

EFFECTIVENESS OF AVALANCHE RESCUE TRAINING WITH STUDENTS

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ABSTRACT: We studied the effectiveness of avalanche rescue training with groups of university students performing an avalanche search and rescue training. The students participated in field courses on snow, avalanches, and snow physics and were all equipped with the basic mandatory safety equipment, i.e. avalanche beacon, shovel, and probe. Initially, the students were only given a short introduction to the rescue equipment with no preliminary training. As one would expect in a real-life situation, there were occasionally students with prior experience with avalanche rescue and some students who handled avalanche rescue equipment for the very first time. In order to create a realistic accident scenario, the rescue exercise was started merely by indication of the area of the simulated avalanche debris where one subject – either an avalanche doll or a backpack – was buried. After the first round of search and excavation we discussed the performed avalanche rescue, and provided a theoretical explanation about the search and excavation process. Evaluating the results, we found that search times varied greatly between different groups for the first, uneducated run. With increasing number of practices as well as the theoretical explanation, the times quickly converged to a minimum time, constrained by the size of the search field, the excavated snow mass, determined by the prevailing snow density, as well as burial depth. Our results emphasize the importance of avalanche rescue training also for non-expert backcountry travelers, and show a surprisingly optimistic effectiveness of such a training, at least within our study and for a simple burial scenario.

KEYWORDS: avalanche rescue, avalanche beacon, rescue training, shoveling, probing

INTRODUCTION

As the survival chances of avalanche burials decrease rapidly with time (Brugger et al., 2001), peer rescue is essential. This importance of peer rescue has become a well-established fact among winter backcountry travelers. Thus, avalanche safety education is booming with recreationists welcoming learning opportunities (e.g. Fisher et al., 2022). As we conduct three different courses on snow, snow physics, and avalanches at the BOKU University of Natural Resources and Life Sciences, Vienna, Austria every year (Reiweger and Fischer, 2018), we also frequently and continuously perform basic avalanche rescue training with the university students. The aim of this rescue training is both to educate the students and also to provide the necessary safety for our field work during the courses.

The research question in this short paper tackles the effectiveness of this rescue training: Does the training serve as a mandatory exercise to comply safety regulations, or does it actually have a measurable effect on the students' performance during a simulated

avalanche accident? We therefore started to systematically monitor the learning process of our students by measuring the duration start the search, locate the avalanche burial, as well as for shoveling and excavation during the avalanche search and rescue training scenario (Fig. 1).



Figure 1: Students practicing peer rescue with a puppet after successful excavation of the previously buried puppet.

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METHODS

The students were divided into groups of three or four people. We started by letting each group of students perform an avalanche search and rescue training scenario with one burial, either a backpack or one of our two puppets (Fig. 1). Our search fields were usually about 40x40 meters wide. The burial depth varied from 50 to 80 cm, depending on the available snow cover. The avalanche burial exercises were performed at Prabichl, Styria, Austria and in Leogang, Salzburg, Austria in the January 2019 and January 2020. The prevailing snow densities were rather low, with an average of 200 kg/m³.

Previous to first training run, i.e. the first avalanche search and rescue scenario each group performed, the only education the students received was limited to basic information on how to turn their beacons on, off, switch to search and send mode and how to assemble their probe and shovel. After the first run we thoroughly discussed what happened during the rescue exercise, what went well and what went wrong. Moreover, we provided theoretical information about checking their own safety, performing the rescue call, avalanche beacon search, avalanche probing, shoveling, as well as excavation of the avalanche burial, checking for vital signs, and providing first aid (Genswein et al, 2022). After the theoretical part, the groups performed three or even four additional scenarios on neighboring search fields under similar conditions. For each run we recorded the duration to complete each phase of the avalanche search and rescue scenario. We categorized the phases as follows: a) preparation (checking own safety, rescue call, preparation of beacons), b) signal search – this phase was theoretical as the students almost immediately had a signal as our search fields were small, c) coarse search, d) fine search, e) probing, f) shoveling, and g) excavating the avalanche burial and recovering the potential avalanche victim. As a measure of success of the avalanche burial exercise, we recorded the duration in terms of total time from the start to final recovery.

RESULTS AND DISCUSSION

Figure 2 shows the total search and excavation time over the number of runs for 31 avalanche rescue exercises. We notice a considerable spread in times for the first, uneducated run. With each increasing run both the times and also the spread became considerably smaller.

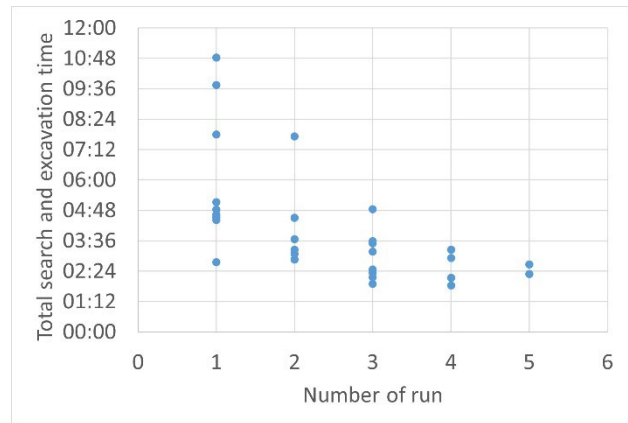


Figure 2: Total search and excavation time over the number of runs (n=31).

Note that overall the times seem quite low. We attribute these short search and excavation times to our relatively small search fields, which omit signal search as well as the relatively shallow burial depth due to low snow heights. Moreover, the prevailing low snow densities made shoveling quite fast, once the groups had understood and implemented the conveyor belt system (Genswein and Eide, 2008).

CONCLUSION

We performed avalanche search and rescue training exercises with university students. Within these exercises the students had to locate and excavate a single avalanche burial, either a puppet or a backpack. After the first training run the students received feedback on their performance as well as theoretical background on avalanche rescue. We recorded the total duration it took the groups to recover the avalanche burial. As a result, we found that with increasing number of practices as well as the theoretical explanation, the search times quickly converged to a minimum time between 2-3 minutes constrained by the setup of our search and rescue scenario. Our results emphasize the importance of avalanche rescue training also for non-expert backcountry travelers. Moreover, the results show a surprisingly optimistic effectiveness of such a training, at least within our study and for a simple burial scenario.

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