

SoTL project on impact of the dark season on student learning experiences in UNIS: highlights and recommendations

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Abstract

The objective of this report is to understand how the dark season is influencing student learning at the University Centre in Svalbard. This project is led by a group of four researchers, taking part in the *Collegial Teaching in Learning in STEM Education* course (MNPED660) through the University of Bergen. To understand the impact of the Svalbard dark season on student learning, we conducted a focus group discussion-based study. Here, we provide a synoptic summary and highlight from this study. To conclude, we provide three main recommendations for the University Centre in Svalbard to facilitate the learning process during the dark season: (1) take the dark season into account in course structure and schedule, (2) provide information to students about the dark season and adaptation methods, and (3) make indoor spaces accessible to students for prolonged periods during the dark season.

1 Introduction

The University Centre in Svalbard (UNIS) is the world's northernmost higher education institution located in Longyearbyen, Svalbard (78°13'23"N, 15°39'09"E). Due to its high latitude, a natural day/night cycle is absent for a large part of the year. Every year, there are approximately four months during which the Sun does not set (i.e. the midnight sun) and four months during which the Sun does not rise. The polar night, which occurs when the Sun remains below the horizon –by at least 6°, lasts 2.5 months in Longyearbyen. Both employees and students experience rapid changes in the amount of daylight available over the course of a semester. Students typically stay between 6 weeks (length of a single Master/PhD course) to a full

semester. Since approximately 50% of the student population comes from universities outside of Norway, it can be assumed that at least part of the students are not used to the daylight deficit during the polar night. These students could potentially struggle to maintain a 24-hr rhythm, also known as a circadian rhythm or focus on their studies.

Most studies that investigate the effects of polar night and/or midnight Sun in and around Svalbard are focused on animals such as the Svalbard reindeer and scallops (Arnold, et al. 2018, Tran, et al. 2016, Perrigault, et al. 2020). Both reindeers and scallops were found to maintain a circadian rhythm during the polar night. Human specific studies into circadian rhythms are scarce, especially in Svalbard. Examples include an investigation during a period of midnight Sun in Svalbard (Weissová, et al. 2019), which concluded that the circadian rhythm of the participants was maintained over a two-week period. It was hypothesized that the communal daily schedule in the experiment setup (e.g. an expedition) enhanced the circadian rhythm. To our knowledge, no similar study has been performed for the polar night in Svalbard. However, the circadian rhythm of researchers in Zhongshan Station, Antarctica (69°22'24"S, 76°22'40"E) has been investigated during polar night (Chen, et al. 2016). Symptoms of seasonal affective disorder (SAD), such as sleep delay, were identified and recommendations included maintaining a strict social schedule and artificial light breaks. As far as we are aware, there are no studies directly investigating the result of the polar night on student learning. However, there have been studies showing a strong connection between student mental health and wellbeing on the one side and student learning on the other (Lindsay, et al. 2023). Therefore, we believe that well-being in general is an important factor to allow for good student learning.

The lack of studies on the effect of the polar night on humans combined with our personal perception that the dark season impacts our daily (work) life in Longyearbyen, are the key motivations to conduct this project. Based on our personal experiences, we hypothesize that student learning is negatively affected by the lack of natural light. The goal of this study is to investigate the impact of diminishing daylight and polar night on the student learning and to find out whether UNIS could accommodate students or facilitate the learning process. For this, we organised a focus group session with four students during which we interviewed them about how they perceive learning during diminishing daylight and/or polar night. We also discussed with the student advisor from the Norwegian Arctic Student Welfare Organization to obtain insight into possible coping mechanisms to deal with the dark season.

2 Methods

Students for the focus group were selected via an open invitation in December 2022 which was sent by e-mail to all students enrolled in the Autumn 2022 semester at UNIS. Five students were selected based on the premise that: (1) they had sufficient exposure to the dark period and (2) they were enrolled in different programs. Due to logistical constraints, the focus group was conducted with three of the students and a separate session was conducted with the remaining student. During the focus group, a set of predefined questions on how the students perceive the effects of the dark season on their learning experiences was discussed (see Appendix A), after which follow-up questions were asked. Focus group discussions were recorded and transcribed. The transcripts were analysed by all four researchers independently. Each researcher prepared a summary document based on their interpretations of focus group discussions.

To put our recommendations into context, we also reached out to The Norwegian Arctic Student Welfare Organisation ("Samskipnaden"). *Samskipnaden* works with student welfare across UNIS and the Arctic University in Norway's (UiT), which runs 9 campuses above the Arctic Circle (Turunen 2019).

3 Results

Most students did not particularly anticipate challenges related to the dark season making statements such as: *I think my friends were more concerned about it than I was* (Participant 3). They also mentioned that

the experience was variable for different students: *It's very subjective. I think some people really struggle and then some people don't notice at all seemingly* (Participant 1) and: *Just from talking with people, I'm not sure if we're representative here* (Participant 3). Additionally, Participant 4 highlighted the novelty of the dark season at UNIS and stated that: *It is something you don't experience elsewhere*. However, the students also emphasized that UNIS could provide information to the students: *[UNIS could] give general information also with regard to the dark season to students for shorter courses* (Participant 4).

Participants encountered challenges related to the dark season through their semester at UNIS. They made statements such as: *I think that the dark season amplifies if you have a shitty day, then it becomes really shitty* and *You kind of get stuck indoors* (Participant 1). Participant 4 specified that: *I do feel a bit more tired in general and I felt like maybe my learning capacity was slightly lower than it would normally be* and added: *If I think about living here, then I would make sure to go away for holiday to a more sunny place in the middle of the polar night*.

Conversely, the participants said that they felt less pressure to be on adventures during the dark season. Participant 2 voiced out that: *I think it [the dark season] is positive because I feel less pressure to go outside and go on hikes and to all these activities*, which was seconded by Participant 3 and Participant 1, who added: *I can second that* and: *I agree, with your point about being more focused on learning*, respectively. There was a clear emphasis on the positive aspect of the dark season on learning from students participating in courses about northern lights: *You need to darkness to really have a good study experience* (Participant 1). Participant 4 also noted that: *[the polar night] has also fun sides and I mean you can still do a few things and see northern lights*.

The students also mentioned the importance of having coping mechanisms, such as Participant 1 saying that: *I think you learn – the more time you spend in the dark season the better you get at adjusting to it* and Participant 2 recommending: *Listen to your body and make good friends*. Participant 3 noted that: *I will say that when there's not a schedule, it's very hard to start the day*, seconded by Participant 1 saying: *If you don't have structure or tasks to achieve, then it is harder for me*. Participant 4 also came up with a similar comment saying that: *I think it helped that we had to go to UNIS every day relatively early, so you were forced to keep your daily rhythm* and: *I think best for me is to study or to do a lot in the first half of the day*.

The participants followed up by talking about the importance of feeling comfortable at UNIS with Participant 3 adding that: *Now [during the dark season] I don't want to deal with walking back [to the student accommodation], I don't want to deal with my headlamp and vest and so I just take my lunch here*. Participant 1 added on the importance of access to good food saying: *The food used to be pretty nice in the cantina, and it's not that nice right now, so I think that would be my main consideration [to improve the comfort at UNIS] to be honest*.

All of the participants also highlighted the importance of social interactions. Participant 2 mentioned that: *If you have things to do and places that make you happy outside of your home, I think it's better* and Participant 2 seconded with: *It's a good idea to not exclude yourself in social activities, especially during the dark season*. Participant 3 then connected social interactions to the learning environments saying that: *I'm very glad there was a group project. If it was individual reports, that would be tough because then you're just stuck by yourself working on this thing and group projects are a great excuse to do things with people*, followed by Participant 1 saying: *I think it's a good idea if there's periods of group work or project work or whatever, to provide a room where people can be and study together*. Participant 2 added that: *I would also advise people to join events* and: *There is a bulletin board, I think it's quite nice and I don't know about you guys but I look at it with my friends quite a lot and so*.

Discussion

Following the student focus-group, the following themes were summarized and linked to the literature. The impacts of the dark season on student learning were separated into two categories: negative impacts and positive impacts. These are outlined and discussed in the following sections.

3.1 Negative impacts of the dark season on student learning

Most negative impacts highlighted by the student fit into one category which consists of effects related to seasonal affective disorder.

3.1.1 Seasonal Affective Disorder (SAD)

The negative side of “dark” and positive side of “light” is documented in the metaphor theory (Lakoff and Johnson 1999). People are found to be posting negative posts on social media when the weather is “bad” meaning cold and dark or wet (Coviello, et al. 2014), which resulted in the regional surge of initiatives to help citizens battling winter blues across North America (Theobald 2015). Previous research shows the impact of wintertime depression on people living in extreme latitudes (Beecher, et al. 2016, Denissen, et al. 2008, Liu, Liu and Yu 2015, Schkade and Kahneman 1998, Young, et al. 1997). Most of the psychological research on winter focuses on the ways it can be especially detrimental to mental health and well-being (Rosenthal, et al. 1984). The American Psychological Association (APA) has claimed that lack of exposure to the sun especially during the winter season raises depressive symptoms (Beecher, et al. 2016). Seasonal Affective Disorder (SAD) (Rosenthal, et al. 1984) is characterized by seasonal patterns of recurrent depression because of the relative lack of sunshine in the winter months (Rosenthal, et al. 1984). Rosenthal and his colleagues theorized the *latitude hypothesis* stating “rates of SAD increase with latitudes” inferring that populations living far north (or south) of the equator with little to no direct sunlight in the winter should be more inclined to SAD. This hypothesis has been backed by other research on psychological issues in winter in the U.S. (Molin, et al. 1996, Rosen, et al. 1990).

Based on the literature and observations recorded in the present study, it can be inferred that wintertime darkness negatively impacts UNIS students’ learning process to a certain degree. With the daylight getting shorter and the nights getting longer, students may struggle to find the impulse to learn and stay productive in a classroom setting. One major negative impact of wintertime in Svalbard is the lack of natural light. Without natural light, it is harder for students to stay awake and alert. The students also reported feeling more tired and less motivated to learn during this period. It is well understood that light helps regulate a circadian rhythm and impacts mood, energy levels, and alertness. In winter, with the absence of daylight (or rapidly diminishing daylight) and overcast skies (which is typical in Svalbard), students are prone to suffer from SAD, affecting their ability to concentrate, focus, and learn. Another factor is decreased physical activity inferred from the dialogue with students. During the winter months, students are likely to spend more time indoors leading to a sedentary lifestyle. This lack of exercise resulting from indoor life can have negative impacts on both physical and mental health, leading to feelings of sluggishness, decreased motivation, and reduced attention span. Based on the symptoms of SAD, the lack of natural light and increased sedentary behaviour can lead to decreased focus and motivation, making it difficult for students to retain information and achieve their academic goals.

3.2 Positive impacts of the dark season on student learning

Although it may seem counterintuitive, there are some positive effects of the dark season on student learning, especially at UNIS. Students partaking in the focus group were quick to highlight some of these points which are discussed in the following sections.

3.2.1 Unique Learning Activities

UNIS' main goal, as laid out by the Ministry of Education and Research, is to provide "high quality in education and research, based on Svalbard's location in a high Arctic area" (UNIS 2021). In short, the location of UNIS offers the opportunity to study unique subjects and thus it is UNIS' mission to take advantage of this position to strengthen education on polar-related disciplines. The course offer at UNIS heavily reflects this mission, specifically, some courses directly benefit from the dark season. For example, the course *AGF-216: The Stormy Sun and the Northern Lights* offered annually during the dark season, focuses entirely on the northern light phenomenon (i.e. aurora borealis). As of 2023, there is no other university-level course focusing solely on northern lights. At other institutions, courses on this subject have either been discontinued (e.g. PHYS163 The Dynamic Aurora Borealis at the University of Alaska Fairbanks, or FYS4610 Magnetospheric Processes at the University of Oslo) or alternatively, northern lights constitute just a small fraction of the course. Other courses offered within Arctic Geophysics such as *AGF-301/801: The Upper Polar Atmosphere* and *AGF-223: Upper Atmosphere and Space Physics* also include northern lights observation techniques, and benefit from the dark season for field work. Fieldtrips to the Kjell Henriksen Observatory are an unprecedented opportunity to partake in state-of-the-art observation techniques to better understand atmospheric processes. In addition, other departments at UNIS, such as Arctic Biology, offer unique polar night courses as well like *AB-334/834: Underwater Robotics and Polar Night Biology* and *AB-329/829: Arctic Winter Ecology*. As such, for students at UNIS, the dark season offers a unique and non-negligible learning potential.

3.2.2 Reducing the Fear of Missing Out

The Fear of Missing Out (FoMO) is defined as the fear that others are experiencing things that you wish you were. In university students, this is characterized as an unpleasant psychological state, where students perceive that their peers are engaging in a more abundant life than themselves (Przybylski, et al. 2013). This could translate in missing out on something fun, interesting, exciting, edgy or adventurous. The latter is informally referred to as *adventure FoMO* and is widespread amongst outdoor enthusiasts, which make up much of the UNIS student population. However, FoMO is far from being felt solely amongst UNIS students. In fact, in a survey with American Generation Z college students (born after 1995), 100% of the respondents reported feeling FoMO at least once a day (Seemiller and Grace 2016). Traditionally, the feeling of FoMO is enhanced by the prolonged use of social media (James, et al. 2019). However, in the context of UNIS, this feeling can be exacerbated by accessibility to the great outdoors. The possibility for outdoor adventures is endless and right at the doorstep of UNIS: skiing, hiking, kayaking, etc. Students discussed in the focus group that their feeling of FoMO declined drastically during the dark season because their peers were all less inclined to partake in outdoor adventures. FoMO is a type of anxiety that correlates not only with low self-esteem and sadness, but can also worsen concentration and memory, which in turn can have a negative impact on student learning (Modzelewski 2020). The participants corroborated this statement, stating that the dark season allowed them to focus more on the course content and enhancing their learning experience.

3.3 Recommendations

One of the principal motivations for undertaking this study was to provide recommendations for UNIS and students to improve teaching and learning during the dark season. To achieve this, recommendations were gathered from *Samskipnaden* at UiT, from available literature, and from the student focus group. The recommendations found are discussed below.

Samskipnaden at UiT provides advice and help to their students in the following ways (T. Toft, personal communication, 10 Feb. 2023):

- By providing a "light café" where students can borrow daylight lamps during the dark season;

- By advising the students to consider buying their own daylight lamp or wake-up light to assist getting up in the morning and keeping a good sleep schedule;
- By advising the students to go outside during the lightest part of the day;
- By advising the students to accept that they will have less energy during the dark season than they are used to and adjust their activities accordingly. This is particularly relevant for students who are not used to dark winters.

However, daylight lamps can worsen symptoms of SAD and work against their intended purpose if used in excess, and particularly if used late in the day (Doljansky, Kanny and Dagan 2005). To gain the advantage of using a daylight lamp, it should be used in the morning at the time one usually gets out of bed (Henriksen 2019). The length of time one uses a daylight lamp is also important. According to *Samskipnaden*, spending 10 minutes twice a week in front of a daylight lamp is enough to get increased energy, and they recommend spending 30 to 45 minutes daily for two weeks for people experiencing sleep problems (Kan æ få være sola di? [Can I be your sun?] 2022). A 2009 study found that the feeling of depression in patients started to decrease with 20 minutes daily daylight lamp therapy, with increased efficiency by prolonged exposure time of 40 minutes. A further increase to 60 minutes did not affect the results (Virk, et al. 2009). Making time for physical activity and keeping a healthy diet were also found to minimize the effect of darkness (Gutman and Galzerano 2022). Based on their study at an Antarctic station, Chen et al. (2016) recommended maintaining a strict social schedule and artificial light breaks

The students from the focus group provided advice for future students to consider before and after their arrival in Svalbard. Like *Samskipnaden*, they highlighted the importance of being structured, having well-defined schedules and pursuing regular activities for an optimal learning experience during the dark season. The students also experienced increased tiredness, but developed coping mechanisms by structuring their days, keeping regular activities and making friends at an early stage of the course. The latter allowed them to develop a good social environment throughout the darkness and highlights the importance of social life and group projects during the dark season for an improved learning experience. Finally, some students suggested using other coping mechanisms such as daylight lamps and vitamin D supplements. These mechanisms are supported by findings from literature.

The students also provided suggestions for UNIS to improve the learning experience during the dark season. The suggestions were focused on course schedules, the physical working environment, and providing information. Regarding course schedules, the students generally found that UNIS provides a good structure that keeps students engaged, but they suggested having longer breaks during the middle of the day in the period of diminishing light (October – November) to allow students to adopt to the darkness and get outside to experience the last light of the year. For the physical working environment, the students highlighted the importance of “cosiness”, and suggests that UNIS can improve on providing a “cosy” workspace. This includes having access to food and coffee throughout the day. Finally, the students would like to receive more information from UNIS, both regarding impacts of the dark season and regarding local happenings to help students engage in social activities.

The advice and recommendations given by *Samskipnaden*, the literature and the students generally coincide. The use of daylight lamps, importance of social life and physical activities, importance of maintaining a regular schedule, and “cosiness” of indoor spaces were brought up as recommendations by the students and/or *Samskipnaden* and are overall supported by the literature.

4 Conclusions

Based on the focus group discussion, the contact with *Samskipnaden* and literature study, we recommend the following remedies to improve the learning experience:

- **Take into account dark season in course structure and schedule.**

- a. Currently, UNIS courses have good structures that keep students engaged while providing enough freedom to work on their own project works. On the other hand, some courses are very intense with a lot of credits within a short period of time. *In such cases*, UNIS could also focus on structuring the learning activities that encourage students to work and study at UNIS during dark periods. This would facilitate social interaction.
- b. Students expressed specifically that structuring lectures in the morning and having more interactive activities such as group discussions and projects in the afternoon would improve their engagement.
- c. Longer breaks in the afternoon (11 am-1 pm) during diminishing lights (typically October-November) could help students gradually adapt to diminishing daylight .
- **Provide information to students about the dark season and adaptation methods.**
 - a. At the start of both short courses and semester courses running partly or fully during the dark season.
 - b. UNIS should provide information regarding coping mechanisms for the dark period, mental well-being and help contacts, and practical advice for incoming students. UNIS should provide information and practical advice on the importance of social life well before the actual polar night starts.
 - c. UNIS could create a calendar listing all activities going on in town to engage students in local activities as some students do not have nor want Facebook (at present, most of the activities are listed in Facebook groups). The UNIS website, a bulletin board or a Canvas group could replace the use of social media. This would ensure that UNIS communicates happenings in town to students better.
- **Make indoor spaces accessible to students for prolonged periods during the dark season.**
 - a. Students highlighted the importance of indoor spaces and cosiness (including access to food and coffee). They also expressed the desire to have access to coffee machines outside office hours, snacks in the canteen outside peak hours, and meeting rooms for group project work.
 - b. UNIS should provide (or advertise the already present) daylight lamps that students can use when working in the morning, similarly to the light café being provided at UiT. These should be located in areas where students work independently, such as the library and study area in the student accommodation.

Appendix A

The predefined set of questions for the focus interview:

1. Did you think or consider the dark season when choosing to come to UNIS?
2. How did the dark season positively/negatively affect your learning experience here at UNIS?
3. Have you noticed changes throughout the semester in relation to the diminishing light?
4. With your current experience of the dark season, would you make any personal adaptations to your learning in relation to the dark season?
5. Have you thought of any improvement that UNIS could put in place to help student cope with the dark season? Think – schedule, infrastructure, personnel, activities, etc.

Depending on the answer of the students, different follow-up questions were asked.

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