Introduction to Improving Adaptive Snow-Sports through Engineering Design, Ergonomic Form and Function.

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Design and approval of surveys and follow-up survey was cleared by State University of New York, University of Binghamton's Institutional Review Board prior to any questionnaires or interviews being conducted.

Abstract:

Project focus is on improving adaptive ski/snowboard equipment through ergonomic design, form/function to increase participation in adaptive snow-sports. By surveying users, instructors/coaches, manufacturers, and collected and categorize data, for both ergonomics and equipment functionality. The areas that need improvement in practice and methodologies were presented and identified through two groups (instructors/participants).

All areas are sighting for each problem where this sport can improve participation. Data was collected based on those variables and statistics were calculated. Using that data and comparing them with both groups (participants/instructors) helped identify similar issues within those groups. Ranking that data for the top categories gave some more predominant issues.

Next to cost, lift and lift issues, equipment failure/comfort, communications, and not having enough instructors were all part of those categories.

Following up with adaptive snow-sports instructors to confirm further information from their teaching perspective, was gathered to assist in updating some equipment standards and adaptive teaching practices. This area was another one of "top categories" identified from our original survey data. Using the identifying and qualitative information; I plan to work with Rehabilitation Engineering & Assistive Technology Society of North America, "RESNA" proposed standards committee to promote new standards for adaptive ski equipment to enhance the future of adaptive snow-sports.

Investigating future teaching practices and methods will be discussed as a virtual lesson simulation for adaptive snow-sports. Having a way to "try" a ski lesson and understand how your body should react in the situation would allow the student to comprehend skiing techniques properly and be ready to take one in real life.

Using the recorded adaptive ski /snowboard practices from users and instructors in my initial survey collection. Evaluating those practices and calculating the proper lifting limits for instructors, using established National Institute for Occupational Safety and Health "NIOSH" revised lift guidelines; immediately showed a need for elimination of lifting capacities presently on instructors.

We can assist the future teaching methods to exclude any lifting by promoting self-loading sit-skis and establish these as the new RESNA standard. Resulting in reduced injuries from strenuous lifting or painful movements by adaptive instructors.

Meaning, we could change future manufacturing methods for the sit-ski models. Some already follow this current design, so it is not an unknown design concept.

Collecting more information from this population of people, we can confirm suggestions to problems they already have with current equipment. These future ergonomic design changes could improve equipment life, future failures, and overall functions for daily use.

Following up with adaptive instructors that may have significance experience (>20 years), will helped develop the future equipment design possibly eliminating the use of tethers. Using data gathered, analyze and compare similarities that exists from instructors/participants on the East Coast vs. West Coast, has helped expose barriers to participation and the sport itself.

Gathering and review of all this statistical data will develop future design for ergonomic function of equipment, and the standards of practice of adaptive snow-sports instruction.

Suggestions of these standards will be brought to the annual RESNA meetings for review and approval. This will assist manufacturers in knowing what they will need to follow in future equipment designs. Improving the equipment for both the participant and instructors, and that is what we are trying to accomplish.

These accomplishments will not only improve the sport itself but expand the participation by publishing these results.

Biographies

Currently is a part-time Lecturer with the State University of New York (SUNY), Buffalo State College in their Engineering Technology Department, has over 20 years in Industry as Industrial Hygienist, Production Manager, Industrial Engineer, Safety and Health Consultant.

Oversees, Saving Grace Outreach in Cattaraugus, NY, where she serves as the outreach director for all food programs, clothing/household and emergency shelter program.

Volunteer for Cattaraugus FEMA Board last 6 years, Emergency Responder with Erie County Hazmat Team for over 5 years, Volunteer for Adaptive Ski Instructor with Lounsbury Program at Holiday Valley Resort.

Education:
Ph. D. in Industrial and Systems Engineering with SUNY Binghamton University
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