E-LEARNING AS AN EDUCATIONAL TOOL FOR AVALANCHE BULLETIN USERS, OBSERVERS, AND FORECASTERS IN NORWAY

Markus Eckerstorfer[1]*, Rune Engeset[1], and Jostein Aasen[1]

[1] *Varsom - Norwegian Avalanche Warning Service, Norwegian Water Resource and Energy Directorate, Oslo, Norway*

ABSTRACT: Regional, daily avalanche bulletins are the primary tool of avalanche warning services to inform winter backcountry recreationists and preparedness authorities about avalanche hazard. Recent studies have shown that the diverse group of avalanche bulletin readers have different levels of risk literacy. The practical capacity to use the given information for competent decision-making varies a lot between bulletin users. It is therefore important to elevate the understanding of the information given in the avalanche bulletin, help to better evaluate it and then finally use it when traveling in avalanche terrain. To address this challenge, the Norwegian Avalanche Warning Service has created different online courses that center around the main pillars of our avalanche bulletins. Concepts like danger vs risk, avalanche terrain, avalanche danger levels, avalanche problems and avalanche sizes are explained in short, interactive modules. Each module is roughly 10-15 min long, containing short movies followed by exercises where the users can self-assess their learnt knowledge. All exercises have direct feedback for enhanced learning. The course is freely available and accessible on our website varsom.no/snoskredskole.

KEYWORDS: Avalanche education, avalanche bulleting literacy, e-learning, Norway

1. INTRODUCTION

Avalanche warning services assist winter recreationists and preparedness authorities in managing avalanche risk. Recreationists are expected to translate avalanche bulletins into safe terrain choices. This is no easy task as we both know from experience, as well as from recent surveys amongst users of public avalanche bulletins (Fisher et al., 2022; St. Clair et al., 2021).

The problem is two-fold: On the one hand, the cohort of people carrying out recreational winter activities is highly diverse. On the other hand, a daily avalanche bulletin must be written and presented in a way that is interesting, understandable and can be translated into action by this diverse user group (Finn, 2020).

The term avalanche bulletin literacy has been coined recently, building on existing research on risk literacy (St. Clair et al., 2021). The effectiveness of avalanche bulletins depends on whether the information about avalanche risk is understood and put into action correctly.

Fisher et al. (2022) suggested improving avalanche bulletin literacy by including learning interventions into the avalanche bulletins. They created route ranking exercises that required users to accurately translate an avalanche forecast into terrain choices.

* *Corresponding author address:*
Markus Eckerstorfer, Norwegian Water Resources and Energy Directorate, Oslo, Norway;
tel: +47 22 95 95 95
email: maec@nve.no

The effectiveness of a bulletins is influenced by the competency of the user (Engeset et al., 2018) and in summer of 2022, we (the Norwegian Water Resources and Energy Direction, NVE) started developing a freely available e-learning course for users of our avalanche bulletins.

2. E-LEARNING PROJECT, PLATFORM AND IMPLIMENTATION

The goal of developing the course was to introduce and explain all elements of the avalanche forecast according to the EAWS information pyramid. Users should become more familiar with concepts behind the avalanche danger level scale, avalanche sizes and avalanche problems. In addition, we were interested in increasing avalanche bulleting literacy by creating route choice and route ranking scenarios on images, synthetic terrain models and maps. The goal was to help users become better at choosing the appropriate terrain given the avalanche conditions.

To implement these different e-learning modules, we used an existing online learning platform made available by the Norwegian government. The online learning platform is based on Moodle (https://moodle.org) and uses H5P (https://h5p.org) as a plugin to create interactive content. The course is either accessible directly on the governments online learning platform (laeringsplattformen.dfo.no) or from our avalanche school (https://varsom.no/skredskole).

The online course was set up as a modular course where participants could access the most interesting modules and carry them out in random order. Course progress was logged, and a course

certificate issued if all modules were completed. In December 2022, the online course went online and has been freely available since then.

3. COURSE CONTENT

The online course has per summer 2023 a total of 12 modules. Each module focuses on a single topic (for example “avalanche terrain”) and is between 10-15 min long. Each module contains an introductory film that explains concepts and ideas with pictures (as illustrated in Figures 1 and 2), diagrams, and voice over, followed by a quiz. Correct quiz answers, or additional explanations to quiz questions are displayed to the users to enhance learning.

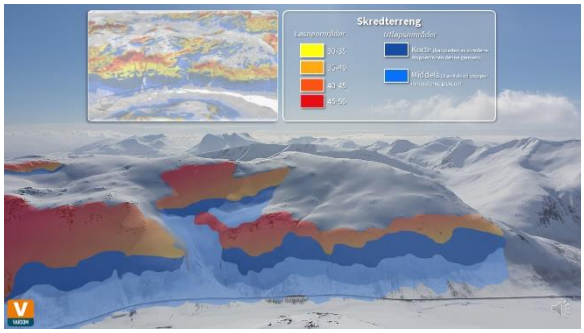

Figure 1: Screenshot from the “avalanche terrain” module film, showing starting and runout zones superimposed on an oblique drone image.

The available course modules are as follows: Avalanche terrain + terrain choice, content of an avalanche bulletin, hazard vs. risk, avalanche risk and avalanche danger scale, probability and consequence, avalanche types and sizes, avalanche problems, avalanche risk for infrastructure, route ranking, snow metamorphism and snow crystals quiz.

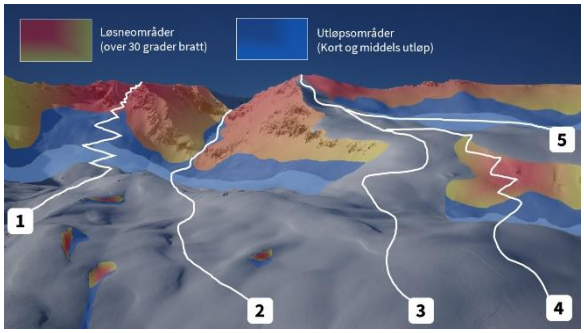

Figure 2: Screenshot from the “avalanche terrain choice” module, showing avalanche terrain and five route choices the users must weigh in terms of relative risk to each other.

4. USER STATISTICS

In the period 30 November 2022 – 31 May 2023, 1352 participants have completed at least 1 course module. 30 % of all participants completed the entire course. The modules presented first in the online course (avalanche terrain, content of an avalanche bulletin) have been completed the most.

Most participants accessed the course in the months of January to March. Little activity was registered in December and May.

The majority of participants were private persons, followed by governmental employees, school pupils and university students. We also had guides and people working in NGO’s (for example Red Cross, Norwegian Trekking Association) accessing our course.

Compared to other publically available courses on the governments online learning platform, our avalanche course is amongst the most popular. The course with most participants have roughly 2000 visits per year.

5. OTHER ONLINE COURSES

Besides the online avalanche course intended for public users of the avalanche bulletin, we have also created online content for our observers and forecasters. We have roughly 100 observers and 30 forecasters that are in different parts of Norway. Both observers and forecasters must complete courses as part of their education. For one of the introductory courses, we have developed online course modules for voluntary pre-learning as well as for post-course assessment.

These modules and tests will be used by the Norwegian Trekking Association (DNT) in their avalanche awareness courses. As our modules are in Moodle and H5P, they can be easily integrated into other online learning platforms and are thus available to schools and universities as well.

6. FINAL REMARKS AND FUTURE WORK

We are aware that our online courses are at best an addition to practical courses as well as the process of gaining experience and knowledge by being outside, talking and discussing with peers and mentors. However, we think that these online courses can assist in lifting avalanche bulletin literacy in users with different training and experience. Our terrain choice and route ranking exercises specifically target and train the skills of understanding the information given in the bulletins and translating them to safe terrain choices.

The online course is also a valuable resource for instructors and participants in field-based avalanche safety courses, both as an introduction to field-based courses and to keep updated after, when practicing your skills.

For the winter 2023/24, we will increase our portfolio by adding more modules. At the same time, we will put more effort into advertising the online course to our bulletin users.

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REFERENCES

Engeset, R. V., Pfuhl, G., Landrø, M., Mannberg, A., and Hetland, A.: Communicating public avalanche warnings – what works?, Nat. Hazards Earth Syst. Sci., 18, 2537–2559, https://doi.org/10.5194/nhess-18-2537-2018, 2018.

Finn, H.: Examining risk literacy in a complex decision-making environment: A study of public avalanche bulletins. MSc-thesis. Simon Fraser University, 2020.

Fisher, K. C., Haegeli, P., and Mair, P.: Exploring the avalanche bulletin as an avenue for continuing education by including learning interventions. Journal of Outdoor Recreation and Tourism 37. 2022. https://doi.org/10.1016/j.jort.2021 2022.

St. Clair, A., Finn, H., Paegeli, P.: Where the rubber of the RISP model meets the road: Contextualizing risk information seeking and processing with an avalanche bulletin user typology. International Journal of Disaster Risk Reduction 66, https://doi.org/10.1016/j.ijdrr.2021.102626