.

All actions in the Action Plan are designed to support the vision and develop the Focus areas. As the various actions evolve, there is need for adjusting and revising. For example, because the activities and innovations in *Focus area 2 Innovative teaching* and *Focus area 3 Practical training* are interdependent, there are much overlap and sometimes difficult to place them in one of the focus areas – they are in both. Some actions (and targets) have been revised in the 2021-report, to include a broader range of collaborators, activities, audiences, and potential outcomes. We see this more as adjusting the map to a changing landscape, rather than deviating from the Centre plan, as the adjustments are in line with the overarching vision.

1.2 Describe, assess, and analyse the most important accomplishments and activities of each work package/ focus area the actual year.

- What are the expected results and impact of the activities?***
- How does the activities contribute to the goals of the centre?***

Descriptions can be found in under each focus area and action in Table 1-4 (Appendix 1). These tables also function as progress tracking according to the targets set. Overall, we consider our results and impacts to be in line with the plans. Individual projects and activities have suffered as a result of the Covid-19 pandemic, and revised progress plans and new approaches was necessary.

How activities are designed to contribute to the goals of the center are described above. The activities and their outcomes are described in Table 1-4 (Appendix 1).

2. Dissemination of knowledge and practices

How has the centre worked with dissemination of knowledge and practices both within and outside of the institution?

What is the expected impact of the dissemination activities?

bioCEED has a well-developed and ambitious outreach strategy ([described in previous reports](#)), that describes who (bioCEED, our staff and students), how, why, and what we will communicate to different audiences and through different communication channels. Outreach is also key outcomes and assessment criteria of many the specific actions in Focus areas 1-3. Our priorities and outputs in 2021 can be found above (see Executive summary), under each Focus area (Table 1-4 Appendix 1, and the overview of dissemination and outreach activities in Appendix 2).

Expected *impact* depend on the intended audience and the format of the dissemination. We strive to stay conscious about this, tailoring the format to the audience. This is sometimes challenging, as *impact* can be open to interpretation and look very differently depending on what perspective you take. For example, a teacher teaching 100 students using effective teaching methods learned at a bioCEED course, may have a greater impact on future biologist and future biological science than a publication in a prestigious journal. Another example is having impact on policy (which is seen as very impactful, indeed – by those who work in management) means little until this policy is translated into actual practice (e.g. the requirements for pedagogical competence for promotion to full professor and the actual assessments made).

3. Further progress:

What are the expectations for the coming year?

In light of the activities of 2021, is there a need for adjustments of the center plan, the budget and/ or the dissemination strategy?

The expectation for the coming year is to continue according to plan, and at the same time be flexible enough to take the opportunities that come along. See above for adjustments to the center plan (which includes outreach and dissemination). Due to Covid related delays we are currently discussing with the center partners and board, whether we should consider applying to have our center period extended. With the current level of activity, funding, and personnel, we are not able to “catch up” all delays and the surplus (just over 730 KNOK) are not sufficient to increase the personnel significantly. However, we consider it likely that, allowed more time, we will be able to complete and deliver on the aims and objectives. bioCEED continues to have a high activity within all our focus areas, and this level of activity is beyond what the SFU grant alone can sustain. Therefore, bioCEED relies on externally funded project grants to maintain the current level of activity. bioCEED staff, especially S. Cotner, and collaborators, are actively seeking external funding and in 2021, five large projects proposals (NFR, HKdir, US) have been submitted, in addition to several minor proposals (e.g. UHR-MNT).). Which proposals are funded, affect expectations and priorities. Still, we maintain that all efforts of securing external funding is in line with our vision and will contribute and add to bioCEEDs core center plan.

Financial account and budget for the current year can be found in the Appendix (Appendix 3, Accounting 2021, budget 2022-23).

Students as partners - the bioHIVE

Students-as-partners are an important and essential priority for bioCEED. Students are involved in bioCEED in a variety of roles; they initiate, participate, contribute, and lead projects and activities in collaboration with bioCEED, and with our partner institutions. This section highlights the contribution students make in bioCEED. More details on projects and activities can be found in Table 1-4 (Appendix 1) and by following the links in the text.

Students are part of the decision-making processes in the center as members of the bioCEED steering group/core team (2 UNIS and 2 UiB student representatives) and the bioCEED Board (1 UNIS and 1 UiB student representative). Student representatives and bioBEEs contribute to our outreach activities by hosting student meetings and workshops, presenting in various arenas, co-authoring/authoring e.g. op-eds and hearings, and writing news item for our Newsletter (see Appendix 2 for overview). They also function as contacts between bioCEED and student organizations at our host departments.

For a summary and student perspective on student representation and student partnership in bioCEED, we recommend the podcast on student partnership with student representative Pernille Eyde Nerlie ([Diku Kvalitetstid](#)).

As we are learning and developing as a center, we see the need to change the language we use to describe our work involving students. Therefore, we have revised the Action (A15) to embrace a students-as-partners perspective rather than student input-perspective:

Outdated text A15: Establish student panel to advise development of innovative teaching modules and curricula

Revised text A15: Involve students in all research and development activities and projects. Involve students in decision making. Ensure sustainability and learning outcomes and provide fair working conditions for student partners

In our Centre, several distinct projects rely on the efforts of student partners, collectively called bioBEEs. bioBEEs partner with staff in many ways, from helping with data collection and interpretation, to organizing an ongoing tutoring program ([biORAKEL](#)). While not all their tasks are research-oriented, they are all embedded in the academic and research community in our department. Thus, we sought to add value to the student experience by creating a learning community focused on student work in the Centre. This community is called the bioHIVE and it was initiated in mid-2021 (see also Executive summary).

Participants include the bioHIVE leaders (Cotner and Strømme) and coordinator (Holtermann), along with current bioBEEs, student representatives and student project leaders (currently 5-6 students). The

idea is to create a common meeting ground for all students involved in projects to better communications and collaboration on all projects. We will continue the bioHIVE in 2022 with regular meetings and an increased emphasis on shared ownership of HIVE discussions.



Student partnership projects include:

- Student members of core team in [Project \(re\)design of BSc biology](#) includes project involvement, as well as participation in core team workshops, and organizing student workshops
- [biOrakel](#) is a weekly student meeting to facilitate a better learning environment. biOrakel continues the great work that led them to win the [UiB Læringsmiljøprisen](#) in 2018, and the concept is spreading to other departments. Initiatives to establish a similar project at UNIS is underway. biOrakel has provided remote meetings during the lock down, and is currently reaching more students when the campus reopened. biOrakel was presented as a [poster](#) at the UNIS Learning Forum.
- [bioSPIRE](#) continues to give undergraduate students a real taste of biology through practical experience on projects under supervision of master/PhD projects. bioSPIRE is organized by PhD student Ragnhild Gya and technician Jonathan Soule
- [UNISprout](#) is continuing to give undergraduate students field- and labwork experiences and at the same time giving master and PhD students support from field assistants³. UNISprout was presented as a [poster](#) at the UNIS Learning Forum
- [Bikuben student journal](#) has been developed by bioCEED students in 2021. The journal publish peer-reviewed texts from BIO students. New texts are currently in revision, and a paper edition is planned for spring 2022.
- bioCEED has funded a student-initiated proposal to develop an escape room as part of the formal curriculum for an upper-level paleoecology course ([BIO250](#)). Escape rooms, like other cooperative live-action games, bring players together in a physical space, which increases engagement and opportunities to learn in new and excited ways. All students in the course participated in 2021, and the project was assessed by the student and shared (via a [workshop](#) and a [poster presentation](#)) at the UNIS Learning Forum in October.
- The biannual [Student poster symposium](#) includes work from students in several BIO courses both [spring](#) and [fall](#), and the bioBEES participated in the on-campus organization of the symposium.
- Curriculum mapping. This project aims to map the research experiences that students on the bachelor level are offered in selected courses at BIO. The bioBEES work on selecting courses that are being mapped, map the courses, recruit students for focus group interviews, as well as conducting the interviews.
- [UNISbreakfast](#) is a meeting arena in UNIS for BSc-, MSc- and PhD students where students can exchange knowledge and experience connected to their thesis work across different departments. Students present their research, the challenges they face as well as their educational decisions which have led them where they are today. Breakfast is served during the presentations which contributes to a friendly atmosphere and creates an informal learning and networking environment for students. UNISbreakfast has also in 2021 been an important meeting arena for students, this year including iEarth as joint collaboration organizer in the student led project⁴.



³ Read the Annual report for UNISprout here:

<https://bioceed.uib.no/dropfolder/www/UNISprout%20annual%20report%202021.pdf>

⁴ Read the annual report for bioBREAKFAST here:

<https://bioceed.uib.no/dropfolder/www/UNISbreakfast%20annual%20report%202021.pdf>

Appendix 1 Focus area and action report 2021

Focus area 1: Learning culture and educational leadership

The development and promotion of a **collegial learning culture**, based on SoTL and inspired by the research culture, is a major success and impact of bioCEED.

In 2021, the pandemic still made much of the activities for collegial sharing and development digital. This works well for some activities, like the shorter digital teacher's meetings which has been a welcomed and well-attended activity; and less well for other activities like the Teachers retreat which was cancelled yet again in 2021. But like the Terminator the Teachers Retreat [will be back](#). A definite highlight was that UNIS managed to organize the Learning Forum in October, this time with much of the bioCEED Bergen team present and contributing with presentations and workshops.

Specific actions are described and monitored through our [Phase II Action plan](#) for 2019-2023. Table 1 below shows the actions, audience, targets set in 2017 (traffic light coding; red: little or no progress, yellow: progress ok, green: completed or progressing according to plan), a summary of progress 2019-2020, activity and progress in 2021, and (new) plans for 2022. A detailed overview of outreach and outputs can be found in Appendix 2. If you follow the links in the text, you will find more information from our web pages or newsletter. We recommend that you do (that is where all the fun lies). Actions from [the original Phase II action plan](#) have been revised to include a broader range of collaborators activities, audiences, and potential outcomes (applies to A2, A3, A4, A8).

Table 1. Learning culture action plan			
	Targets	Progress	2021
A1. Offer project funding and support to stimulate collegial SoTL-based teaching development (Biology educators locally / nationally)			
	Projects completed	(15)	
	Innovations implemented	(>10)	
	Outcomes and impacts documented	(>5 papers)	
		bioCEED has supported 4 teacher led SoTL-projects in 2019-2020 (2 UNIS, 2 BIO), and will continue to give grants. 4 student development projects funded 2014-2020. (see previous Annual reports for overview). In addition, we have given grants to several master students in teacher education to support their research (see appendix).	
		2021	<ul style="list-style-type: none">Three new (additional) projects received grants in 2021; The student-led conference on Polar Environment (SCOPE) (student project UNIS, PI Christina Hess) and the Biology escape room (student project BIO, PI Ruben S Thormodsæter). SCOPE and Escape room successfully developed implemented. The Escape room is being used in biology courses at BIO and are being developed and adapted to increase relevance for BIO courses even more. The assessment project (PI Sehoya Cotner)). Funds were awarded to support 1-2 students (bioBEEs) in a descriptive study of how UiB-MN faculty approach assessment in their courses. The aim of this work is to engage bioCEED and our students in meaningful discussion around the upcoming two-sensor law deliberations. Results will be shared via the bioCEED newsletter, MNT conference, and likely publication.Some ongoing projects delayed and postponed due to pandemic (e.g. GLAD).Area for improvement: document outcomes and impacts.
		2022	<ul style="list-style-type: none">SCOPE – will continue in 2022 run by PhD students as part of duty work to better maintain predictability as well as to enhance institutional implementation.
A2. Develop collegial fora and a SoTL culture at our host institutions in collaboration with the Pedagogic Academy and other relevant units and partners (Biology educators locally, MN Faculty/UNIS/UiB)			
Old text: work with Pedagogical Acamey to develop collegial fora and a SoTL culture at the faculty level.			
	Active and visible	bioCEED and Pedagogic Academy	
	Staff participation in fora	>40/yr	
		bioCEED hosts and organize collegial fora at our host departments (e.g., BIO100-club, teacher’s meetings, Teachers retreat), our institutions/faculty (e.g. seminars, Learning forum) and beyond (conferences, seminars, workshops, presentations). An overview can be found in the appendix.	
		2021	<ul style="list-style-type: none">Hybrid Learning Forum held in October with 95 participants from all scientific- and tech/Adm departments as well as students and with broad contribution from bioCEEDDigital teacher meetings, BIO100-club, (re)design core team

			<ul style="list-style-type: none"> Area for improvement: Teachers retreat BIO postponed 4 times.
		2022	<ul style="list-style-type: none"> Teachers retreat in June and November.
A3. Develop and offer courses and opportunities for professional development for educators at different levels (TAs, PhDs, Tech/Admin, Teachers), in collaboration with the University Pedagogy Unit and other relevant partners (Partner institution educators) Old text: In collaboration with the University Pedagogy Unit , develop courses for educators at different levels			
	Courses developed, evaluated and implemented (4) Good participation (10/course/yr)		
		Courses developed, evaluated and implemented: Teaching and Learning in Biology/STEM (collegial project course – CPC/MNPED660), TA course (UNIS+BIO).	
		2021	<ul style="list-style-type: none"> BioCEED staff (Andersson, Førland) taught the spring version of UPED601 (Dokumentering og evaluering av undervisningseffektivitet), one of the modules in UiB's pedagogical training program. BioCEED staff (Holtermann) contributed to the development of the new course module on quality in education for education administration at UiB; KUSK – Modul 5 Kvalitet i utdanning, and taught a session on student evaluation of teaching. TA course BIO is here to stay! The course consists of 2 modules over 2 days and are led by Lucas Jenø in collaboration with Christian B. Strømme and Dagmar Egelkraut. The course is offered to teaching assistants (incl. PhD and post docs) at BIO and was offered spring semester 2021 (30 participants) (remote) and fall semester 2021 (15 participants). A similar design of the course is also being implemented at the Department of chemistry. TA course UNIS: The 3-day hands-on TA course "Teaching and Learning course" was successfully run March 2021. The course was primarily offered to PhD students across all scientific departments but also open to Master and Postdocs as well. The course was run in collaboration with iEarth and led by Ivar Nordmo and teachers from UNIS. It consists of 4 parts focusing on central theories and concept of learning, presenter vs. facilitator role in classroom, written feedback and field learning. The brand-new course Leading Educational Change – through SoTL was developed by bioCEED and iEarth faculty and started in 2021. It is a pilot initiative involving two SFUs and 23 academic-change leaders from several institutions (UiB, UiO, UiT and UNIS). The course is led by bioCEED and iEarth faculty which represent a range of perspectives – including SoTL, theories of change in higher education, and scientific teaching. The course targets people working in quality development, and who typically have limited opportunities for appropriate professional training in this area. In-person meetings have been held at UiB and UiO, and future meetings will include UiO and UNIS. A scheduled UiT meeting was cancelled due to COVID. The course got additional funding from UHR. The workshop on scientific writing for PhD students in Arctic Biology, UNIS, concluded in May 2021 after being run for year. The Writing Workshop was comprised of lectures, seminars, and writing a research proposal. The aim of the workshop was to introduce and train PhD students in scientific writing as well as in giving feedback. The workshop was run by Simone Lang, with five PhD students involved. PhD teaching hours: Through 2021 bioCEED with Academic Affairs and Scientific staff at UNIS have worked to create a common institutional duty work system at UNIS to improve the allocation of PhD teaching hours within the 25% duty work part of their four-year PhD position and professionalize the use of the teaching resource that PhDs represent. A policy document and an accounting system are developed and will be implemented in 2022.

		2022	<ul style="list-style-type: none"> TA course @MN-UiB - collaborate with the MN Faculty to scale up TA/PHD-teaching course to include all STEM – departments TA course @UNIS will be offered in March 2022 The Collegial Project course (MNPED660) will be offered in 2022/23 to MN Faculty staff
A4. Document and research impact of educator course participation and professional development on teaching practice and student outcomes (HigherEd internationally) Old text: Research impact of educator course participation on teaching practice and student outcomes old text Based on bioCEED projects, organize and contribute to workshops and research on SoTL culture development			
	Conference presentations (6) Published papers (2)		
		A SoTL project documenting and assessing the Collegial Project (MNPED660) course has been conducted and a paper (see appendix) presented at conferences. A study documenting and assessing outcomes of Learning Forum Sharing session has been conducted. A SoTL project mapping and analyzing learning outcomes against course content was conducted (MNPED660 course project).	
		2021:	<ul style="list-style-type: none"> MNT conference paper and presentation (see appendix) on collegial project course (MNPED660). Full paper to be submitted to NJSTEME in 2022. MNT conference paper and presentation (see appendix) on learning outcomes and learning activities. Paper on Learning Forum Sharing session in review. Also submitted to EuroSoTL2022.
		2022:	<ul style="list-style-type: none"> Publish papers and present at conferences.
A5. Contribute to develop and assess impact of educational leadership (Partner institutions, at all levels)			
	EdLead training module(s) developed EdLead has clear role Targets to be revised and added to reflect the full breadth of educational leadership.		
		Leadership in bioCEED and at host departments/partner/institutions have changed during phase II and are now fully operative and effective communication and collaboration have been established. BioCEED is represented through our host departments in the national body for biology (Nasjonalt fagråd for biologi). We collaborate with experts in educational leadership, eg. SFUs and other relevant units, and we have tight links the Centre for Engineering Education at LTH, Lund University.	
		2021:	<ul style="list-style-type: none"> MN Faculty UiB have implemented a new educational leadership model, where educational leaders are appointed at each department. The new vice dean of Education (Sigrunn Eliassen) is from bioCEED and holds ETP status. Things are good at MN-UiB. The course Leading Educational Change through SoTL fill a gap in professional development opportunities at our institutions (and everywhere else) and offer educational leaders and change agents an arena to learn and develop. National expert body for biology (Nasjonalt fagråd for biologi under UHR) was led by Steve Coulson in 2021 in addition to the already established secretary function by Tina Dahl (2020-2021). BioCEED is frequently raised at Nasjonalt fagråd for biologi meetings and anchored in the group. BioCEED online tools have been shared and presented (Oct. 2021), a project proposal for mapping sustainability teaching in biological courses at Norwegian universities and

			<p>develop an online course model from Nasjonalt fagråd for biolgi to UHR-MNT involving bioCEED was funded (led by UiT).</p> <ul style="list-style-type: none"> SFU collaboration: A significant priority is cross-SFU collaboration. To that end, Sehoya has engaged in the following activities: Presenting at the iEarth digital teachers forum and CCSE seminar (« “Envisioning more equitable Higher Education” in March 2021 and Nov 2021). Presenting at the CCSE Christmas Seminar (“Maximizing student learning with Open-Source, Course-Based Research Experiences (OSCREs)”) Collaborating with CCSE and iEarth on an RCN proposal (“Praxis, access, and assessment: Open science for better science education (PROBE)”) to study open-source, course-based research experiences Offering the iEarth/bioCEED combined course in Leading Educational Change, discussed above, including a UHR proposal to support travel costs for our LEC course, discussed above. Cotner has been involved as an Associate Editor with the Nordic Journal of STEM Education (NJSTEME). This involves the standard review of manuscripts but has also led to the development of a successful UHR proposal («From Practice to Publication: An authoring workshop for the Nordic Journal of STEM Education”, in collaboration with colleagues from UiA, UiS, NTNU, and Lund University. One of the bioBEEs, Lars Martin Myhre, has also supported some NJSTEME efforts through the development of a new icon to be used throughout the journal’s online and printed media.
		2022:	<ul style="list-style-type: none"> Share experience from the Leading Educational Change- course, both participants project (7 projects) and the course itself (EuroSoTL, other conferences & publications) Nasjonalt fagråd for biolgi 2022: Steve Coulson will continue as an ordinary member of the national expert body for biology. bioCEED will be invited to the spring meeting in March. bioCEED will give input to the UHR funded project. SFU-collaboration: 2022: Planning a collaborative assessment PhD project with MATRIC, Planning a collaborative equity-related project with CELL. NJSTEME workshop: In March 22, we will host 20 of our colleagues from Norway and Sweden in an authoring workshop, in an effort to revive NJSTEME activity, develop more reviewers for future submissions, and encourage more of our colleagues in the STEM disciplines to consider contributing to the STEM-education literature.
A6. Contribute to the development and implementation of educational merit systems (HigherEd in Norway)			
	Process participation (3) Institutional collaboration (2)		
			BioCEED has been essential for the implementation of pedagogical merit systems at UiB, and have contributed considerably to building knowledge and supporting the development and implementation of such systems across Norway. BioCEED/CEE PhD researching merit systems.
		2021:	<ul style="list-style-type: none"> Continued collaboration and support with Pedagogical Academy. Contributions to workshops, meeting and seminars on merit systems. BioCEED involved on several levels in the first round of application to the newly established Teaching Academy in Iceland. BioCEED contributed teaching portfolio workshops in collaboration with Lund University (R. Andersson and A. Ahlberg) and in the evaluation committee (O. Følrand and T. Olsson).
		2022:	<ul style="list-style-type: none"> BioCEED staff (O.Følrand) will lead the work with evaluating the Excellent Teaching Practitioner scheme at MN-UiB.

A7. Develop a research project to assesses role of teacher culture for educational quality in HigherEd (NFR Finnut programme)			
		Project developed, funded, and successfully completed	
		PhD project started, but no project funding.	
	2021	PhD project (very slowly) progressing.	
A8. Based on bioCEED projects and competence, organize and contribute to workshops and research on SoTL culture development (Teachers, students, HigherED internationally)			
		Workshops arranged (>3)	
		Well attended (>30 participants)	
		See appendix and workshops related to specific Actions. Our activity is high but have been affected by the pandemic the past two years. This is of course because of the travel and social distancing restrictions, but also because our staff and activities have largely focused on supporting teachers, students, teaching and research through the everchanging situation and demanding tasks of teaching and researching during a pandemic (going online, going offline, changing research plans etc.).	
	2021	See Appendix 2 for an overview and see Outreach output summary.	

Focus area 2 & 3: Innovative teaching and Practical training

An important priority in Focus Area 2 has been to mainstream bioCEED innovations into the formal structures and processes at our host institutions. This is essential for broad, lasting and sustainable local impact, and it requires moving beyond the project phase and the ‘coalition of the willing’ to involve staff and structures at the broader departmental and program level. This links directly to the work within focus area 3 where students should be exposed to a wide range of learning experiences. bioCEED especially develop authentic learning experiences occur when students engage with ‘real’ biology in the field or lab, when they train in performing and applying biological skills and competences in relevant contexts, or when they participate alongside ‘real’ biologists working in research or in the workplace.

Much of the development in these Focus areas are organized under some large, overarching projects (see Table 2, A9-A14, and Table 3). Researching, assessing, and documenting teaching innovations is an important part of these Focus areas.

Specific actions are described and monitored through our [Phase II Action plan](#) for 2019-2023. Table 1 below shows the actions, audience, targets set in 2017 (traffic light coding; red: little or no progress, yellow: progress ok, red: completed or progressing according to plan), a summary of progress 2019-2020, activity and progress in 2021, and (new) plans for 2022. A detailed overview of outreach and outputs can be found in Appendix 2. If you follow the links in the text, you will find more information from our web pages or newsletter. We recommend that you do (that is where all the fun lies). Actions from [the original Phase II action plan](#) have been revised to include a broader range of collaborators activities, audiences, and potential outcomes (applies to A15, A19, A21, A24).

Table 2 Innovative teaching

Action (Audience)	Target	Progress	2021
A9. Wider use of platforms across major courses, as a backbone for aligned bioSKILLS training across programmes (Teachers, students)			
	Courses that use the platforms (>10)	Staff and students contributing to develop them (>50)	
		Developing the bioSKILLS platforms have been at the core of bioCEEDs development work from the start. The platforms bioST@TS , bioWRITE , bioSKRIV and bioPITCH are developed and implemented in several courses at BIO and UNIS. They are also freely available for other educators and students. Staff and students contribute to the continued development of the platforms. bioSKILLS are central to several ongoing projects (e.g. ((re)Design).	
		2021	<ul style="list-style-type: none"> bioSKILLS' platforms bioST@TS, bioWRITE, bioSKRIV and bioPITCH have become central teaching resources in more than a dozen biology courses at BSc and MSc level⁵ including 3⁶ of the five major intro courses in the BSc programme at BIO. The platforms now constitute a repository for tutorials, guidelines, references, examples and exercises for students and teachers. The code is more what you'd call 'guidelines' than actual rules (Hector Barbossa). The community building the platforms used to be limited to course leaders and teachers, but now expands to a younger and motivated population of students and teaching/technical assistants who actively contribute to expanding the content library. See also Writing course at UNIS.
		2022	See A10.
A10. Develop and implement new bioSKILLS modules for key subject-specific and transferable skills (Teachers, students)			
	Modules developed (>4)	bioSKILLS is backbone of skills training through curriculum	
		See A9 and platforms. Currently 4 modules are (fully, although not definitely) developed.	
		2021	<ul style="list-style-type: none"> bioST@TS is undergoing a profound remodeling of its content library to further increase relevance to the biology courses that require better teaching and understanding of numerical competency. This will result in the publication online of a comprehensive set of digital books (published here for now) during spring 2022 on the homepage of bioST@TS. bioPITCH showcases all student posters presented at the biannual Student Poster Session (BIO, UiB), giving students i) practice in outreach and ii) a scientific product from coursework they can link to cv/documents. Student Poster Session was conducted digitally spring 2021 (140 students/5 courses) and on campus fall 2021 (170 participants/4 courses). All posters remotely presented were presented in one-minute pitches. On campus, all posters were presented on poster stands and also, one-minute pitches/ three minutes talks in the auditorium, giving all students outreach

⁵ BIO101, BIO103, BIO104, BIO201, BIO241, BIO299, BIO250, SDG214, SDG215, MOL231, BIO300A, BIO300B and BIO325 – non exhaustive list

⁶ BIO101, BIO103, BIO104

			<p>training in science communication, and building on experience gained with remote poster sessions. All posters are digitally available on bioPITCH</p> <ul style="list-style-type: none"> • Student outreach skills are developed through blogs for UiB and UNIS, workplace practice courses at BIO and UNIS and research practice courses at UiB and UNIS.
		2022	<p>Publish digital books on bioST@TS that includes a set of course-specific pages in the context of practical teaching in microbiology (BIO101/BIO104) and behavioural ecology (BIO241).</p>
A11. Develop joint virtual and physical model systems to support training key skills and competences (Biology educations, teachers, students)			
	Develop model systems (>3) Implementation into courses (>6)		
		See A9 and A10, as well as projects BIG , FieldPASS , Learning Arctic Biology Platform , VFG , bioSKILLS , VtG , ArtsAPP , (re)Design .	
		2021	<ul style="list-style-type: none"> • Different teaching and assessment tools (FieldPass) are under development and partly being tested out in 2021. Virtual field guides have been introduced within courses to prepare students for fieldwork as well as used as a teaching tool. Reflection tools have been tested out in both courses⁷ at UNIS and BIO and will be further implemented and tested out in courses in 2022. A microscopy certification tool had been developed and tested out in several courses⁸ as a joint project between UNIS, UiB and UiO. A homepage has been developed and launched. • We have continued to develop and added new virtual field guides (VFGs) to our Learning Arctic Biology platform. The VFGs was presented at Læringsfestivalen 2021 as well as on Learning Forum in October. Further, a seminar presentation was given to all staff at UNIS on How to utilize and develop our Learning Arctic Biology platform. In the beginning of 2022 a workshop on How to utilize virtual field guides in teaching was given to staff at UNIS. • The escape room for paleoecology was developed in summer 2021 and offered to students in Fall 2021. The project was assessed and findings presented at the UNIS Learning Forum in October 2021. Furthermore, groups at UiB were encouraged to sign up to participate in the escape room (as a fun, pre-holiday activity) in December 2021, and over 30 students and faculty participated in this offering. • bioSKILLS. bioST@TS has become a joint venture where teachers at NTNU and BIO collaborate to develop collective teaching materials. The contents under development address universal components of biostatistics and numerical competency that are indeed not exclusive to our two universities, but relevant to virtually any teaching programme in biology. • Model systems: Initial planning for field-based study systems involves leadership of the University Gardens, course teachers and the Heathland Centre at Lygra. These developments are informed by successful course-based student research projects in biology at UiB and other institutions as reported in available literature. • New student learning spaces at UNIS: In 2021 bioCEED have been involved in a project group working with the use and the furnishment of the student learning spaces at UNIS. The process is led by Coulson and Dahl in collaboration with iEarth and Ivar Nordmo from UiB and together with student representatives from the Student Council. The increasing numbers of students at UNIS and the lack of informal learning areas have shown a need for such areas. These learning areas are also important in terms of supporting the development of generic skills within student-active research such as collaboration, communication, critical thinking and problem solving and give demands on how we design the physical learning environment. The students are largely dependent on being able to work group-based around their research projects and the new learning areas will therefore be

⁷ BIO250 (UiB), AB-201, AG-2010 (UNIS)

⁸ BIOS1110 (UiO), BIO250 (UiB), AB-201, AB-201, AB-321 (UNIS)

			an important and necessary contribution to improving the student's learning environment. The work will continue in 2022 where the room is planned to be finalized during spring/summer with furniture and IT equipment and taken into use by students. An evaluation/research project of the use of the learning space and how it supports the learning processes will be planned and conducted in 2022/2023.
		2022	<ul style="list-style-type: none"> • FieldPASS will continue through 2022 testing different tools for teaching and assessment.
A12. Develop program-wide ILOs for key subject-specific and transferrable skills (Programmes, teachers, students)			
	Track change in course and programme ILOs		
		See projects FieldPASS , bioSKILLS , VuggetilGrad and (re)Design .	
		2021	<ul style="list-style-type: none"> • Development of programme-level ILOs - Development of rubrics based on ILOs. A core team of scientific-, administrative- and pedagogical support staff and students are redesigning the structure and content of the BSc programme in Biology at BIO following a model for (re)design for learner-centered curriculum. New ILOs have been developed through systematic consultation with faculty, and further work on program courses is planned. • Curriculum-based training in transferable skills, research skills as well as research experiences of students were mapped through focus group interviews that involve students in BSc programmes. Focus groups were planned and conducted in collaboration with student co-workers. The results from this effort inform the ongoing Redesign project. • FieldPass tools developed and tested in courses across different institutions (UNIS, UiB, UiO).
		2022	<ul style="list-style-type: none"> • Following the model for backwards planning, the redesign project is planning to continue to implement and revise the program ILOs, curriculum mapping rubrics to ensure ILOs at course level meet program ILOs. Work is planned as workshops for teachers retreats and seminars.
A13. Develop quality assurance aligned with the above (Programmes, institutions, teachers, students)			
	Track change in course and programme ILOs, focusing on skills and alignment		
		See A12 and projects FieldPASS , bioSKILLS , VtG , and (re)Design .	
		2021	<ul style="list-style-type: none"> • A new course survey questionnaire has been developed and piloted as a standard student course evaluation questionnaire for BIO courses. An R-based course evaluation report template has been developed for the purpose of easy data access and presentation for course teachers at the department. The survey includes validated survey items available in Norwegian from Course Experience Questionnaire (CEQ). The survey also includes items intended for assessing constructive alignment as inferred by student perceptions of key course aspects, namely the Constructive Alignment Learning Experience Questionnaire (CALEQ) This questionnaire was translated to Norwegian Bokmål by Jorun Nylehn, Arild Raaheim and Christian Bianchi Strømme and the first validation stages have been completed. • Team-based learning (TBL) was formally integrated into the BIO100 (UiB), and bioCEED developed and administered the pre- and post-course surveys to assess the impact of TBL on student engagement and motivation. • TBL training and implementation in BIO101 (UiB) is supported by bioCEED staff, workshopping the curriculum redesign of the course to adapt to more active learning through TBL. Workshops were supported through UHR-MNT funding. • Project (re)design of BSc Biology targets alignment and skill training in the programme

			<ul style="list-style-type: none"> Data from curriculum mapping on selected generic skills (2019), was analyzed in accordance with course ILOs to map alignment between generic skills training and written ILOs for courses in one programme, results presented at the MNT conference 2021 (see appendix).
		2022	<ul style="list-style-type: none"> TBL BIO100: pre- and post-course survey data will be analyzed and interpreted in early 2022
A14. Stimulate educational innovation through project funding and support. Prioritize projects with students as partners (Biology educators and students locally and nationally).			
	Projects completed (>20).. With students as partners (>10) Innovations implemented (>15) Impacts documented (> 7 papers)		
		Ref A1. 20 SoTL projects have so far been completed as part of Teaching and Learning in biology/STEM (Collegial Project Course, MNPED660) over several rounds, leading to innovations being implemented (e.g. early versions bioSTATS, bioWRITE, Larvae incubator, TBL), and documented as papers, conference presentations and reports.	
		2021	<ul style="list-style-type: none"> Ref A1 and Students as partners- section. A web page listing and sharing the SoTL-projects from CPC course is under construction
		2022	<ul style="list-style-type: none"> SoTL project/CPC web page launched. Projects from LEC-course completed (7), documented and shared/published
A15. Students as Partners. Include students in all research and development activities and projects. Include students in decision making. Ensure sustainability and learning outcomes and provide fair working conditions for student partners (Programmes, institutions, students) (Old text: Establish student panel to advise development of innovative teaching modules and curricula)			
	New targets to be defined by bioHIVE		
		BioCEEDs student involvement and partnership approach have evolved over the centre period. This is excellently described in the podcast on student involvement by student representative Pernille Eyde Nerlie.	
		2021	See Students as partners section The bioHIVE was established, and student technicians (bioBEES) engaged in projects Student involvement in redesign core team Bikuben Student Journal Student led projects bioRAKEL , UNISbreakfast , UNISprout , bioSPIRE continued. SCOPE – The student-led conference on Polar Environment
		2022	Hire more bioBEES – expand the bioHIVE
A16. Researching the impact of innovations on staff and student attitudes, learning, and motivation (Teachers, students, HigherED internationally)			
	Improved educational outcomes (>5) PhD (1) and master (4) theses Published papers (>5)		
		BioCEED have a large portfolio of research projects that investigate student learning outcomes, motivation, teaching and assessment methods. bioCEED core team include researcher in professor, associate professor, post doc and PhD positions, as well as research assistance and support from admin and tech staff. Student partners, master students and bachelor students are also part of our research teams and outputs.	
		2021	See publications and other outputs in Appendix. See A7, A14, A16, A19. Selected ongoing research projects in addition to those described under other action:

			<ul style="list-style-type: none"> • PhD project Anja Møgelvang: Preparing students for an uncertain future is a topic of discussion worldwide, and the main questions include what skills the students need and how the educational system may help the students develop these skills. The MN Faculty UiB is redesigning its bachelor programs to strengthen the generic skills. Building on Cooperative Learning (CL) theory, research and the ongoing redesign process at the faculty, this PhD project will contribute with knowledge on the uses and effects of CL in higher STEM education through three steps: 1) a literature review to obtain insight into the field of CL and its effects in higher global STEM education, 2) a survey examining the existing uses and effects of CL in select courses at the MN Faculty, UiB, and 3) an intervention study and implementation of CL structures in a big introductory biology course at BIO-UiB. • Post doc Kseniia Kalian: We have designed and are currently testing reflection tools and practices to promote learning and enable better assessment of fieldwork-related learning outcomes. The project is iterative. The first iteration was conducted during autumn semester 2021 and the second iteration is scheduled to spring 2022. • Associate professor Lucas Jenø: Through the ArtsApp project, we are investigating the effectiveness of ArtsApp and technologies for increased motivation and learning. • Master students, associate professor Jorun Nylén, and postdoc Christian B Strømme: Two master students in the Integrated teacher programme in science and mathematics started their master projects on how students perceive relationships between key aspects of teaching and learning in BSc Biology core course constructive alignment. The students are supervised by Jorun Nylén and Christian Bianchi Strømme. • Postdoc Christian B Strømme: The new course evaluation survey questionnaire (see A13) was applied to core courses in BSc in biology with the purpose of assessing teaching and learning practices ahead of planned study programme changes (see A12). Along with information obtained through the master student-led projects described above, gathered data will inform ongoing educational development efforts described in A12. Further, surveys will be performed after the study programme changes to assess the impacts of those efforts. Taken together, the data will constitute the basis for the documentation for the ReDesign, including a manuscript intended for an international peer-reviewed journal. • Postdoc Christian B Strømme: Addressing how Open Science (OS) aspects are learned, understood and perpetuated among practitioners in ecology, we surveyed participants at the 2nd Living Norway Colloquium that was organized by the Living Norway Data Network in October 2020. The study was intended to inform higher education study programmes in ecology and related domains by highlighting how OS is mainly practiced by researchers in those fields, as well as what they view are the main incentives and barriers to individual engagement in OS. The study has employed a combination of qualitative and quantitative approaches from educational research and has yielded a manuscript currently under review in an international peer-reviewed journal (preprint: https://doi.org/10.1101/2021.10.12.464125). Further, results were presented at the 3rd Living Norway Colloquium in October 2021. • Professor Sehoya Cotner: see TBL A13, and appendix for publication list. <ul style="list-style-type: none"> ○ Assessment in STEM Higher Education in Norway, starting 2022 and involving bioBEES and one PhD fellow ○ Team-based learning in BIO 100, data analysis in 2022 ○ Sense of belonging in lower-level geosciences courses, a collaboration involving bioCEED (including PhD fellow Anja Jacobsen), iEarth's Mirjam Glessner (UiB and Lund U) and Maria Jensen (UNIS), and a visiting postdoctoral
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			<p>researcher, Sarah Hammarlund, from the US. This work will be based on Hammarlund and Cotner's prior work on belonging (currently in press at BioScience) in introductory-biology courses at the University of Minnesota.</p> <ul style="list-style-type: none">○ Equity and Inclusion in Introductory STEM. Cotner leads a growing network (Equity and Diversity in Undergraduate STEM, EDU-STEM) of over 20 institutions and participating faculty engaged in using data-driven methods to better understand barriers to equity in introductory STEM courses. Several publications, including in 2021, have resulted from this work. Cotner will be leading the 3rd annual meeting of the EDU-STEM network in July 2022.
		2022	<ul style="list-style-type: none">• Continue ongoing projects.• 2 NFR applications submitted. 1. Praxis, access, and assessment: Open science for better science education (PROBE) in collaboration with iEarth and CCSE (discussed above) and UiO and UiT. 2. Evidence-based mentoring: Impacts of mentor factors, mentoring practice and institutional context on student outcomes (IMPRINT) submitted by Eliassen and Cotner, in collaboration with Univ of Minnesota and the University of Nevada Las Vegas• New PhD project on assessment planned.
A17. Organize workshops on educational development at biological scientific conferences (HigherEd biologists)			
	Workshops arranged (>5)		
	Well attended (>50)		
	See overview under Outreach, Appendix and A8		
A18. Organize and contribute to workshops and research on innovative teaching (Teachers, students, HigherED in Norway)			
	Workshops in connection with Learning Forum, Teachers retreat, in addition to workshops on other institutions (14).		
	See overview under Outreach and in Appendix.		
A19. Research project on outcomes of student-active research and inquiry-based learning (Programmes, Institutions, HigherED)			
	Project developed and funded and successfully completed		
	See A16, publication list and outreach overview in Appendix, and projects FieldPASS , VuggetilGrad , (re)Design .		
A19. PhD project on impact of learning and assessment tools on student learning and motivation (HigherEd Internationally)			
	Research papers (>4)		
	Conference presentations (4)		
	Guidelines developed		
		PhD project Marius Ole Johansen: Motivation among students in higher education is of great importance as it is a central component of academic performance as well as personal health and well-being. As our understanding of motivation continues to evolve, research and practical implementations are necessary to help students reach their true potential. Utilizing Self-Determination Theory (SDT), our projects expand the frontiers of research on student motivation in higher education STEM courses through SDT based interventions and theoretical applications of the SDT tenets. This PhD project consists of a total of 3 studies; I) A cross sectional study to map student motivation in mandatory introductory calculus courses for all STEM students at the Faculty of Mathematics and Natural Sciences to investigate how various forms of motivation affect effort, engagement, vitality, and learning, II) An intervention based on SDT tenets aimed at investigating the effect of making digital assignments more relevant and less abstract for students, and III) A repeated measures design to study within-student variation during learning activities.	
		2021	1 paper for review, “Subject relevant exercises increase autonomous motivation and well-being”
		2022	Two manuscripts to be submitted early 2022

Table 3 Practical training

	Target	Progress	2021
A21. Revise and streamline the work and research practice courses, and work to ensure all students relevant practical experience as part of their BSc programmes (Biology educations, teachers, students)			
Old text: Revise and streamline the practice courses as a compulsory part of the disciplinary BSc programmes			
	Practice integrated in all programmes All students have had practice course or module		
		An important focus has been to mainstream practice courses into the formal structures and processes at our host institutions. We work to ensure students are exposed to a wide range of learning experiences; especially develop authentic learning experiences as courses (e.g. BIO299, BIO298, AB-208, AB-207) or as modules in courses. Student numbers in the practice courses are increasing, and number of modules in courses are also increasing.	
		2021	<ul style="list-style-type: none"> Research practice in biology (BIO299, 32 students 2021) have been redesigned based on student feedback and improving course ILO. ILOs now include training in outreach through blog and poster in addition to the research practice and report. Rubrics are developed to streamline the assessment and support the supervisors. BIO298 Workplace Practice (20 students in 2021) in biology has added workplace hosts, giving more students possibility for workplace practice. The student blogposts are part of the course ILOs. Internship course AB-208 together with research project in Arctic Biology AB-207 run as course package (30 ECTS) during spring 2021(5 students) with common seminars to increase learning outcomes and enhance synergy effect. The students blogpost for AB-208 are part of the course ILOs. In addition, AB-207 was re-run during summer 2021 with 3 students. Research internship students involved in collecting research data from the Thon funded field laboratory part of Bjørndalen Integrated Gradient (BIG).
		2022	<ul style="list-style-type: none"> Due to limited resources, the practice course AB-208 at UNIS will not be run in 2022. Develop toolkit cases and evaluation of practice courses.
A22. Develop and document ‘best practice of practice’ to enable transfer of experiences across disciplinary educations (Programmes, teachers, HigherEd)			
	A manual for ‘work placement for better learning in disciplinary educations’		
		The development and impact of the work practice courses have been documented through publications and shared in relevant foras.	
		2021	<ul style="list-style-type: none"> bioCEED and partners designed a project focused on supporting work practice hosts and students to improve learning outcomes of work practice. The proposal Develop was submitted to DIKU Arbejdslivrelevans call and was funded.
		2022	<ul style="list-style-type: none"> bioCEED received HK-dir Arbejdslivrelevans funding for «Developing evidence-based mentoring for better STEM work placements (DEVELOP)». DEVELOP is a 3-year program, involving collaborators from IMR, Norce, UiB, UiO, UiT, and two SFUs—iEarth and bioCEED. DEVELOP seeks the continued input of many work-placement hosts, in developing a series of on-line modules to assist in mentoring student workers. These modules will be based on a combination of theory, past program evaluation data, and in-depth assessment via student surveys and focus groups and host focus groups and interviews. DEVELOP will use a design-based implementation and research approach to

			ultimately distribute online modules that have undergone two rounds of testing and necessary revision. Distribution will occur through a multi-pronged approach that includes hosting webinars and sharing content via the SFUs, host institutions, and relevant professional societies. DEVELOP partners had their official kick-off meeting February 2022.
A23. Formalize network with partners in the private and public sector, staff, and students over work practice (Private sector, public sector)			
			Regular communication, useful inputs, systematic collaboration over work practice
		BIO298 and AB208 continue network with hosts and Work practice host network meeting (IMR)	
		2021	Develop was developed. See A22.
		2022	Develop will strengthen and expand network. See A22.
A24. Establish a panel of end-users, staff and students to advise on biology curriculum development to meet society's need			
			Refer to A22, 23, 25, and 26
			This action has been imagined through a variety of projects (e.g. Redesign-project, students as partners, host meetings) and purpose-built networks and connections. The redesign core team is established to redesign the BSc biology, and consists of teachers, pedagogues, students and staff, and includes cooperation with the UiB Learning Lab.
A25. Carry out bioCEED survey 2018 and 2022 (Programmes, teachers, students)			
			Surveys completed and published Papers on change over time in student, staff, and sector experiences
			BioCEED Survey conducted in 2018. Data used in research and dissemination.
		2021	<ul style="list-style-type: none"> The project "Paths to dropout" employed data from the bioCEED-2018 survey to investigate different motivational determinant that predicts students' achievement, well-being and dropout. Ongoing study with data from bioCEED surveys of 2015 & 2018 applying to investigate probabilistic relationships between perceived structural, social and psychological features that are predicted to affect relatedness, need satisfaction and perceived collaborative skills among biology students. Area for improvement: 2018 survey lack comprehensive report.
		2022	
A26. Research the impact of different forms of practice on staff and student attitudes, learning, and motivation (Teachers, students, HigherEd internationally)			
			Improved educational outcome PhD (1), MSc (1) theses Published papers (>4)
			The project PRIME (including the very excellent PhD Torstein Hole Nielsen) documented and researched the impact of practice (see publications).
		2021	We collect data from work and research practice for further documentation and research on practice (student experience and learning through evaluations, blogs etc).
		2022	Develop, see A22.

Focus area 4: Outreach

Dissemination and outreach are important not only to promote bioCEED outputs, but also as a key part of the idea behind bioCEED. Our communication and dissemination strategy is broad, both thematically and regarding its aims. The activities have different audiences and scopes, ranging from local communication with our staff and students regarding practical pedagogical issues, to national and international communication aiming more to affect educational policy and society more broadly.

Table 4 Outreach

	Target	Progress	2021
A27. Develop bioCEED communication platforms; web page, bioSKILLS, newsletter, etc. (Teachers, students, HigherEd)			
	Platform content develops (10% yr) Relevant reach locally and externally		
		2021	<ul style="list-style-type: none"> • Newsletter – read it! It's fun! • See appendix for Outreach.
		2022	<ul style="list-style-type: none"> • Develop toolkit cases for publication on web pages. See also Table 2 for platform development.
A28. Contribute to scientific literature, public debate, and policy development vs. quality teaching and learning in HigherEd (Policy, society, teachers, students, HigherEd)			
	Scientific papers (>5/year) opinion pieces (10/year) impacts on policy (1/year)		
		2021	<ul style="list-style-type: none"> • See appendix for publications, op-eds and quality/policy work contribution.
		2022	<ul style="list-style-type: none"> • Scientific publications (>5) • Opinion pieces (>5) • Impact on policy (1) • Conference presentations (>7)

Our outreach activities are summarized in Table 5 and Appendix 2.

Outreach summary			
Format	Previous **	2021 *	Reference
Scientific publications	28	8(11)	Cristin.no, bioCEED.no
Conference presentations/papers	64	6	Cristin.no
Other presentations	93	32	Cristin.no
Master theses		7	
Seminars, workshops, courses	>83**	26	Appendix, bioCEED.no
Media (op-eds, interviews, magazine articles, podcasts etc.)	37	6	Cristin.no, bioCEED.no, nokut.no
	18		SFU Magazine /HKdir newsletter
Platforms	10	18 (+8)	bioCEED.no
Student meetings/seminars biORAKEL, unisBREAKFAST	>75	>30	bioCEED.no
	>75		Mitt.uib.no, bioCEED.no

Table 5. Summary of dissemination output. */**as reported in CRISTIN/see annual reports 2014-2020

bioCEED Personnel 2021

Name	Function in bioCEED, position	Unit
Sehoya Cotner	Prof II (2016-2020) Centre director (2021-), professor	BIO, UiB
Stephen Coulson	Deputy Centre director (2021-), professor	AB, UNIS
Oddfrid Førland	Centre coordinator, PhD student	BIO, UiB
Jonathan Soulé	Senior engineer	BIO, UiB
Tina Dahl	Advisor, adm. and tech support	AB, UNIS
Christina Hess	Staff member, adm support	AB, UNIS
Kristin Holtermann	Project coordinator, administration	BIO, UiB
Roy Andersson	Associate professor II, academic developer	bioCEED
Lucas Jenø	Associate professor	PED,UiB
Gro van der Meeren	Core team member, senior scientist	IMR
Vigdis Vandvik	Core team member, professor, PI	BIO,UiB
Marius Ole Johansen	PhD candidate	bioCEED
Anja Møgelvang Jacobsen	PhD candidate	bioCEED
Christian Bianchi Strømme	Post doc	bioCEED
Sigrunn Eliassen	PI, associate professor (jan-june 2021)	BIO, UiB
Simone Lang	Core team member, associate professor	AB, UNIS
Pernille Bronken Eidesen	PI, Associate professor II	AB, UNIS
Gaute Velle	PI, researcher, Prof II	Norce /BIO, UiB
Jorun Nylén	Core team member, associate professor	BIO, UiB
Ragnhild Gya	Project leader bioSPIRE	BIO,UiB
Kseniia Kalian	Post doc	AB, UNIS
Timon Brüggemann	Department engineer	AB, UNIS
Simen Hjelle	Field and technical assistant Olav Thon Project	AB, UNIS
Student partners:		
Samira Terzenbach	Student representative	AB, UNIS
Marlena Wegner	Student representative	AB, UNIS
Mathilde Bryn Eikefjord	Student representative	AB, UNIS
Christina Hess	student representative	AB, UNIS
Ørjan Vabø	Student representative	BIO, UiB
Ingvild Straumøy	Student representative	BIO, UiB
Sondre Olai Spjeld	Student representative /bioBEE	BIO, UiB
Pernille Eyde Nerlie	Student representative /bioBEE	BIO,UiB and AB, UNIS
Jørund Johansen	Student research assistants (bioBEE)	BIO, UiB
Tonje Totland	Student research assistants (bioBEE)	BIO, UiB
Lars Martin Myhre	Student research assistants (bioBEE)	BIO, UiB
Ruben Schelbred Thormodsæter	Student research assistants (bioBEE)	BIO. UiB

Feedback from site visit 2021

You can read the feedback [here](#).

APPENDIX 2 Overview of dissemination and outreach activity

Many of these activities are further described in our [Newsletter](#) and [cristin.no](#) (project 468879).

The bioCEED community and beyond – seminars, workshops, courses

Table 6 bioCEED seminars 2021

bioCEED seminars 2021		
Topic	Speaker(s)	When and where
How to utilize and develop our Learning Arctic Biology platform	Pernille Bronken Eidesen, UNIS	8. Feb. 2021, UNIS/online
Team-based Learning	Pernille Bronken Eidesen, UNIS	1. Mar. 2021, UNIS/ online
Concept maps	Kseniia Kalian, UNIS	23. Mar. 2021, UNIS/online
Gamification in an educational context – experiences from an ecology course	Sigrunn Eliassen, BIO	13. Apr. 2021, UNIS/online
Project development seminar	bioCEED Bergen team	3-4 May, Bekkjarvik
HKdir Site Visit to bioCEED	bioCEED core team	6 Sept, Bergen/online
Tips and tricks on how to get your course to match your students	Aga Nowak, UNIS	15 Dec. 2021, UNIS/online
Cooperative Learning	Anja Møgelvang & Ståle Ellingsen	7. Oct. 2021, Dept. of Chemistry, UiB

Table 7 bioCEED Professional development activities 2021

BioCEED Professional development activities 2021		
Topic	Speaker(s)/Facilitator(s)	When and where
Academic writing workshop for PhD students	Simone Lang, UNIS	2020/21, UNIS
Introduction to teaching assistant course	Lucas Jenø, UiB	8. Jan. 2021g, BIO/online
Workshop: Engaging students during remote instruction	S. Cotner, S. Eliassen, V. Vandvik & UNIS teachers	28 Jan. 2021, BIO/online
Teacher's meeting @ BIO: mittuib/LMS	Ø. Fiksen, S. Eliassen, A. Bjune, BIO teachers	23. Feb. 2021, BIO/online
Teachers Assistant Course, module 1 and 2	L. Jenø, C.B. Strømme & D. Egelkraut	25.-26. Feb. 2021, BIO/online
Learning & Teaching course – PhD students	I. Nordmo, P.B. Eidesen, M. Jonasson, S. Lang, T. Bruggemann & T. Dahl	2.-4. Mar. 2021, UNIS
Research Practice in Biology, Supervisor meeting	V. Vandvik, D. Egelkraut, K. Holtermann	3. Mar. 2021, BIO/online
Workshop on digital teaching – how to engage students during remote instruction; experience from using Teams and Canvas; Whiteboard functions; menti & perusal.	S. Cotner (UiB), P-M. Lefevre (UNIS), R. Skogseth and L. Baddeley (UNIS), N. Partamies (UNIS)	16 Mar. 2021, UNIS/online

Team Based Learning for the 100 courses at BIO (workshop)	S. Eliassen	22. Mar. 2021, BIO/online
How to write a well-structured teaching portfolio, and follow-up course for applicants	R. Andersson (+A. Ahlberg/LU)	March-May 2021, University of Iceland/online
UPED601: Dokumentering og evaluering undervisningseffektivitet, UPED.	R. Andersson & O. Førland	vt2021/online
Workshop redesigning the BSc degree, learning outcomes and rubrics /redesign team and 100 club	S. Eliassen, K. Holtermann, C.B. Strømme, Redesign team, 100 club/BIO teachers	8. Jun. 2021, BIO , Bergen
Teacher's meeting @ BIO: What have we learned from the last semester	S. Eliassen, A. Bjune, K. Holtermann, BIO Teachers	17. Jun. 2021, BIO/online
Teacher Assistant course, module 1 and 2	L. Jenø, C.B. Strømme & D. Egelkraut	18 –19 Aug. 2021 BIO/Bergen
Learning Forum	P.B. Eidesen, S. Coulson, R.Andersson, S. Lang, C. Hess, K. Kallian, T. Bruggemann, S. Terzenbach, J. Soule, S. Cotner, L.M. Myhre, R.S. Thormodsæter, T. Dahl	5-7 Oct. 2021, UNIS, hybrid
Teachers meeting @ BIO: meet the UiB Læringslab	A- Bjune, K- Holtermann (arr) UiB Læringslab v/ M. S. Nerheim, GAV Lavik	28. Oct. 2021, BIO/online
Teachers meeting @ BIO: Teacher's lightning talks	BIO teachers, A. Bjune, S. Cotner, K. Holtermann (arr)	2. Des. 2021, BIO/online
Leading Educational Change – through SoTL (5 ECTS)	R. Andersson, S. Cotner, A. Ahlberg and T. Roxå, bioCEED/iEarth	Fall 2021- Spring 2022

Table 8 bioCEED student meetings and seminars 2021

bioCEED Student meetings & seminars 2021		
Topic	Who	When and where
biOrakel	Student oracles with waffles	Weekly, BIO/UiB/online
bioCEED seminar: Use of satellite in biology education	Stud representatives & PhD student Daniela Walch, AB	14 Apr. 2021, UNIS
UNISbreakfast	Stud representatives & Master student Sebastian Andersen, AB	19 Apr. 2021, UNIS
Student Poster Symposium	BIO teachers, BIO students, Jonathan Soule, Kristin Holtermann	19. May 2021, BIO/online
UNISbreakfast	Stud representatives & PhD student Cheshtaa Chitkara, AB	21. May 2021, UNIS
bioCEED seminar: Future job perspectives	Stud representatives & Norwegian Polar Institute	28. Sept. 2021, UNIS
Learning Forum – workshop for students 1. What can Escape rooms teach us about group work 2. Post or publication: How to write for the public - and reach out.	Sehoya Cotner & Ruben Thormodsæter Maria Rossi	5-6 Oct. 2021, UNIS
SCOPE – Student-led conference on Polar Environment	Christina Hess	15. Oct. 2021, UNIS
UNISbreakfast	Stud representatives, PhD student Robynne Nowicki, AB & PhD student Lotte van Hazendonk, AGF	9. Nov. 2021, UNIS

bioCEED seminar: Outreach - research communication to the public	Student representatives	17. Nov. 2021, UNIS
bioCEED seminar: Future job perspectives	Student representatives & UNIS	22. Nov. 2021, UNIS
Student Poster Symposium	BIO teachers, BIO students, Jonathan Soule, Kristin Holtermann	25. Nov. 2021, BIO, VilVite

bioCEED reaching out - conferences, events, meetings and seminars

Table 9 Presentations at scientific conferences (peer reviewed) 2021

Presentations at scientific conference (peer reviewed) 2021				
Title	Occasion	Contribution	Speaker	When and where
Conferences as a learning arena in a pedagogical course	MNT konferansen 2021	Paper presentation	Førland, O., Andersson, R.	15-16 March, online via UiA,
Er vi bedre på læringsaktiviteter enn på læringsutbyttebeskrivelser?	MNT konferansen 2021	Paper presentation	Holtermann, K. Gjerdevik, B. Rensvik, B.U. Balevik, S.B Stokka, T.	15-16 March, online via UiA,
En samtale om vurdering	MNT konferansen 2021	Panel debate	Contribution by Ø.Vabø. Led by T. Gjesteland (Matric)	15-16 March, online via UiA,
Virtuelle feltguider bygger bro mellom teori og praksis	Læringsfestivalen	Paper presentation	Eidesen, B. P., Hjelle, S.	10. May 2021, online
Embedding skills into education	Evolving molecular bioscience education	Talk	Eidesen, B. P.	27. May 2021, online
Pandemi-undervisning fra studentenes perspektiv	Læringsfestivalen	Talk/panel	Vabø, Ø.	11. May 2021, online

Table 10 Presentations at seminars, workshops, conferences, etc 2021

Presentations at seminars, workshops, conferences, etc. 2021				
Title	Occasion	Contribution	Speaker	When and where
STEM Course-level Interventions for Equity	AAU Undergraduate STEM Education Initiative	Workshop presentation	S. Cotner	Jan 2021, online
Sjølevaluering – a rough guide	<i>Veiledningswebinar om selvevaluering i NOKUTs evaluering av lektorutdanningene</i>	Talk	V. Vandvik	17. Feb. 2021, Oslo
Assessing Constructive Alignment in Norwegian Higher Education: A pilot study using CALEQ	Teled Monthly research series	Talk	J. Nylén, A. Raaheim & C.B. Strømme	23. Feb. 2021
Studentaktiv forskning og overførbare ferdigheter i redesign av biologiutdanningen – når studenter er med å utvikle	Prosjektdager for Dikus kvalitetsprogrammer	Invited Talk	K. Holtermann	21. Apr 2021, online

A study of the first «ETP» teachers in Norway	Teled research seminar	Talk	O. Førland	28 May, online
Embedding skills into education	Underverk, UiO - seminar	Talk	P.B. Eidesen	11. June 2021, online
Teaching Assistants' Development as Culturally Responsive Science Educators. July 2021.	Society for the Advancement of Biology Education (SABER) 2021 Virtual Conference	Presentation	S. Cotner	July 2021, Online
Using a social belonging intervention to examine biology teaching assistants' understanding of student concerns.	SABER 2021 Virtual Conference	Presentation	S. Cotner	July 2021, Online
Instructor reasoning behind assessment strategy changes during a pandemic	SABER 2021 Virtual Conference	Presentation	S. Cotner	July 2021, Online
Meta-analysis of gender performance gaps in undergraduate natural science courses	SABER 2021 Virtual Conference	Presentation	S. Cotner	July 2021, Online
Envisioning more equitable STEM education	ASERT-IRACDA Education Retreat	Presentation	S. Cotner	July 2021
Merit Systems for Excellence in Teaching: Where are we and where are we going?	Teled Monthly research series	Panel	O. Førland, A. Raaheim, J. Ubøe & P.B Eidesen	14 Sept. 2021, Bergen/online
Student Peer Assessment Workshop	Learning Forum UNIS	Workshop	R. Andersson	5. Oct. 2021, Longyearbyen, Norway
How to introduce reflective writing in courses that have fieldwork as one of their learning activities	Learning Forum UNIS	Workshop	K. Kallian	5. Oct. 2021, Longyearbyen, Norway
Creating 360° Virtual Field Guides to improve field learning	Learning Forum UNIS	Sharing session and Poster	P.B. Eidesen & S. Hjelle	6. Oct. 2021, Longyearbyen, Norway
What can escape rooms teach us about group work and student engagement?	Learning Forum UNIS	Sharing session, Workshop and Poster	S. Cotner, R. S. Thormodsæter & J. Soule	6. Oct. 2021, Longyearbyen, Norway
SCOPE	Learning Forum UNIS	Poster	C. Hess	6. Oct. 2021, Longyearbyen, Norway
bioSTATS	Learning Forum UNIS	Poster	J. Soule	6. Oct. 2021, Longyearbyen, Norway
bioWRITE	Learning Forum UNIS	Poster	J. Soule	6. Oct. 2021, Longyearbyen, Norway
Fieldwork, Reflection, Visualization	Learning Forum UNIS	Poster	K. Kallian	6. Oct. 2021, Longyearbyen, Norway
bioRAKEL	Learning Forum UNIS	Poster	L.M. Myhre	6. Oct. 2021, Longyearbyen, Norway

UNISprout	Learning Forum UNIS	Poster	S. Terzenbach	6. Oct. 2021, Longyearbyen, Norway
Hvordan bruke studentevalueringer av undervisning?	Kompetanseutvikling for erfarne studie-konsulenter UiB, modul 5 – kvalitet i utdanningen	Invited talk	K.Holtermann	22. Oct. 2021, UiB, Bergen
Attitudes to open science in higher education	Living Norway Colloquium 2021	Talk	C.B. Strømme	25-26 Oct. 2021, Trondheim
Åpent informasjonsmøte om ny SFU-utlysning	Informasjonsmøte, UiB Læringslab	Invited talk	S. Cotner, S. Eliassen and others	1. Nov. 2021, UiB/online
Theory of change – veikart for endring	SFU Network seminar	Invited workshop	O. Førland, B. Krogstien (Excited)	11 Nov. 2021, Oslo
Discipline-based Education Research	SFU Network seminar	Invited workshop	S. Cotner	11 Nov. 2021, Oslo
Hvordan får man til studentpartnerskap i utdanning?	<i>Podcast: Kvalitetstid</i>	Panel	H. Skålevik, Ø. K. Kvalø and P.E. Nerlie	18. Nov. 2021, online
Next-generation field courses: can open science and digital tools help maximize the potential of field-based learning?	AMB Education Day	Talk	S. Cotner	Nov., 2021 UiT, Tromsø
Envisioning more equitable STEM education.	Estonian University of Life Sciences (Tartu) Mini-Symposium	Talk	S.Cotner	Dec., 2021, Tartu, Estonia
Maximizing student learning with Open-Source, Course-Based Research Experiences (OSCREs)	CCSE Christmas Seminar, University of Oslo:	Talk	S. Cotner	Dec, 2021, Oslo
Hvorfor vil undervisere bli merittert?	Studiekvalitetsseminaret UiB	Talk	O. Førland	26. Jan. 2022, Bergen

bioCEED publications 2021

*Barron, H., Brown, J., and Cotner, S. "The Culturally Responsive Science Teaching Practices of Undergraduate Biology Teaching Assistants." *J Res Sci Teach.* 2021;1–39. DOI: 10.1002/tea.21711

Chacón-Labela J, Boakye M, Enquist BJ, Farfan-Rios W, Gya R, Halbritter AH, Middleton SH, von Oppen J, Pastor-Ploskonka S, Strydom T, **Vandvik V**, and Geange S. 2021. From a crisis to an opportunity: Eight insights for doing science in the Covid-19 era and beyond. *Ecology and Evolution* 11:3588–3596. <https://doi.org/10.1002/ece3.7026>

Geange S, von Oppen J, Strydom T, Boakye M, Gauthier T-L, Gya R, Halbritter A, Jessup L, Middleton S, Navarro J, Pierfederici ME, Chacon-Labela J, Cotner S, Farfan-Rios W, Maitner B, Michaletz S, Telford RJ, Enquist BJ, & **Vandvik V**. 2021. Next generation field courses: integrating Open Science and online learning. *Ecology and Evolution* 11:3577–3587. <https://doi.org/10.1002/ece3.7009>

*Gonsar, N., Patrick, L., & Cotner, S. (2021). Graduate-and undergraduate-student perceptions of and preferences for teaching practices in STEM classrooms. *Disciplinary and Interdisciplinary Science Education Research*, 3(1), 1-17.

- Gya, R., & Bjune, A. E. (2021). Taking practical learning in STEM education home: Examples from do-it-yourself experiments in plant biology. *Ecology and Evolution*, 11, 8, 3481-3487. DOI: 10.1002/ece3.7207
- Hebert S, Blum J, Wassenberg D, Marks D, Barry K, Cotner S. 2021. Open inquiry versus broadly relevant short-term research experiences for non-biology majors†. *J. Microbiol. Biol. Educ.* 22(1): doi:10.1128/jmbe.v22i1.2167
- Lucas M. Jenö, Jorun Nylehn, Torstein N. Hole, Arild Raaheim, Gaute Velle & Vigdis Vandvik (2021): Motivational Determinants of Students' Academic Functioning: The Role of Autonomy-support, Autonomous Motivation, and Perceived Competence, *Scandinavian Journal of Educational Research*, DOI: 10.1080/00313831.2021.1990125
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- *Salehi, S., Berk, S. A., Brunelli, R., Cotner, S., Creech, C., Drake, A. G., ... & Ballen, C. J. (2021). Context Matters: Social Psychological Factors That Underlie Academic Performance across Seven Institutions. *CBE—Life Sciences Education*, 20(4), ar68.
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*Cotner research prior to bioCEED director position

In revision:

Strømme, Christian B., A. Kelly Lane, Aud H. Halbritter, Elizabeth Law, Chloe R. Nater, Erlend B. Nilsen, Grace D. Boutouli, Dagmar D. Egelkraut, Richard J. Telford, Vigdis Vandvik, Sehoya H. Cotner. In revision at plosone. Applying And Promoting Open Science In Ecology - Surveyed Drivers And Challenges

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- Førland, O. & Andersson, R. (2021, March 15-16). Conferences as a learning arena in a pedagogical course. *Nordic Journal of STEM Education MNT konferansen 2021, Volume 5 No. 1*. DOI: <https://doi.org/10.5324/njsteme.v5i1.3930>
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Research on/in bioCEED – Master theses

Schei, Odin Monrad (2021): «Det er kanskje sånn vi alltid har vært på universitetet.» En kvalitativ studie av pedagogiske endringsarbeid i to akademiske fagmiljøer, Masteroppgave i pedagogikk PED-3900, mai 2021. Permanent link: <https://hdl.handle.net/10037/22410>

Orvik, Emilie Humborstad (2021): «Tegning som læringsstrategi blant biologistudenter. En kvantitativ pilotstudie av studenters syn på og bruk av tegning som læringsstrategi i biologi». Masteroppgave i biologididaktikk, BIO399K. Permanent link: <https://bora.uib.no/bora-xmlui/handle/11250/2768644>

Guthu, Hanna (2021): «Meningsskapende samsvar i biologiundervisningen. En kvantitativ pilotstudie av biologistudenters oppfatninger av meningsskapende samsvar og tilnærming til læring i to emner ved UiB». Masteroppgave i biologididaktikk, BIO399K. (Fant den ikke på nett.)

Langedal, Helene (2021): «Læreboka si rolle i evolusjonsundervisninga. Ein kvalitativ studie av lærarar sin bruk av læreboka, og om dei vurderar ho kritisk». Masteroppgave i biologididaktikk, BIO399K. Permanent link: <https://bora.uib.no/bora-xmlui/handle/11250/2761417>

Espedal, Mathias Hansson (2021): «Knagger og krydder. En kvalitativ intervjustudie av biologilæreres syn på evolusjon som sammenbindende faktor i biologiundervisningen». Masteroppgave i biologididaktikk, BIO399K. Permanent link: <https://bora.uib.no/bora-xmlui/handle/11250/2761436>

Skagseth, Viljar Hauso (2021): «Mindset» og personlighet blant biologistudenter. En kvantitativ studie av «mindset» for intelligens og personlighetstrekk fra femfaktormodellen blant biologistudenter ved UiB. Masteroppgave i biologididaktikk, BIO399K. Permanent link: <https://bora.uib.no/bora-xmlui/handle/11250/2736966>

Eide, Elise Bromstad og Bakken, Hanna Olin (2021): «Samarbeidslæring og mestringsforventning hos biologistudenter. En kvantitativ undersøkelse av samarbeidslæring, akademisk selvopplevd mestringsforventning og deres sammenheng». Masteroppgave i biologididaktikk, BIO399K.

bioCEED online and in the media

See also our [web archive](#) for press.

- **Monthly bioCEED Newsletter:** <http://bioceednews.w.uib.no/>
- **bioCEED Web pages:** <http://bioceed.w.uib.no/>
- **bioCEED Web page UNIS:** <https://research.unis.no/bioceed/>
- **Twitter:** @sfubioceed @VVandvik @OysteinVarpe @lucas_jeno @Frueidesen @bioCEED_JS @oddfriidforland @sehayacotner @laffustotalus @Ruben_ST
- **Facebook:** <https://www.facebook.com/bioceed/>
- **Facebook UNIS:** <https://www.facebook.com/bioceedUNIS>
- **Instagram:** sfubioceed
- **About bioCEED:**
 - [Fieldwork without getting cold feet - UNIS](#)
 - [SCOPE 2021: First student-led conference at UNIS - UNIS](#)
- **Kvalitetstid – en podkast fra Diku**
 - [Er kulturendring en forutsetning for å kunne jobbe med innovasjon i utdanning?](#)
Intervju med Vigdis Vandvik (bioCEED) og Jon Helge Sætre (CEMPE)

- [Hvordan får man til studentpartnerskap i utdanning?](#)
Intervju med Pernille Eyde Nerlie (bioCEED) og Øystein Kvalø (CELL)
- **Op -eds 2021**
 - [Kjenner studentene konsekvensene med to sensorer? Christian Jørgensen, Khrono, 26 april 2021.](#)
 - [To sensorer på eksamen vil være et skuffende tilbakeslag for høyere utdanning i Norge. Sehoya Cotner, Forskersonen.no, 7. mai 2021](#)
 - [To sensorer er visst svaret – men hva er spørsmålet? Vigdis Vandvik, Khrono, 10. mai 2021.](#)
- **Hearings**
 - [Skriftlig innspill til forslag om endringer i UH-loven - fra CELL på vegne av ledere av fem Sentre for framragende utdanning \(SFU-er\)](#)
- **Contribution to quality development in higher education**
 - Kristin Holtermann contributed to the development of the new course module on quality in education for study administration at University of Bergen; KUSK – Modul 5 Kvalitet i utdanning, UiB
 - Sehoya Cotner contributes to the GenderAct -project at MN-fak, UiB
 - BioCEED staff (Sehoya) contributed to external reviews of three SFU proposals from HVL.
 - Roy Andersson on the MNT conference review committee
 - Sehoya Cotner is Associate Editor with the Nordic Journal of STEM Education
 - Sehoya Cotner is Associate Editor with CBE-Life Sciences Education
 - Sehoya Cotner is Associate Editor with Ecology and Evolution
 - Christian Bianchi Strømme, Jorun Nyléhn and Lucas Jenö developed an information sheet on student course evaluations that was intended for educational leaders and sent to MN Faculty Vice Dead for Education Sigrunn Eliassen
 - Stephen Coulson leader of ECom – the Educational Committee at UNIS and Tina Dahl as bioCEED representative
 - Stephen Coulson and Tina Dahl leading/members of new student learning spaces at UNIS working group
 - Tina Dahl member of working group with PhD Duty work at UNIS

bioCEED platforms

- **BiKUBEN:** <https://bikuben.w.uib.no/nb/>
- **bioST@TS :** <https://biostats.w.uib.no/>
- **bioPRACTICE student blogs:** <https://biopraksis.w.uib.no>
- **bioPITCH:** <https://biopitch.w.uib.no/>
- **BioWRITE:** <https://biowrite.w.uib.no/>
- **BioSKRIV:** <https://bioskriv.w.uib.no/>
- **Learning Arctic biology:** <https://www.learningarcticbiology.info/>

- Virtual field guides, Svalbard: <https://360.learningarcticbiology.info/>
- FieldPass: <https://research.unis.no/fieldpass/>
- Bjørndalen Integrated Gradient (BIG): <https://research.unis.no/big/unis.no>
- Internship students blogs from the AB-208 course: <https://blog.learningarcticbiology.info/>
- Teach2Learn: <https://teach2learn.w.uib.no/>
- ArtsAPP: <https://artsapp.uib.no/> and Identify arctic plants with your phone: <https://www.youtube.com/watch?v=i1IPoDaZrvo>
- Larvae Knowledge Incubator: <https://lki.w.uib.no/> , project leader Ivar Rønnestad.
- CodeRclub: <https://coderclub.w.uib.no/>
- Biorakel: <https://biorakel.w.uib.no/>
- Biospire: <https://biospire.w.uib.no/>
- UNISprout: <https://unisprout.w.uib.no/>
- UNISbreakfast: <https://unisbreakfast.w.uib.no/>

Awards

Awards 2021		
Who	Title	From
Sigrunn Eliassen	Excellent Teaching Practitioner	MN Faculty UiB
Sigrunn Eliassen	Excellent teaching prize (2021)	Olav Thon Foundation
Vigdis Vandvik	Dissemination Prize	MN Faculty UiB
Vigdis Vandvik	Excellent teaching prize (2022)	Olav Thon Foundation

Appendix 3 - Accounting 2021 and budget 2022-2023

bioCEED finansieres gjennom årleg tildeling fra DIKU. Årleg tildeling er på 4 MNOK, i tillegg til eit akkumulert overskudd fra første senterperiode (2014-19) på totalt 1 852 000 er fordelt på åra gjenværende senterperiode.

Tildelinga er i all hovudsak brukt på personell (senterleder 40%, nestleder 20%, teknisk og administrativ støtte i Bergen og Svalbard). I 2020-21 har pandemien ført til at mange av de mer kostbare aktivitetane (reising, kurs og konferansar, arrangement) ikkje har vore muleg å gjennomføre. Dette gjeld og ein del av utviklingsprosjektene som har støtte gjennom bioCEED.

Regnskap 2020 og budsjett 2021-2023

SUMMARY DIKU FUNDING						
	Forbruk	Budsjett		Budsjett	Budsjett	
	2 021	2 021	Avvik	2 022	2 023	Totalt
Personnel	2 683 387	3 024 402	-341 015	3 308 091	3 289 962	13 948 446
Partnermidler UNIS	760 000	760 000	0	760 000	760 000	4 331 000
Drift	145 394	153 076	-7 682	158 236	173 663	625 282
Utvikling	157 729	568 821	-411 092	737 183	740 537	1 919 186
Outreach	131 095	104 030	27 065	104 030	99 030	496 789
Total	3 877 606	4 610 329	-732 724	5 067 540	5 063 192	21 853 427
ACTIVITY BUDGET DIKU FUNDING						
	Forbruk	Budsjett		Budsjett	Budsjett	
	Forbruk 2021	2 021	Avvik	2 022	2 023	Totalt Budsjett
Senterdrift	145 394	153 076	7 682	158 236	173 663	625 282
Lærarkultur	105 940	231 755	125 815	400 117	237 108	1 190 359
Utv.prosjekter - inn. teaching	51 789	310 400	258 611	310 400	476 761	1 008 217
Practical training		26 666	26 666	26 666	26 668	53 334
Outreach	131 095	104 030	-27 065	104 030	99 030	496 788
UNIS -partnermidler	760 000	760 000	0	760 000	760 000	4 331 000
Senterleder - frikjøp	756 314	835 637	79 323	880 426	838 381	3 860 486
Senteradmin	535 625	594 904	59 279	612 381	612 382	2 837 999
Prof. II Andersson	293 437	306 875	13 438	316 875	328 729	1 287 535
Prof. II Cotner/frikjøp	0	151 380	151 380	361 380	367 636	899 106
Tekniker - frikjøp	521 510	533 889	12 379	520 494	520 297	2 582 016
Dlv.lønn 50% Holterman	490 831	529 420	38 589	544 238	550 238	2 417 931
Timelønn	85 670	72 297	-13 373	72 297	72 299	263 373
Totalt budsjett	3 877 606	4 610 329	732 724	5 067 540	5 063 192	21 853 427

Etter at rekneskapen ble avslutta for 2021 har bioCEED et overskudd på 732 724 NOK, i tillegg til et overskudd av partnermidler ved UNIS (per nov 2021) på 330 000 NOK. I aktivitetsregnskap viser vi at en betydlig andel av overskotet er på aktivitetane Lærarkultur og Utviklingsprosjekt / Innovative teaching (pga mangland gjennomføring av aktiviteter). I tillegg har vi en ufyllt prof II-stilling (tidl Cotner), som videre blir omprioritert til kortere engasjement.

Overskotet frå 2021 er fordelt på 2022 og 2023, men ei auke av allokering til Personal for å evt kunne skalere opp aktivitet for å ta igjen forsinkelse etter Covid. Prof II Andersson blir vidareført, medan den andre prof II-stillinga blir omgjort til frikjøpsmidlar for relevante forskarar/utviklararar som kan bidra inn mot pågåande prosjekt. Dersom bioCEED søker utvida prosjektperiode vil vi re-budsjettere for å inkludere evt. forlengingsperiode.

bioCEEDs partnere bidrar i tillegg med en betydelig egenandel i form av stillingsressurser (se partner personall ressurser i Tabell 2):

- BIO: 50% administrativ stilling, utviklings- og forskningstid vitenskapelig stab
- MN Fak/UiB: to stipendiatstillinger
- AB UNIS: 60% administrativ stilling, øvrig støttestab
- Havforskningsinstituttet: inntil 100 t (a 1400 NOK)
- PED UiB: 20% vitenskapelig stilling

I tillegg bidrar vertsinstitusjonen UiB med forsterkingsmidlar (årleg toppfinansiering fra UiB som i 2021 utgjorde ca 600 KNOK). Forsterkingssmidler fra UiB blir primært brukt til driftsmidler til 3 PhDar, samt personell (50% undervisningstekniker til BIO, samt timelønn, drift og administrativ prosjektstøtte).

SUMMARY INKIND FUNDING						
Partner personell resources	2 021			2 022	2 023	Totalt 2019-2023
Personnel BIO	6 264 604			6 452 542	6 646 118	31 350 394
Personnel MN/UiB	2 055 638			2 117 307	2 180 826	10 287 172
Personnel AB UNIS	1 271 118			1 304 391	1 338 663	6 360 436
Personnel IMR	140 000			140 000	140 000	700 000
Personnel PED	306 510			315 705	325 176	1 533 888
Totalt	10 037 870			10 329 945	10 630 783	50 231 890
Toppfinansiering UiB	547 483	606 000	58 517	706000*	606000*	3093664*
* avhenger av bevilgning og evt justering.						

bioCEED-partnerne innhenter i tillegg betydelige midler gjennom ekstern prosjektfinansiering. Mange av disse prosjektene støtter direkte opp under bioCEEDs prosjekter og mål, andre er tilstøtende aktiviteter (se oversikt over tilknyttede eksterntfinansierte prosjekter).

Appendix 4 Externally funded bioCEED - projects

A full list of project with and funding with bioCEED involvement can be found in the table at the end of this section. In the paragraphs below we give an overview of the projects tightly linked and integrated in bioCEED activities and core team.

Online learning platform for Arctic Biology

Granted by	Project period	Funding	PI/Main partner
Svalbard Environmental Fund	2018-2020	140 KNOK	PB Eidesen (UNIS)

The funding period for the online learning platform [Learning Arctic Biology](https://360.learningarcticbiology.info/) at UNIS ended in 2020 with a final report summarizing the project. However, the platform has been further developed in 2021, and a former PhD student have been engaged as editor to prepare new material, and extra technical support from bioCEED has been allocated to aid publication. In cooperation with the FieldPass project, a set of Virtual Field Guides (VFGs) have also in 2021 been added to the learning platform (<https://360.learningarcticbiology.info/>) and a "How to» guide regarding how to make the VFGs is submitted to the Norwegian SoTL channel "Læring om læring". The Learning Arctic Biology platform have been introduced as part of the curriculum in different courses at UNIS.

FieldPass- "Development, testing and evaluation of tools and assessment forms that promote constructive alignment in field teaching"

Granted by	Project period	Funding	PI/Main partner
DIKU Aktiv læring	2019-2023	4800 KNOK	PB. Eidesen (UNIS)

The project [FieldPass](#) at UNIS aim to develop and test alternative ways of assessment suitable for assessing/evaluating knowledge, practical skills or general competences achieved through field and lab work. In partnership with UiB and UiO, we will test arena innovative field and lab preparations and assessment of learning in the field and in the lab. We have identified three development areas we will focus on in this project 1) digital tools for preparation and assessment, 2) certification as assessment of practical skills, and 3) reflection combined with concept maps as assessment tool. The project was put on hold through 2020 due to Covid-19 and will end in early 2023. The cancelling of courses and restricted number of people that could attend field activities forced the project to find other ways of testing tools for e.g., certification where ways of doing certification in the lab have been tested rather than in the field. Digital tools (like virtual field guides and instructional videos) are developed, but the testing of these tools has been less extensive or different from initially planned. Reflective tools to be used for evaluating students' reflections during fieldwork have been developed and tested. [A project homepage](#) is created to enhance the sharing of tools developed.

ArtsApp: How technology impacts motivation and interest for learning species

Granted by	Project period	Funding	PI/Main partner
NFR, Finnud	2018-2022	5900 KNOK	J.A. Grytnes (BIO) and Lucas Jenø (IPED)

ArtsAPP develops an interactive app for species identification. ArtsApp is an educational research and development financed by the Norwegian Research Council. The overarching goal is to optimize ArtsApp and enhance students' motivation and learning for species identification. ArtsAPP have published the results from an experimental study we conducted with colleagues from the University

of Stavanger. This [study](#) was published in Computers & Education. Another study is in press, in which we investigate if user interface and different functionalities in different learning tools have an impact on students' engagement, wellness, and learning. This study will be published in Frontiers of Psychology soon. Currently, we are working on implementing different functionalities based on a qualitative study we did with students. We conducted focus group interview with bachelor and master students and received a lot of useful information about ArtsApp and how to improve the app both for motivational and learning purposes. This study is under review and we are aiming at publishing during the spring. Read more about the ArtsApp project [here](#).

Artsapp for Svalbards flora

Granted by	Project period	Funding	PI/Main partner
Svalbard Environmental Fund	2019-2022	200 KNOK	PB Eidesen (UNIS)

The first full version of Artsapp for Svalbard was launched in June 2020, covering all vascular plants in Svalbard except graminoids. The current version is available in English. A Norwegian translation was developed and launched in spring 2021. During spring and summer 2021 the key was tested out and introduced as a tool within terrestrial courses at UNIS. A PhD student together with course students at UNIS have developed the graminoid key through 2021 and will finalize this during spring 2022. Enjoy a small advertisement of the [flora in Svalbard](#), [the app](#), and [an intro to how to use it](#).

REdesign- Student active research and transferable skills in redesign of the biology education

Granted by	Project period	Funding	PI/Main partner
DIKU Aktiv læring	2019-2022	4500 KNOK	S. Eliassen /S.Cotner (bioCEED/BIO)

The project is a partnership with BIO and UiB Læringslab. Following a 8-step [model](#) for study programme redesign, the project is currently redesigning the BSc Biology UiB, while also adapting the model to Norwegian higher education context. A core team of BIO teachers, students, postdoc, coordinator, didactics expert and UiB learning lab runs the project. The core team has conducted workshops on developing intended learning outcomes and has also involved faculty through digital meetings. The project reports to the Programme board at BIO. Through a process of backwards planning, the intended learning outcomes form the basis for learning rubrics for the program. The project focus on developing generic skills in teaching and learning, as well as alignment throughout the program. bioWRITE, TA course, poster sessions and the 100club are examples of activities and innovations in this project (see above). Students are highly involved in the project, both in the core team, and as student research technicians (bioBEES). See above text for 2021-activities and 2022-plans.

Cross disciplinary high arctic field Laboratory for research and teaching

Granted by	Project period	Funding	PI
Thon Stiftelsen	2019-2021	1350 KNOK	P.B. Eidesen (UNIS)

In 2019, the AB Department at UNIS got a funding from Thon to support the development of a Field Laboratory in Bjørndalen. The Field Lab is as a part of the departmental project [BIG \(Bjørndalen Integrated Gradient\)](#) close to Longyearbyen for education and research. In BIG, AB is combining resources to study and link systems from the marine realm, through the coastal zone and onto land. In 2021, the Field Lab provided a research arena for students admitted to the practical course AB-207 Research Project in Arctic Biology (15 ECTS) as well as for research internship students working at the site during summer 2021 collecting data and setting up instrumentation. The Field Lab efficiently links field activities in different courses across seasons.

Vugge til Grad – student active research

Granted by	Project period	Funding	PI
Thon Stiftelsen	2019-2022	1500 KNOK	V.Vandvik, O.Førland, R.Gya

This project explore how exposure to, and practical experience with participating in, science and the scientific process can support student learning and motivation. Through several of our development projects (bioSPIRE, course-based research practice at the BSc, MSc, and PhD level) we explore different approaches to student-active research, and we assess the impact of these approaches on student learning outcomes and motivation. The different development projects complement each other in that they meet the student at different levels, put different demands on the students, set up diverse forms of collaboration between students and between students and supervisors/mentors, and thus they also provide diverse learning outcomes. For example, in bioSPIRE (student-led initiative; see above), BSc students can get research experience by assisting MSc or PhD students in the field or lab. In our research practice course (BIO299, BIO), students get to do a small research project under supervision of a staff member, and here bioCEED is developing group activities and discourse to support professional development and awareness in the students. In [higher-level courses](#), planning, data management and publishing is increasingly included.

RECITE - Research and Education Partnership in Climate Change Impacts on Terrestrial Ecosystems

Granted by	Project period	Funding	PI
NFR NTPART	2018-2022	5787 KNOK	V.Vandvik, with S.Cotner, A.Halbritter and others

RECITE develops and studies student-active research experiences through international student exchange for internships, and international research-based field courses. A focus of RECITE has been to expose students to the full reality of ‘real’ research, including a focus on reproducibility throughout planning, conducting, and managing data from research projects. RECITE supports the courses (and to some extent internships) with a string online scaffolding, which proved an added value supporting student learning, course and project sense of community, and inclusion and sharing of knowledge during the pandemic and associated shutdowns. This has inspired greater attention to the potential added value of open and reproducible science practices in our team, which again inspired the MORE proposal to allow us to develop and document these issues further. The international internship experiences were shifted to local internships and remote internships during the pandemic.

ExperTS: Experiments, Traits, Synthesis: Using knowledge from global ecological experiments to validate, assess, and improve trait-based theory

Granted by	Project period	Funding	PI
NFR IntPart	2019-2023	5906 KNOK	V.Vandvik, with S.Cotner, A.Halbritter and others

ExperTS is a follow-up project from RECITE, focusing more on integration of ecological theory and synthesis with field-based and reproducible research experiences.

MOVUL – Mobilbasert vurdering som læring

Granted by	Project period	Funding	PI
DIKU Dig	2020-2021	550 KNOK	L.M. Jenø

Associate professor Lucas Jenø (UPED) and professor John-Arvid Grytnes (BIO) received funding for the project “MOVUL: MOBilbasert VURdering som Læring”. MOVUL aims at developing a digital portfolio used for formative assessment for biology student in the BIO102 course. The project is a collaboration between University Pedagogy (UiB), BIO (UiB), and bioCEED (UiB).

NJSTEME workshop: From Practice to publication

Granted by	Project period	Funding	PI
UHR-MNT	2022-2023	250 KNOK	S. Cotner (bioCEED), T. Gjesteland (Matric)

The editors of the Nordic Journal of STEM Education will host a two-day in-person workshop (March 7 and 8, 2022, Oslo) to guide authors in developing a manuscript for NJSTEME. The workshop will consist of two consecutive days of in-person activities and a follow-up meeting for each participant or team with one of the facilitators. During this professionally facilitated workshop, we will analyze and discuss previously published articles from the journal and work with writing and reviewing guides to help participants better understand how to write for this journal. To accommodate a diverse group of participants, the workshop will be conducted in English. At the end of the workshop, participants will be prepared to serve as authors for NJSTEME, enhancing dissemination of research on STEM teaching and learning in Nordic countries. Furthermore, additional deliverables (a Canvas course based on the workshop materials, an initial webinar to introduce the course), coupled with these 20 new “journal ambassadors” will help grow the writing and reviewing population of the journal, helping to ensure its future and expanded reach.

Leading Educational Change

Granted by	Project period	Funding	PI
UHR-MNT	2022-2023	160 KNOK	R. Andersson (bioCEED)

The new course, *Leading Educational Change* – through SoTL is a pilot initiative involving two Centres for Excellence in STEM Education (see above). This course is **innovative** along multiple dimensions. The course involves academic-change leaders from several institutions **across Norway**, representing a collaboration between bioCEED and iEarth, and is led by bioCEED and iEarth faculty from UiB and Lund University in Sweden. We accepted 19 course participants from 4 institutions. Today (February 16, 2022) we have the third course meeting in Oslo with all participants present. The first meeting took place in Bergen in late October, with the second meeting distributed online in November/December due to the covid-situation. The fourth and final meeting is scheduled for UNIS April 20, for which we already have booked travel and lodging to all participants.

Team-based learning

Granted by	Project period	Funding	PI
UHR-MNT	2022-2023	93,5 KNOK	A. Bjune (BIO)

A digital workshop was held in Dec 2021 with the theme *What is Team Based Learning (TBL) and how to do it (in your course)* for 10 participants that teach the BIO101 Organismal biology spring 2022. In Jan 2022 a face-to-face meeting was held to discuss and organize student activities in an active learning room, using *BIO101 as case* where all participants had prepared i) a question/case with 4 alternative answers to be solved in groups. The topic was connected to the teaching topic for that teacher, ii) a short description of the topic/module the question/case belong in. Both workshops had teachers, TAs and study admin participants. This project has hired a student partner to develop TBL in BIO101 spring 2022, and will share results nationally.

Developing evidence-based mentoring for better STEM work placements (DEVELOP)

Granted by	Project period	Funding	PI
HKDir- ARbeidslivsrelevans	2022-2024	4 700 KNOK	S. Cotner (bioCEED)

DEVELOP is a three-year project, involving collaborators from the Institute of Marine Research, NORCE, the University of Bergen, the University of Oslo, the University of Tromsø, and two Centres

for Excellence in Education—iEarth and bioCEED. The project will be coordinated by bioCEED and led by centre director Sehoya Cotner. DEVELOP will focus on the work placement hosts, with the objective to increase the (learning) outcome for students, hosts and higher education institutions during work placements. DEVELOP seeks the continued input of many work-placement supervisors, in developing a series of on-line modules to assist in mentoring student workers. These modules will be based on a combination of theory, past program evaluation data, and in-depth assessment via student focus groups and host interviews.

New proposals

bioCEED core team member submitted 4 proposals in 2021/2022 currently under revision:

- Praxis, access, and assessment: Open science for better science education (PROBE), Sehoya Cotner in collaboration with iEarth and CCSE and UiO and UiT. (NFR)
- Evidence-based mentoring: Impacts of mentor factors, mentoring practice and institutional context on student outcomes (IMPRINT), by Eliassen and Cotner, in collaboration with Univ of Minnesota and the Univ of Nevada Las Vegas (NFR)
- Parallel test anxiety interventions across the EDU-STEM Network in the US to promote more equitable performance in stem classes between men and women through these interventions, SEhoya Cotner (US)
- MIND – Mobile Integration or Distraction: Understanding the motivating, distracting, or educating role of technologies in higher education, Lucas Jenö (NFR)

Table 11. Full list of externally funded projects with bioCEED involved (granted) 2014-

Granted by	Project title	Project period	Funding	PI/Main partner
Intpart	Confect -Connect and Infect - An interactive network to advance research and education in viral ecology and evolution	2021-2026	10 mill NOK	S.Våge
UiB, MN	Formidlingsprisen	2021	50 KNOK	V. Vandvik
Thon Stiftelsen	<i>Pris for fremragende undervisning</i>	2022	500 KNOK	V. Vandvik
UHR-MNT	NJSTEME workshop: From Practice to publication	2022	250 KNOK	S. Cotner (BIO), T. Gjesteland (UiA)
UHR-MNT	Leading Educational Change	2021-2022	160 KNOK	R.Andersson
UHR-MNT	Team Based Learning workshops	2022	93,5 KNOK	A.Bjune
UHR-MNT	Utvikling av kursmodell for bedre samhandling innen biofag-utdannelse i Norge	2022	900 KNOK	Nasjonalt fagorgan for biologi, Elina Haltunen, Steve Coulson (bioceed)
DIKU Arb.livsrelevans	DEVELOP	2022-2024	4 700 KNOK	PI S Cotner
NFR/DIKU Intpart	Excel AQUA II - Norway-Japan Partnership for Excellent Education and Research in Aquaculture	2020-2024	3500 KNOK	PI Ivar Rønnestad
Thon Stiftelsen	<i>Pris for fremragende undervisning</i>	2021	500 KNOK	S. Eliassen
DIKU Dig	MOVUL – Mobilbasert vurdering som læring	2020-2021	550 KNOK	L.M. Jenö
DIKU Aktiv læring	Utvikling, testing og evaluering av verktøy og vurderingsformer som fremmer meningsskapende samsvar i feltundervisning (FIELDPASS)	2019-202	4800 KNOK	P.B. Eidesen (UNIS+BIO)

DIKU Aktiv læring	<i>Studentaktiv forskning og overførbare ferdigheter i redesign av biologiutdanningen (REDESIGN)</i>	2019-2022	4500 KNOK	S. Eliassen
Thon Stiftelsen	<i>Utvikling av et høy-arktisk, tverrfaglig feltlaboratorium for forskning og undervisning</i>	2019-2021	1350 KNOK	P.B. Eidesen (UNIS)
Thon Stiftelsen	STUDENTAKTIV FORSKNING – FRA VUGGE TIL GRAD	2019-2022	1500 KNOK	V.Vandvik, O.Førland, R.Gya, E. Lygre (BIO)
Thon Stiftelsen	<i>Pris for fremragende undervisning</i>	2019	500 KNOK	I.Rønnestad (BIO)
Olaf Grolle Legat	<i>Biology students knowledge in species identification</i>	2018	10 KNOK	L.M. Jenø
Svalbard Environmental Fund	Artsapp for Svalbards flora	2019-2022	200 KNOK	P.B. Eidesen (UNIS)
UiB	<i>Learning Environment Prize to biORAKEL</i>	2018	50 KNOK	Core team of students (BIO)
NFR, Finnud	<i>ArtsApp: How technology impacts motivation and interest for learning species</i>	2018-2022	5985 KNOK	J.A. Grytnes (BIO)
NFR/DIKU Intpart	RECITE- Research and Education Partnership in Climate Change Impacts on Terrestrial Ecosystems (274831)	2018-2022	4500 KNOK	V. Vandvik (BIO)
Svalbard Environmental Fund	Online learning platform for Arctic Biology	2018-2020	140 KNOK	P.B. Eidesen (UNIS)
NFR/DIKU Intpart	ExpertS - Experiments, Traits, Synthesis: Using knowledge from global ecological experiments to validate, assess, and improve trait-based theory (287784)	2019-2023	4500 KNOK	V. Vandvik (BIO)
NFR/DIKU Intpart	PRIMA LEARNING - Connecting hands-on-PRactice and Innovative MARine ecological sampling methods and analysis tools for enhancing student LEARNING"	2018-2023	4500 KNOK	A.G.Salvanes (BIO)
NFR/DIKU Intpart	<i>Excel AQUA - Norway-Japan Partnership for Excellent Education and Research in Aquaculture</i>	2017-2019	4500 KNOK	Rønnestad (BIO)
NFR/DIKU Intpart	FILAMO - Connecting Field work and Laboratory experiments to numerical MOdeling in a changing marine environment. Project number: 261636	2017-2023	3960 KNOK	Ø.Fiksen (BIO)
Thon Stiftelsen	<i>Numerical Competence and Student-Active Research</i>	2017-2019	1400 KNOK	Eliassen, Varpe, Soulé
SiU, IntPART	<i>IScope (integrating Science of Oceans, Physics and Education)</i> Project number 249718	2016-2018	4345 KNOK	K.Pittman, (BIO)
Thon Stiftelsen	Research project student-active research: <i>Økosystem, klima og variasjon i eit «mini-havøkosystem»: ein vestnorsk fjord</i>	2016-2018	1137 KNOK	AG. Salvanes, (BIO)
SiU - High North Programme	<i>TraitTrain. Comparing climate change impacts on High North vs. Alpine ecosystems through research and training in trait-based approaches HNP-2015/10037</i>	2016-2018	1500 KNOK	V. Vandvik. (BIO/UNIS)
Norgesuniversitetet	Artsapp: En applikasjon for enklere artsidentifikasjon	01.01.2015-30.12.2017	550 KNOK	JA. Grytnes (bioCEED)

Olsens Legat	<i>Effekten av ArtsAPP på studenters læring og motivasjon</i>	2015-2016	47 KNOK	L. Jeno (bioCEED)
Thon Stiftelsen	Excellent Teaching Award	2015	500 KNOK	C.Jørgensen (BIO)
Thon Stiftelsen	Excellent Teaching Award	2015	500 KNOK	K.Pittman (BIO)
UiB	Learning environment Award	2015	50 KNOK	C. Jørgensen (BIO)
WUN Research Mobility	Research stay at University of Rochester, USA,	Sept-Oct 2015	36 KNOK	Lucas Jeno (bioCEED)
UHR	Contribution to for talk at MNT-conference 2015	18-19.03.2015	75 KNOK	Ø.Fiksen, JA Grytnes (bioCEED)
NFR- FINNUT programme	PRIME - How Implementation of PRactice can IMprove relevance and quality in discipline and professional Educations (knowledge building project). NFR Project number: 238043	01.08.2014-01.08.2018 (ext 2020)	7000 KNOK	G. Velle (bioCEED/Uni)
SiU- UTFORSK	TRANSPLANT.Student research experience linked to an international research project.	2014-2016	1109 KNOK	V.Vandvik. (BIO)
Research Council of Norway-FINNUT programme	ArtsApp: En applikasjon for enklere artsidentifikasjon (pre-project). NFR Project number: 237821	01.05.2014-30.04.2015	287 KNOK	JA Grytnes. (bioCEED)
UiB, PEK-programme	<i>Sammen for bedre læring</i>	03.04.14-03.04.15	280 KNOK	A. Raaheim (UiB)
Research Council of Norway-FINNUT	Travel scholarship for developing projects – University of Otago	autumn 2014	160 KNOK	PB Eidesen (AB)