AVALANCHE AWARENESS AT THE JACKSON HOLE HIGH SCHOOL

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ABSTRACT: Each year, more young skiers, riders, and snowmobilers are accessing the backcountry. For the past 12 years, the American Avalanche Institute has been working with the Jackson Hole High School (JHHS) to provide avalanche education to the youth of Teton County, WY. The current awareness program at JHHS consists of 9 days of classroom instruction and one field day during the school week. Additionally, students can choose to participate in two more days of field training and complete a level 1 course.

This winter, to inform instruction and maximize outcomes, students participating in the Avalanche Physics and Awareness program participated in pre and post course surveys. Some notable survey results include the fact that 58% of JHHS seniors have been personally affected by someone being caught, injured or killed in an avalanche. Out of the 100+ students in the avalanche awareness course, 70% of JHHS Seniors ski, snowboard or snowmobile, 40% venture into Avalanche terrain and pre-course, only 20% had Avalanche training. Pre-course, 50% of students knew how to get the avalanche forecast and the avalanche hazard rating. Post-course, 100% of students knew where to find this information.

At the end of the Avalanche Physics and Awareness program, students completed a graded focused unit assessment which including video questions and accident analysis. They also completed an ungraded post course survey which included several questions that were answered in the pre-course survey. Based on survey results, students' ability to recognize avalanche terrain and recognize bulls-eye clues improved during the course. One student said, "I learned so much about avalanches and now I know what to look for when I'm skiing and how to be prepared..." This avalanche awareness program continues to grow and evolve, in an effort to educate the youth of Teton County, WY.

KEYWORDS: avalanche education, youth education, Wyoming.

1. INTRODUCTION

Winter backcountry use has continued to increase in the US. Backcountry skiing, snowboarding and snowmobiling attracts not only adults, but also today's youth. The American Avalanche Institute (AAI) in conjunction with the Jackson Hole High School, developed an avalanche education program for high school students 12 years ago. This program has expanded to reach over one hundred high school students each winter, both in school, during science class, as well as in the field. This winter, in an effort to understand what students know about snow before and after the Avalanche Physics and Awareness unit, and in order to continue to evolve and improve course content, students participated in pre and post course surveys. The responses to these will inform future instruction. The goal of this program is to inform Jackson's youth about the hazards they face when traveling in the backcountry, to reduce backcountry accidents, to continue to expand students' understanding of the natural environment, and to present applicable science content in school.

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2. CURRENT AVALANCHE AWARENESS PROGRAM

During winter 2015/16, over 100 students attended the high school Avalanche Physics and Awareness program. This program consists of 9 days of classroom presentations and hands on activities, learning and talking about avalanche terrain, how to recognize obvious signs of hazard, using tools such as ALPTRUTh (McCammon, 2004) or the Backcountry Checklist (Carpenter, 2014), where to find the avalanche forecast, how to read a forecast, basic snow metamorphism, basic avalanche dynamics, weather factors that contribute to avalanche hazard, and other topics. These classroom days are taught by high school science teachers

Trevor Deighton and Garrick Hart, as well as guest instructors from the snow and avalanche community, including a local highway forecaster, a public forecaster, and AAI instructors. The curriculum used for these days was developed by the American Avalanche Institute and Jackson Hole High School science teachers. We review the curriculum annually and adjust based on course results from the previous year, as well as AAI curriculum changes. Course topics are taken from Level 1 curriculum and adjusted to fit the timing of a class period in high school, as well as student learning styles. The age of students informs our teaching styles, as does their backcountry activities – from snowmobiling to snowboarding to building jumps in the backcountry.

In addition to the classroom days, students also have the opportunity to spend a day in the field with AAI instructors and Teton County SAR volunteers. During this field session, students spend part of the time in snow pits, looking at snow grains, practicing stability tests, and discussing other pertinent observations, such as obvious signs of instability. Students also spend time identifying avalanche terrain and non-avalanche terrain by measuring slope angles, looking at vegetation, and discussing historical data. In addition to these skills, students practice using transceivers, shovels, and probes, working through rescue scenarios in the snow.

At the end of the field day, students return to the high school auditorium, where the Wyoming DOT forecaster, Jaime Yount, and Bridger Teton Avalanche Center Forecaster, Mike Rheam presented on their forecasting programs and continued discussing avalanche awareness.

3. CURRENT LEVEL 1 PROGRAM

The high school avalanche awareness program leaves many students wanting more. As was stated earlier in this paper, based on our pre-course survey, 70% of Jackson High School seniors ski, snowboard or snowmobile and 40% of high school seniors venture into avalanche terrain. Before the high school awareness class, only 20% of these students have had avalanche training. Students are taking the risk of being caught in avalanches without the knowledge or training to make these decisions.

Students who are interested in snow and avalanches, and who are venturing into the backcountry have the opportunity to complete a Level 1 course. A level 1 avalanche course, under current American Avalanche Association guidelines, is a minimum of 24 hours of instruction with 60% being field time, covering a variety of topics including avalanche terrain, snowpack and weather, decision-support tools, rescue, and slab mechanics (American Avalanche Association, 2010). Once they have completed the 9 day avalanche physics and awareness program, they can sign up to participate in 2 additional field days to complete their level 1 training. These 2 field days are offered on Teton Pass for skiers, snowboarders, and snowshoers/hikers/climbers, and on Togwotee Pass for snowmobilers. The field days are on a prescheduled weekend following the awareness training. Last year, over 20 high school students completed their level 1 course.

These field days are used to round out student training, as well as practice what students learned in the classroom. Students plan for the trip, identify avalanche terrain, practice rescue scenarios, discuss/identify obvious signs of instability, and dig snowpits. They also apply the AAI backcountry checklist each day, from planning for the tour, through communicating snowpack observations to making a decision as a team, to debriefing at the end of the day. The goal is to offer students useful tools for traveling in the backcountry.

4. PRE AND POST COURSE SURVEY

4.1 Pre-course survey

110 students were asked a series of questions before the Avalanche Physics and Awareness unit was taught. Questions were posed to better understand student demographics, students exposure to avalanches and to measure learning and understanding during and after the course.

Students were asked “Do you know someone who has been carried, buried, injured or killed in an avalanche?” 35 students answered yes, 28 answered “not directly but a friend of a friend or family member” and 46 students answered no. (*Fig. 1*)

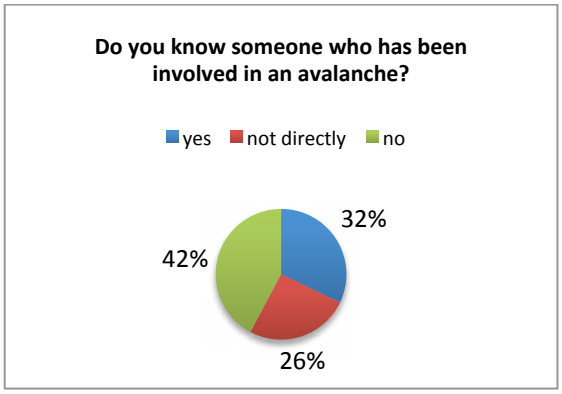


Fig. 1: 58% of seniors have been affected by someone being caught, injured or killed in an avalanche.

Students were also asked to rate answers to several questions on a scale of 1-5, 1 being strongly disagree and 5 being strongly agree. Prior to taking the course, students were asked if they agreed with the following statement:

I can recognize avalanche terrain

Only 27% (30 students) agreed or strongly agreed to this question pre-course. 56% of students (64 students) disagreed or strongly disagreed. (Fig. 2)

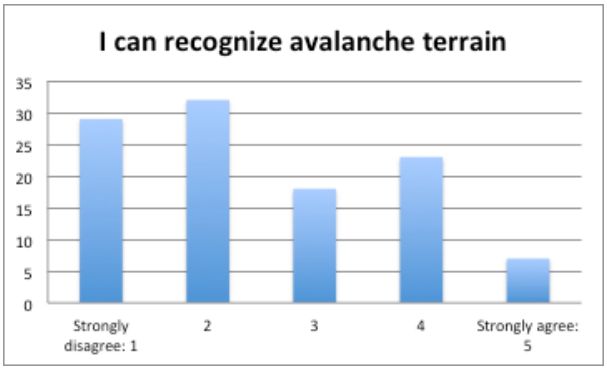


Fig. 2: Only 27% (30 students) of students said they could recognize avalanche terrain in the pre-course survey.

Students responded to the question:

I can recognize the red light conditions that contribute to avalanches

20% of students agreed or strongly agreed to this question, while 59% disagreed or strongly disagreed. (Fig. 3)

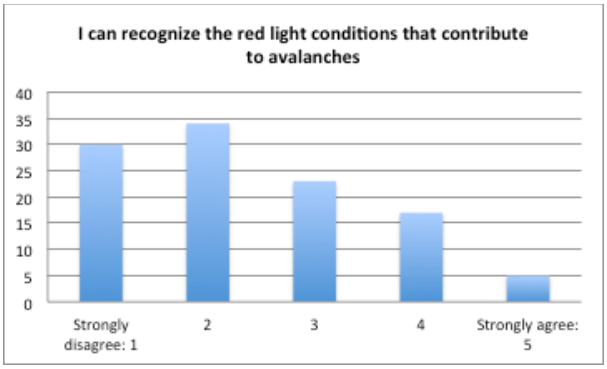


Fig. 3: 20% (22 students) of students said they could recognize red light conditions in the pre-course survey.

Another question posed to students pre-course was:

I understand the ALPTRUTh avalanche decision-making model and can use it to make better decisions in avalanche terrain.

22% of students agreed or strongly agreed to this question, while 60% disagreed or strongly disagreed. (Fig. 4)

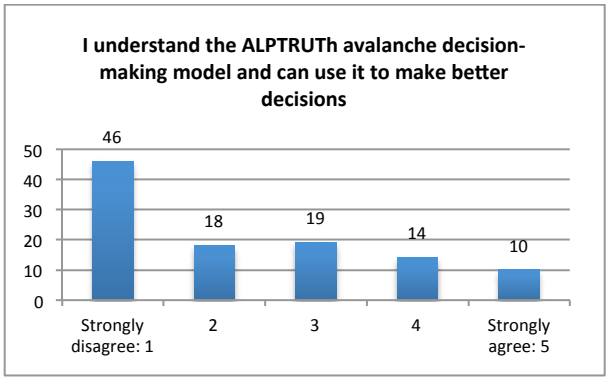


Fig. 4: 22% of students understood and could apply ALPTRUTh pre-course.

When asked who they go into the backcountry, 62% of students (67 students) answered that they don't go into the backcountry. Of the remaining students, 22% (24 students) replied that they went in the backcountry with friends, 2% (2 students) with siblings, 13% (14 students) with parents, and 1% (1 student) with a coach or guide. The question that followed this was: Does the person you primarily go in the backcountry with have avalanche training? 24% of students (26 students) answered yes, 6% of students answered no, and 12% of students answered I don't know. 58% of students stated that this question didn't pertain to them, as they don't go into the backcountry. The answers of No and I don't know highlight the need to educate students. The idea that 38% of students are traveling in the backcountry, when only 19% of students had formal avalanche education before this course, is striking. These answers, as well as the others, helped to focus the program this winter, working to give students better communication skills, a better understanding of "red light conditions," as well as an idea of where to find the avalanche forecast and how to interpret it. Another point that is made with high school students is that parents need to be in the communication loop regarding entering the backcountry and if that decision is appropriate.

4.2 Post Course survey results

When students were asked many of the same questions post-course, the answers were encouraging for the program.

When asked "I can recognize avalanche terrain," 83% of students (48 students) agreed or strongly agreed, versus 27% (24 students) who agreed or strongly agreed with this statement pre-course.

Tbl. 1: I can recognize avalanche terrain

	Pre Course	*Post Course*
Strongly Disagree	29	1
Disagree	32	1
3	18	8
Agree	23	20
Strongly agree	7	28

When asked "I can recognize the red light conditions that contribute to avalanches," 86% of students agreed or strongly agreed with this statement, versus 20% (24 students) who agreed or strongly agreed with this statement pre-course.

Tbl. 2: I can recognize the red light conditions that contribute to avalanches

	Pre Course	*Post Course*
Strongly Disagree	30	0
Disagree	34	0
3	23	8
Agree	17	19
Strongly agree	5	31

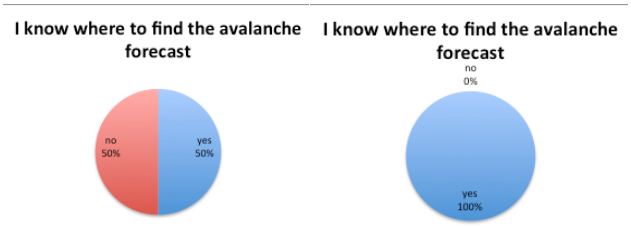
When asked, "I understand the ALPTRUTh avalanche decision-making model and can use it to make better decisions in avalanche terrain," 91% of students (53 students) agreed or strongly agreed with this statement, versus 22% (24 students) who agreed or strongly agreed with this statement pre-course.

Tbl. 3: I understand the ALPTRUTh avalanche decision-making model and can use it to make better decisions in avalanche terrain.

	Pre Course	*Post Course*
Strongly Disagree	46	1
Disagree	18	1
3	19	3
Agree	14	14
Strongly agree	10	39

Another question that students were asked both pre-course and post-course is "Do you know where to find the avalanche forecast?"

Results, as illustrated in Fig. 5, show that by the end of the unit, all students knew where to find the daily avalanche forecast.



4.3 Current curriculum discussion

One of the key messages during this course was how to recognize red light conditions – recent avalanche activity, collapsing or "whumphing", and shooting cracks. Students able to recognize these conditions have another tool to keep themselves safe. This, in conjunction with numerous discussions and practices regarding recognizing avalanche terrain and how to move through the mountains defensively, avoiding avalanche terrain, are tools that can improve safety in a winter environment.

Decision-making in the backcountry can prove challenging for any group. ALPTRUTh can provide probabilistic decision-making strategies for the assessment of avalanche risk. Students are introduced to ALPTRUTh (McCammon,) in the classroom, review the avalanche forecast with ALPTRUTh in mind, and overlay their pre-trip plan with ALPTRUTh, in an effort to choose appropriate terrain for the conditions.

Although ALPTRUTh is not a decision-making tool, it does offer students a succinct, organized way to sort information.

Students repeatedly checked the forecast during the course, overlaid ALPTRUTh on the forecast, and discussed terrain appropriate for a given day. When discussing appropriate terrain, AAI instructors and high school teachers discussed terrain for

skiing, snowboarding, snowmobiling and for building jumps. We recognize that students are not just heading out in the backcountry to ride powder, but they are also heading out to build jumps. Recognizing avalanche terrain, including terrain traps, is a key component to reducing exposure to backcountry hazards for these students.

4.4 Conclusions from pre and post course survey

Students in Jackson, WY live in a snowy environment for 6 months out of the year. The Avalanche Physics and Awareness unit taught in their high school science classes helps students to develop a better understanding of their surrounding environment. At the end of the unit, all students in the course knew how to get the avalanche hazard and the avalanche forecast. The majority of students surveyed at the end of the unit (50 students, 86% of student responses) agreed or strongly agreed to the statement, "I can recognize the red light conditions that contribute to avalanches." One student was quoted as saying, "I would like to say thank you, even though I have never backcountry skied, the information was useful because we live in a town where all the information is relevant."

Giving students tools to recognize the hazard, to better inform themselves by reading what the forecasters have to say, and offering them a tool for sorting information is what the goal of this program has been for the last 12 years. Based on survey results, students are understanding the information that is being presented and are able to apply it to their practices. There are still students who say they can't recognize avalanche terrain and can't recognize the red light conditions that contribute to avalanches. Based on these responses, we will continue to adjust our curriculum and focus on presenting information to a wide variety of learning styles.

5. CONCLUSION

The American Avalanche Institute has been working with Jackson Hole High School for the last 12 years, helping to educate the youth of Jackson, WY regarding snow and avalanches. In an effort to guide our instruction and quantify the efficacy of our education, students answered both pre and post course surveys.

Based on student responses, communicating how to find the avalanche hazard and avalanche forecast is working. 100% of students answered that they could do this by the end of the course.

The majority of students can recognize avalanche terrain and can recognize red light conditions. Since this answer is not 100%, we can continue to improve our teaching, through more repetition and a variety of presentation styles.

The avalanche education program has grown and changed over the last 12 years. Students now receive 9 days of instruction in their science class that is focused not just on the physics of snow, but also on avalanche awareness. Students have the opportunity to continue this education by spending 2 additional field days with AAI instructors, in order to complete a level 1 course.

The goal for this program is to continue to grow, adapt and modify within the Teton County, WY school system. We would also like to see this program expanded into mountain towns throughout the world. We are hopeful that we can expand our program or help others to begin one of their own.

6. CONFLICT OF INTEREST

This program was not supported financially by manufacturers of avalanche safety equipment. None of the authors are involved financially in the production or sale of avalanche safety equipment nor have they received any related grants or patents.

Sarah Carpenter is the co-owner of the American Avalanche Institute, an avalanche education school based in Jackson, WY.

Trevor Deighton is a science teacher employed by the Teton County School District and an Avalanche Educator employed by the American Avalanche Institute.

7. ACKNOWLEDGEMENTS

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Backcountry Access has been very supportive of this program, providing transceivers, shovels, probes and packs for field days.

The Steve Romeo Memorial Fund is instrumental in this program, providing funding to run this, and all youth avalanche education program in Jackson, WY each year.

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