

Improvements to Teaching Methodology for Adaptive Skiing Using Ergonomics and Engineering

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Abstract

The practice of alpine snow sports involves movements at a high rate of speed down a sloped hill over various terrains. This method of adaptive skiing can also involve avoiding trees, people, towers, rocks, and other objects. In learning about adaptive snow sports, the participants must accept that risk. All instructors intend to teach students how to safely enjoy adaptive snow sports. Could the risks of sport be reduced? Would participation increase if risks were eliminated? How could we aid in the amount of communication used in adaptive sit-ski lessons? Most adaptive lessons take time and repetition, making communication difficult in a noisy, and cold environment. Over 60% of instructors expressed this difficulty in the snow-sports survey conducted for improving adaptive snow-sports by O'Neill (2021). With the aid of their outriggers allowing them to turn, they also will assist this population in becoming more stable and independent. This is a teaching methodology in which communication with the participants is necessary, so they absorb the techniques during a lesson. Participating in sports regularly has been shown to increase mental outlook and help improve their quality of life (Hulme, 2018). People using this equipment sit in a sled-type ski on 1 (mono) or 2 (bi-skis) and use their arms with outriggers that are shorter arm poles with ski ends on one side and a brake on the other. Improving participation in adaptive snow sports by exploring methods that can improve communication and teaching techniques is a goal of this research. Getting more adaptive participants on the slopes and learning to become independent skiers is what Professional Ski Instructors of America (PSIA) methodologies stress (2013). Unfortunately, many of these techniques are not often taught. One improvement resulting from our research was a redesign of a rear handhold that can improve teaching by allowing multiple instructors to assist a student while maintaining proximity. A review of these methods while increasing adaptive snow-sports participation is what this research strives to achieve.

Simulators in multiple industries are effective in learning tasks where people and equipment are at risk. Training in a simulator has been a safe and effective method for industries such as flight, Hanners (2021). Adaptive snow sports deal with a population that has limited physical mobility and cognitive limitations, so getting them outside is an important part of their health. If simulation could make it easier to try an outdoor sport without all the heavy clothes and equipment, it could increase participation. Teaching a regular adaptive sit-ski lesson takes approximately 2 hours, to learn all the beginner motions to control a sit-ski, and practice these techniques, repeatedly. This could make it difficult to teach complex maneuvers when on a tight schedule. Other limitations might be weather conditions, time of day, and the limited number of instructors. Offering improved methodology for teaching flatlands along with a simulator, could assist students in learning skills required to control a sit-ski for adaptive alpine skiing. Starting with basic flatland maneuvers, and progressing in each level, simulators could spark interest in a disabled population who may otherwise be hesitant to try something that may seem risky, or dangerous.

Keywords

Adaptive snow sports, teaching simulators, adaptive teaching, learning sports, sit-skis

Biographies

Elizabeth O'Neill, Assistant Professor in the Department of Industrial Engineering Technology, State University of New York, Buffalo State University and the University of Buffalo. Her research on adaptive snow sports was through her Dissertation; "Improving Adaptive Snow-sports through Engineering Design, Ergonomic Form and Function at the State University of New York, University of Binghamton. She continues to teach industrial safety and engineering courses while completing research in this topic area. She researches projects in ergonomics, and 3-D printing for manufacturing applications.

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