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Research Article

INTENSIFICATION OF THE PROCESS OF ALPINE SKIING TEACHING THROUGH TRAINING ON INLINE SKATES

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A B S T R A C T

The purpose of this research was to assess the influence of introductory inline skating training as regards the future learning of alpine skiing. Participants were divided into two groups of students from the University of Athens during the years 2012-2015. Group A (111 persons) was trained on inline skates prior to a ski camp at the Parnassos Ski Centre (simulation of the basic technique of alpine skiing), while group B (117 persons) participated in the camp without any prior inline skating training. All study participants were beginner skiers. Both groups (A and B) got the following time-based tests: 1. The "Haczkiewicz triangle test" (on a blue ski slope), 2. The "Slalom test" with seven gates (on a red ski slope). The statistical analysis was conducted with F-test and ANOVA test ($F = 0.004 < 0.05$) for independent samples in order to determine differences between mean values of a common variable (the time of performing each test) for both groups. The difference between times in the "Haczkiewicz test" and the "Slalom test", achieved by students who got inline skating training (group A) and students who did not participate in it (group B), was statistically significant. Teaching the basics of alpine skiing technique on inline skates has a beneficial influence on the effects of training and should be applied in order to increase the effectiveness of alpine skiing teaching.

INTRODUCTION

Skiing is taught in specific and often difficult conditions that differ from the generally accepted standards of physical education teaching. New experiences in skiing frequently include low temperatures, snow, limited visibility, and exposure to alpine landscape; such experiences may have a daunting effect on people who have never before been on the mountains. Furthermore, students, who participate in training camps organized by universities, also experience stress due to the requirement of receiving a passing grade from the classes. Such training is a complex didactic process within a short time (most often 3-10 days). Effectiveness of teaching and safety are of primary importance here. One of the methods of increasing the effectiveness of teaching is to incorporate the phenomenon of skills transfer.

Many authors (Harb *et al*., 2004; Hintermeister *et al*., 1994; Kroll *et al*., 2004; Lindinger *et al*., 2001; Neumaier *et al*., 1997; Petjanke *et al*., 1995; Radman *et al*., 2016) observe that inline skating is similar to the skiing technique.

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In particular, Duquette, (2000); Hebert-Losier, (2014); Lazarenko, (2014) and Roschinsky, (2004) explain that the carve turn in skiing and inline skating has a similar mechanism, and that the forces engaged in both techniques have similar characteristics. The turn is executed on the edges of the skates and requires the skater to maintain lateral and frontal balance as well as to bring their center of mass low in relation to the inside of the turn radius. Hoffman *et al*., (1992) state that the physiological strain presented during recreational inline skating with poles at 15 km/h is similar to the strain presented during recreational skiing of physically fit persons, i.e., about 68-90% of VO2max. This is why many competitive and recreational skiers train on inline skates during the summer (Giovanis and Vasileiou, 2017; Hoffman *et al*., 1992; Louis *et al*., 2012; Roschinsky *et al*., 2004).

Inline skating has been treated as a separate for a long time. It comprises many different types, such as aggressive skating (trick skating), speed skating (long-distance or sprint), hockey skating and downhill skating. At the same time, inline skating is a complementary sport in many winter sports (Nordic and alpine skiing, ice skating, hockey, etc.).

Bearing in mind the biomechanical and physiological similarity between skiing and skating, it seems obvious that improving one's skills in one sport it may also improve them

in the other sport. Roman *et al*., (2009) investigated the phenomenon of motor transfer from inline skating to skiing. They observed that persons who participated in inline skating performed significantly better in the "slalom test" than non-participating persons. Their research involved youth from alpine areas.

This research verified the effects of the transfer of skills acquired in inline skating on learning beginner-level skiing (it was observed by the aforementioned authors) on the basis of training camps organized in Greece. Issues that concern the teaching of skiing in Greece are similar to those in Poland and include short seasons, large distances to ski centers, and a lack of tradition to teach alpine skiing in primary schools. For the aforementioned reasons, ski camps, that were organized by both University of Athens and University of Physical Education and Sport in Gdansk, involve many persons at the beginner level of alpine skiing. To increase the effectiveness of teaching, we conducted an experiment at the University of Athens that involved inline skating training prior to the ski camp (Giovanis, 2006; Giovanis *et al*., 2008). The crucial aspect of skill transfer uses practical exercises that are directly related to motor terms.

The purpose of this research was to assess the influence of introductory inline skating training as regards the future learning of alpine skiing.

METHODOLOGY

Study participants comprised 228 students (113 women and 115 men) from the University of Athens during the years 2012-2015, divided into two groups. Group A (111 persons) got inline skating training prior to a ski camp at the Parnassos Ski Centre (simulation of the basic technique of alpine skiing, Giovanis *et al*., 2010), while group B (117 persons) participated in the camp without prior inline skating training (Table 1). The training consisted of four trips of three days and each one took place on consecutive weekends. Based on previous studies (Baka and Aschenbrenner, 2009; Giovanis and Aschenbrenner, 2010; Wojtyczek *et al*., 2014) and because gender distribution was similar in both groups, it can be stated that gender does not have a significant influence on the effects of teaching beginner-level skiing; for this reason, the influence of inline skating according to gender was not analyzed. All study's participants declared that they were beginner skiers. Both groups (A and B) had the following time-based skiing tests:

1. "Haczkiewicz triangle test" on a blue ski slope, on the last day of training (Giovanis, 2006; Haczkiewicz, 1976; Pawlik, 1993),
2. "Slalom test" with seven gates on a red ski slope, on the last day of training.

Table 1 Number of participants (women, men, A – inline skates training, B – no inline skates training).

	Year				
Groups	2012	2013	2014	2015	Total
Women					
A	18	12	14	16	60
B	17	17	16	3	53
Men					
A	16	9	10	16	51
B	20	13	20	11	64
Total	71	51	60	46	228

The "Haczkiewicz test" was used to assess the participants' motor abilities (primarily coordination) in terms of their predispositions to learning the basic technique of skiing. It involved running on alpine skis twice along a triangle path (length of each side 10 m) located on a low-inclination ski slope. The "Slalom test" assessed the effectiveness of the participants' skiing technique. The level of mastery of the skiing technique was evaluated using the expert evaluation method with a 5 -point scale. Three basic drills were evaluated: the snowplow turn, the stem turn and freestyle skiing (the participant crossed a set distance using any technique they were best at). In addition, questionnaires were used to assess participants' engagement and training satisfaction on a 5-point scale, where five points constituted the best score (referred to as "enthusiasm"). Engagement and satisfaction are important elements of the process of teaching, because they determine trainee motivation (Baka and Aschenbrenner, 2007). Statistical analysis was conducted with F-test and ANOVA test ($F = 0.004 < 0.05$) for independent samples in order to evaluate the differences between mean values of a common variable (the time of performing each test) for both groups. Spearman's rank correlation coefficient was also calculated.

RESULTS

On their last day of training, the participants took the "Haczkiewicz test", a special fitness test for beginner skiers. Group A, which took part in an introductory inline skating training, achieved a statistically ($p < 0.01$) lower mean time (37.07 ± 12.57 s) than group B (53.48 ± 11.13 s), which did not take part in the skating training (Table 2).

Table 2 Results of the Haczkiewicz test for groups: A (inline skates training) and group B (no inline skates training).

Group	M [s]	Min	Max	SD
A	37.07*	15.77	78.1	12.57
B	53.48*	22.34	123.12	11.13
Total	44.06	15.77	123.12	18.58

* statistically significant difference ($p < 0.01$)

Group A performed over 30% better than group B, which indicates the beneficial influence of inline skating on the motor abilities necessary for skiing. The results of the "Slalom test" indicate the effectiveness of the participants' skiing technique. Group A performed better than group B. Participants, who were trained inline skating training, achieved a mean slalom time of 15 ± 2.7 s; which was statistically better than the achieved mean time of the persons who did not got the introductory training (17.6 ± 2.9 s, Table 3).

Table 3 Results of the "slalom tests" for both groups: A (inline skates training) and group B (no inline skates training).

Group	M [s]	Min	Max	SD
A	15.0*	13.4	37.3	2.7
B	17.6*	14.2	38.2	2.9
Total	16.1	13.4	38.2	2.9

*statistically significant difference ($p < 0.05$)

The results of the "Haczkiewicz test" were correlated with the results of the "Slalom test" (performed on the last day of training) in order to evaluate the usefulness of the Haczkiewicz test for the assessment of participants' predispositions for learning skiing.

Figure 1 Statistical analysis was conducted with F-test and ANOVA test (F = 0.004 < 0.05) for independent samples in order to determine the differences between mean values of a common variable (the time of performing each test) for both groups.

To eliminate the influence of weather conditions in different years of the study, we compared the achieved times, instead of race positions. Then we calculated the rank of Spearman's correlation coefficients (Figures 1 and 2). The results of the test were statistically significant in both groups: r = 0.72 in group A and r = 0.50 in group B ($p < 0.05$). Expert evaluation was performed by ski instructors at the end of the training and no statistically significant differences between the groups were found.

However, a tendency was observed for persons who got inline skating training to receive better scores. Group A achieved better scores in the snowplow turn and freestyle skiing (2.8 and 3.2 points for group A and 2.6 and 3.0 points for group B, respectively). Group B performed slightly better only in the stem turn (2.5 points for group A and 2.6 points for group B, Table 4).

The assessment of participant's enthusiasm, which was performed by the ski instructors, constituted an auxiliary evaluation. However, it still reflected the participant's engagement in learning skiing. People who received inline skating training had higher mean enthusiasm (3.6 ± 0.5 points) than persons without such training (3.4 ± 0.6 points).

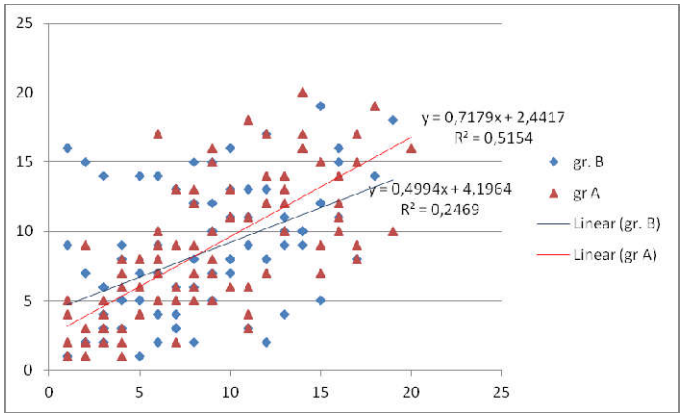

Figure 2 Relationship between results of the "Haczkiewicz test" and the "slalom test" in group A (inline skates training) and group B (no inline skates training).

Table 4 Evaluation of ski technique for groups: A (inline skates training) and group B (no inline skates training).

Groups:	A		B	
Kind of exercise:	M [pts]	SD	M [pts]	SD
Snowplow turn	2.8	0.8	2.6	0.9
Stem turn	2.5	0.7	2.6	0.9
Free skiing	3.2	0.6	3.0	0.9

*statistically significant difference ($p < 0.05$)

The final score was statistically higher for persons who got an introductory inline skating training (4.2 ± 0.7) than for persons who did not participate in such training (3.5 ± 1.0; Table 5).

Table 5 General score and enthusiasm score for groups: A (inline sates training) and B (no inline skates training).

Group	A		B	
	M [pts]	SD	M [pts]	SD
Enthusiasm	3.6	0.5	3.4	0.6
General score	4.2*	0.7	3.5*	1.0

* statistically significant difference ($p < 0.05$)

DISCUSSION

Previous research (Baka and Aschenbrenner, 2007) indicated that in groups with a different fitness level, the time of completion of a slalom course by beginner skiers does not depend to a significant extent on the level of motor characteristics; rather, it depends on the level of technical mastery.

This research found a beneficial influence of introductory training on inline skates, which confirmed the observations done by Roman *et al*., (2009) on the positive motor transfer from one to the other. A person, who had gotten training on inline skate, was already familiar with the transposition of balance and the mechanism of turns involved in skiing and was able to control his speed and trajectory of movement, which helped them greatly to learn the ski technique. Training on inline skates allows for increased intensity of ski classes as the trainees are better prepared, in terms of strength and coordination. It should be noted that, ski classes with such high intensity can be conducted in groups with an intermediate and advanced level of physical fitness; such was the case in our experiment, which involved students of physical education. In our opinion, a group, that got a thorough, several-week-long introductory training on inline skates, was able to learn the ski training curriculum from the basics to the parallel turn in about three days; learning the same material, takes the few best students at least 5-7 days.

This transfer may be both positive, by facilitating the process of learning, and negative, by making it more difficult for the trainee to change their habits and reflexes in order to acquire a new skill. Incorrect habits and negative experiences (pain, falls, etc.) that stem from an unskillful training on skates may hamper future ski training.

CONCLUSIONS

The results of the study showed the following:

1. The group who got inline skating training performed better in the "Haczkiewicz test" and the "Slalom test".
2. Correlating the results of the "Haczkiewicz test" with the achieved time during the "Slalom test", it showed a greater positive correlation (r = 0.72) to the "inline skates group", with the coefficient of determination amounting to $R^2 = 0.51$ (statistically significant), than

for the non-skates group ($r = 0.50$; $R^2 = 0.25$). This may indicate a greater significance of the "Haczkiewicz test" in participants who received an introductory inline skating training than in participants who did not participate in such training, for whom the results are random.

3. The inline skates group achieved better scores for enthusiasm, which indicates that they were better engaged in training and that they were more satisfied from skiing than the other group. This may occur, due to a better understanding of movements that were learned and the fact that the trainees were already familiar to additional equipment on their feet and the transposition of balance. Inline skating training decreased their fear of speed and falling.
4. The difference in times achieved, in the "Haczkiewicz test" and in the "Slalom test" between participants who received inline skating training (group A) and participants who did not get such training (group B), was statistically significant.
5. The group who got an introductory inline skating training achieved better scores in the qualification tests at the end of the training. They also showed greater enthusiasm during the course of training.

Practical application

The basics of the alpine ski technique can without a doubt be taught on inline skates during the beginning stages of learning (on various asphalt pitches) as introductory inline skating training has a positive influence on further ski training.

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