EFFECTS OF PRACTICE STYLE ON A COMPLEX GYMNASTICS SKILL PERFORMANCE OF HIGH-, MEDIUM-, AND LOW-SKILLED LEARNERS

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Abstract

This study examined the effect of the practice style of teaching in teaching a complex gymnastic skill and compared the achievements of low, medium and high skilled learners on motor skill performance. 46 students of the first highschool grade aged 12-14 years, of two classes, were taught using practice style of teaching the handstand forward roll during (12) lessons, 30 minutes each, 2 times per week. The skill performance has been recorded and evaluated prior, post and two weeks after the end of the program. Based on the initial compound measurement scores, students were grouped into three equal groups of low, medium and high skill. The 3 x 3 analysis of variance (skill level group x test), with repeated measurements in the last factor showed that all the groups have improved their performance both in outcome (quantitative measurement) and in technique (qualitative measurement) of the handstand forward roll and that there were significant effects for the learners' skill level. This study showed that low skilled learners improved to a greater extent, compared to those of medium and high skill, particularly as for the skill outcome.

Keywords: Practice style of teaching, motor learning, gymnastics skills, adolescents.

INTRODUCTION

The sports skills are central point of the teaching in most programs of physical education (PE). Key objective for the teacher of PE (TPE), is the implementation of appropriate strategies and methods in order to achieve learning and improvement of motor skills.

The learning of motor skills is a problem related to the control and synchronization of the trunk and the body parts, which must operate in accordance with the time and spatial restraints required to reach the target skill (Magil, 1993). The motor learning occurs as a result of training and experience converting in this way the acquisition of motor experience and practice to the most powerful predictors of skill learning (Silverman, 1996). According to Schmidt, (1991), the practice is the most important factor for the effectiveness of performing a skill, where learning and experience lead to performances with the least effort.

Silverman (2005) states that the more time spent practicing a skill, the more learning will take place. The degree of learning is a function of the relationship between the time actually spent on learning and the actual time it takes (Silverman, 1996). Correlational studies have consistently found out that skill learning is positively related to the number of successful practice trials and negatively

related to unsuccessful practice (e.g., Ashy, Lee, and Landin, 1988).

In physical education classes, the researchers discovered that the time spent on student practice is also related to the effectiveness of teachers (De Knop, 1983), and also to the teaching strategies they apply (Silverman, 1996). The more effective teachers provided their students with the double amount of the engaged skill learning time than the less effective teachers (Phillips & Carlisle, 1983). On the other hand, effective teaching is characterized by a lot of practice time and limited instruction and management (Behets, 1997). Physical education is "learning by doing". The teaching strategies which promote the practice are very important, since students need enough time to learn the motor skills (Silverman, 1996).

There is no single superior teaching style or teaching-learning approach (Mosston and Ashworth, 2002). All teaching styles, when used appropriately, contribute to human development in different ways. Consequently, the use and significance of each individual style will be determined by the teaching objectives. Researchers have recognized that the use of reproductive styles is more suitable for the acquisition of motor skills than productive styles (e.g., Hein, 2012).It is also generally accepted that direct teaching styles are suitable for the improvement of learners' motor performance (e.g., Housner, 1990), and more effective in learning motor skills (Hein & Kivimets, 2000; Siedentop, 1991). Unlike the indirect or child-centred instruction, (Metzler, 1983), the direct instruction relies more on the teacher's initiative, on taking decisions and it is characterized by task-orientation, clear statement of goals, demonstration and explanation of the task, the teacher's control, the close supervision, immediate and task-related feedback (Boyce, 1992; Siedentop, 1991). Teacher-centered (direct) teaching styles can be also considered as controlling behavior whereas student-centered teaching styles as autonomy-supportive behavior.

The practice style is one of the most well-known forms of teaching in PE, from the spectrum of teaching styles of Mosston, (Mosston, 1966), associated with the direct teaching. The practice style largely represents the prevailing form of teaching in schools (Cengiz & Serbes 2014; Salvara & Birone, 2002; Cothran et al., 2005). It has also been found that in professional and amateur sports, coaches use primarily the practice style of teaching during workouts of the year (Hewitt & Edwards 2015).

The practice style of teaching aims at increasing students' practice (Mosston & Ashworth, 2002). On the basis of the theory of spectrum, in practice style the TPE decides on the purpose of the teaching unit, the exact duties or the tasks that must be completed, as well as the criteria of the acceptable performances. The aim of the practice style is to learn the students to work individually, giving time and opportunity to practice in their own pace (Mosston & Ashworth, 2002). The same authors state that, providing a relative independence and freedom gives students the opportunity to maximize practice time. Researchers claimed that the opportunity to maximize the available practice time by students is connected with improving performances (Goldberger & Gerney, 1986; Goldberger, Gerney, & Charnberlain, 1982). Other researchers argued that during the practice style of teaching students receive individual feedback on skills at a higher rate (Byra, Sanchez, & Wallhead, 2014).

According to the research of teaching styles, a relatively small number of studies examined the effects of practice style, in comparison with other styles (command, reciprocal and inclusion), on various motor skill performances (Beckett, 1991; Boyce, 1992; Goldberger & Gerney, 1986; 1991; Goldberger et al., 1982; Griffey, 1983; Harrison, Fellingham, Buck, and Pellett, 1995; Zeng, Leung, Liu, & Bian, 2009). These surveys have highlighted the effectiveness of practice style to improve motor skills, for the majority of learners. However, some contradictions have turned up about the influence of the practice style

in the students' skill level. Other studies showed that the practice style was more effective in medium skilled learners (Boyce, 1992; Goldberger & Gerney, 1986; Goldberger et al., 1982; Jenkins & Byra, 1997), others that was equally appropriate to medium and high skilled learners (Beckett, 1991; Griffey, 1983), but also to students of low potential (Harrison et al., 1995). The researchers attributed these conclusions to the different ages of samples, the nature of learning skills, but also to the different learning environments.

In the specific area of gymnastics, numerous studies have been published that investigated various aspects of learning and teaching of gymnastic skills. Most recent studies highlight the importance of practice in gymnastics as a wide range of new skills must be acquired and the acquisition as well as the retention of complex motor skills presupposes possession of the simpler skills (Delaš Kalinski, Miletic & Bozanic, 2011), of the quantity and quality of practice (Pehkonen, 2010), and of a good organizational strategy in mini-circuits (Ariza, Domínguez, López, & Vernetta, 2011; Vernetta, Delgado, & Lopez, 1996). Also, authors stated that the fundamental movement skills (Culjak, Delas Kalinski, Kezic, Miletic, 2014), the individual positive and encouraging feedback (Delaš Kalinski et al., 2011), and the observation of model with verbal teaching (Maleki, Shafie Nia, Zarghami, & Neisi, 2010), are factors of particular importance for the qualitative acquisition of basic and complex gymnastics skills. Other authors demonstrated that, as a learner acquires a motor skill in gymnastics, this changes the way the learner perceives that skill (Heinen, Mandry, Vinken, Nicolaus, Nunomura, Oliveira, 2013). In addition, there have been several studies that examined differential practice effects within novice and experts gymnasts and highlighted the differences in coordination pattern of expert gymnasts when performing the same skill (e.g., Huchez, Haering, Holvoet, Barbier, Begon, 2016). However, there were only a few surveys on issues related to the impact of

teaching styles, in particular for the practice style, on the learning of gymnastics skills in schools. The most recent research refers to the reciprocal teaching and "task assignment", using a mini-circuit organization, and it relates to University students (Santana, Sánchez, & Bedoya, 2015).

From the literature review (Chatoupis, 2009; Goldberger, Ashworth, & Byra, 2012), it seemed that the impact of the practice style on different motor skills as well as on the skill level of the students have not been adequately studied by researchers. The lack of relevant studies in the field of gymnastics and the implementation of longer duration programs, make this study necessary and of special interest. The gymnastics skills integrated into curricula of PE, are mostly complex sport skills and present special difficulties, especially for low-skilled students. Complex skills include control and synchronization of a larger number of body parts, and demand more practice to be acquired (Schmidt, 1991). It is accepted that, higher skilled learners typically have higher amounts of successful practice than the lower skilled peers (Herbert, & Landin, 1996). However, it is very likely the students of different skill levels to exploit differently the potential provided by the practice style, to increase their individual practice, and there might be different impact on their learning.

The findings related to the motor skill learning have their own significance in the field of PE. It is also important whether there are differences among learners of different skill levels when taught with practice style of teaching. The purpose of this study was to examine the influence of practice style of teaching in outcome and technique performance of a complex gymnastics skill, like the handstand forward roll, on highschool first grade students; in addition, to compare the effects of practice style on low, medium and high skilled students' motor performance. In this study, the practice style was chosen for the research because this style of teaching was

used more than any other style (over 50%), out of the total of TPE in schools (Cothran et al., 2005).

METHODS

The participants in the study were 46 students aged 12-14 years ($M = 12.7$, $SD =$. 44), of two classes of the first highschool grade in a semi-urban school. After the selection of the school that served the needs for the realization of the present study, a relevant authorization was requested from the competent departments of the Department of Primary Education and the Director of the school. Also, the guardians' written consent for the pupils' participation was requested because the subjects in the sample were minors. All attendees participated voluntarily, took part in all the tests and had full participation in courses while they had no athletic experience in gymnastics.

Treatment. On the basis of the PE curriculum of the grades of the school four (4) small homogeneous groups (2 of boys n = 27, and 2 of girls n = 19) were formed in order to facilitate teaching. All groups followed the same teching style (practice), and the same training program to learn the handstand forward roll. They also, had equal practice time and used the same tasks and the same equipment. Furthermore, there were specific positions and equipment, for each task and students practiced two by two in each equipment. In each lesson, students practiced circular in four tasks, both of which focused on learning the handstand forward roll and the rest on different gymnastics tasks. Totally six (6) tasks were used for learning the handstand forward roll, referred to in the relevant literature (Knirsch, 1998). The methodological progression was consisted of six distinct tasks: (1) performing forward rolls down hill, (2) swing to handstand on a mat against a wall with support, (3) candlestick (3-5 sec) and rolling forward to stand up,(4) front support from a stack (height: 0.70 m), kicking up using one leg to handstand, and rolling forward onto a gymnastics mat, (5)

front support with feet elevated up wall to handstand and rolling forward onto a gymnastics mat, and (6) performing the swing to handstand and rolling forward to stand up onto a gymnastics mat. A progressive partial teaching strategy was used which included the individual practice of each part of skill and then composition. The first two tasks were used in 1st-4th, the next two in the 5th-8th and the last two in the 9th-12th lessons.

The teaching was by the same TPE, who had sufficient experience in the application of the practice style of teaching of Mosston & Ashworth, (2002). Moreover, to ensure the validity of the experimental process and teaching style, detailed course plans were followed and all the sessions were tested by the researcher.At first, there were two (2) preliminary lessons for the students to understand the teaching style and the whole process. Then the main program was carried out, which was completed during (12) lessons, 30 minutes each, 2 times per week. At the beginning of each lesson, after a five-minute warm-up, the TPE explained and demonstrated the tasks that should be learnt, recalled the roles of students and teacher's role towards the students. Then the opportunity was given to students to practice, having at their disposal the instruction sheets and the criteria for each task. Each sheet included illustrations and instructions on how to perform the task, highlighting five (5) key points of the technique that the students should remember. During the exercise, the TPE provided individual and private feedback, on the movement quality and systematically moved students to the next station, every five (5) minutes. Manual assistance was provided when necessary. After each station change, as well as at the end of the lesson, the teacher provided also summary feedback and highlighted the key points of the tasks.

Skill. A gymnastics skill was chosen that was unknown to the students of the 1st high school grade, but which is included in the PE curriculum. That skill was the handstand forward roll, a complex skill. It consisted of connecting two individual

elements, the handstand and the forward roll. It is an easy task for gymnastics athletes but relatively difficult for beginners high school students, as it requires, among other things, the development of the necessary nerve-muscle coordination and various abilities, such as strength support, balance, orientation etc. and therefore requires enough training to be assimilated.

Skill test. Prior to the instructional phase of the study all subjects were pretested on their ability to perform the handstand forward roll. Pretesting was conducted to determine the learner's level of skill prior to receiving instruction. Following the treatment phase of the study all of the subjects were posttested to determine the effects of the treatment on learner skill performance. The retention of learning was tested after two weeks followed the same protocol used during the pretest and initial posttest.

The evaluation process included a quantitative measurement (*outcome*) and a quality measurement (*technique*). The execution in handstand forward roll evaluated through video and using a subjective assessment scale established in cooperation with two experienced gymnastics trainers. Trainers subdivided the task in ten separate phases of movement (see figure 1), identifying the main movement features of each part, and then determined the proper implementation criteria with corresponding reductions of each part of the task omitted or was executed with mistakes. Each one of these ten parts of the task was marked with one (1) point, giving a score range from 0 up to 10 points. Technique mistakes have been subdivided into three main categories, small, medium and big mistakes, with corresponding reductions of 0.10, 0.20 and 0.40 points, based on the code of points (F.I.G., 2009). The size of the deviation from the correct execution of each part of the movement defined the mistake category. Such errors related to incorrect positions of the body parts, the bad range and dynamic of the movement, the lack of pace, as well as small, medium or large assistance by the

TPE, during the task execution. Similar methods of evaluating the execution of the tasks in physical education are also described by other authors (Majerič, Strel, & Kovač, 2016).

"*Outcome*" assessment included the measurement of points from the task parts the student performed. The parts of the task omitted or executed with very poor technique were not assessed. The score of each student in outcome was the total number of the task parts the student could perform. Therefor, outcome scores are total number of separate phases of movement executed in the best trial

"*Technique*" assessment included the measurement of reductions for the technique mistakes appeared in each part of the task. Then the score of reductions were deductible from the outcome score and the final result was the student's technique score of the task. Therefor, technique scores are the number of separate phases of movement demonstrated without mistakes in the best trial.

Coding Procedures. To assess coding biases and reliability, three trained coders who were trained by one of the trainers coded each subject's tests (pre-post- and retention) twice. At first, they learned to evaluate properly the execution of the handstand forward roll, observing 10 different students. Then, after having coded 10 different students, the coders' scores were compared to those of the trainer. If agreement was less than 90 percent, then the training program was repeated and up to achieve the reliability criterion of 90%. The coders coded independently the videotaped skill performances and didn't know the group in which the students have joined in order to ensure the validity. Scores were, in each case, the average of the scores of the three coders.

Percentage agreement and intra-observer reliability was calculated using intraclass correlation coefficient (ICC; Fleiss & Cohen, 1973). The ICC values were given with 95% confidence intervals. An ICC value greater than 0.75 was considered as excellent agreement, 0.40 to

0.75 was fair to good and below 0.40 was poor. In the present study the intra-observer reliability both for outcome and technique were excellent (outcome: pretest .94 to .96, posttest .96 to 98, and technique: pretest .95 to 98, posttest .94 to .96). Similarly, the inter-observer reliability for outcome (.95 to .98), and technique (.94 to .96), were excellent.

Skill Level Procedures. In order to examine the influence of ability level on learner's skill performance in handstand forward roll all students were classified into three equal groups (low-, medium- and high-skilled). The above groups, low-skilled (LS; n = 16), medium-skilled (MS; n = 15), and high-skilled (HS; n = 15), arose after calculating and arranging hierarchically students' pretest complex scores (outcome and technique) and were divided by three. In Table 1 the pretest means for skill performance scores in handstand forward roll by ability group are presented. Regarding the learners' sex in each group's structure, the girls held the 31.25% of the low-skilled group, 40% of medium-skilled and 53.3% of high-skilled, compared to the other percentages of the boys. We realize that this confounds skill level and gender. But given the irregularity of the sample and that gender-based programming in PE classes, is considered unnecessary and since mandates separate instruction only by skill level, the results for skill level will be presented here.

Data analysis. Separate two-factor 3x3 analysis of variance (skill level group x test), with repeated measurements on the last factor (MANOVA) were used to examine student learning (from pretest to posttest and to retention test) for each skills test and to detect if one group was superior to each other. In total, two analyses of variance were conducted for each independent variable (outcome and technique) on handstand forward roll. Bonferroni *post hoc* analysis was also conducted to detect statistically significant differences between the levels of each factor and analyses of simple main effects were

conducted to examine the interactions between the factors.

RESULTS

Descriptive statistics. Descriptive statistics for each test and group for skill performance (outcome and technique) on handstand forward roll are presented in Table 2. All groups improved their performance from pretest to posttest and to retention test, both in skill outcome and in skill technique. The LS group showed the greatest improvement over the rest with a change score (gain) from the pretest of 2.12-2.22 points for the skill outcome, and of 1.42-1.46 p. for the skill technique. In contrast, the lowest progress was shown by the HS group, with a corresponding change score of 1.33-1.36 p. and 1.02-1.06 p., while showing the highest average scores in all tests, both in skill outcome and in skill technique.

Skill Outcome Performance. The 3x3 analysis of variance (skill level group x test), with repeated measurements (MANOVA), showed significant differences in the "test" factor ($F_{2,86}$=119.14, $p<.001$). A Bonferroni *post hoc* analysis revealed that all students showed significant progress from pretest to posttest and to retention test, with no changes from posttest to retention test. The effect of the "test" factor was tested separately at each level of the "skill level group" factor, and showed significant differences for the LS group ($F_{2,30}$=29.62, $p<.001$), the MS group ($F_{2,28}$=91.28, $p<.001$), and the HS group ($F_{2,28}$=90.08, $p<.001$). Tests of between-subjects effects showed that there was a significant primary effect of the "skill level group" ($F_{2,43}$=19.30, $p<.001$). A Bonferroni *post hoc* analysis revealed significant superiority of HS students, compared to those of LS and MS ($p <.001$).

Tests of within-subjects effects also showed that there was a statistically significant interaction between the factors "skill level group" and "test" ($F_{4,86}$=2.56, $p<.05$). A Bonferroni *post hoc* analysis showed a significant improvement from

pretest to posttest and to retention test for the LS group, and no significant improvement for MS and HS groups. For further control of the interaction the analysis of simple main effects was used which showed significant differences between the three groups for pretest ($F_{2,43}$=49.64, p<.001), posttest ($F_{2,43}$=10.12, p<.001), , and retention test ($F_{2,43}$=9.75, p<.001). A Bonferroni *post hoc* analysis showed that in the pretest the HS group was superior to MS, which was also superior to LS. In the posttest and retention test there were no significant differences between the LS and MS groups, whereas HS significantly exceeded the above groups. Figure 1 shows a trend to reduce the difference between the three groups from the posttest and the retention test for the outcome performance on handstand forward roll.

Skill Technique Performance. The 3x3 analysis of variance (skill level group x test), with repeated measurements (MANOVA), showed significant differences in the "test" factor ($F_{2,86}$=105.74, p<.001). A Bonferroni *post hoc* analysis revealed that all students showed significant progress from pretest to posttest and to retention test, with no changes from posttest to retention test. The effect of the "test" factor was tested separately at each level of the "skill level group" factor, and showed significant differences for the LS group ($F_{2,30}$=22.10, p<.001), the MS group ($F_{2,28}$=149.44, p<.001), and the HS group ($F_{2,28}$=83.21, p<.001). The pretest scores of all three groups were significantly lower than those

of posttest and retention test, and there were no differences between the posttest and the retention test. Tests of between-subjects effects showed that there was a significant primary effect of the "skill level group" ($F_{2,43}$=14.50, p<.001). A Bonferroni *post hoc* analysis revealed significant superiority of HS students, compared to those of LS and MS (p <.001). Moreover, LS and MS students did not differ significantly. Table 2 shows that the HS group had the highest means in the pretest (M=3.05), in the posttest (M=4.07), and in the retention test (M=4.11).

Tests of within-subjects effects also showed that there was no statistically significant interaction between the factors, "skill level group" and "test", ($F_{4,86}$=1.13, p>.05). For a more detailed investigation, the analysis of simple main effects was used which showed significant differences between the three groups for pretest (F2,43 = 37.85, p <.001), posttest (F2,43 = 8.19, p <.001), and retention test (F2,43 = 8.23, p <.001). A Bonferroni *post hoc* analysis showed that in the pretest the HS group was superior to MS (p<.001), and MS group was superior to LS (p<.05). In the posttest and retention test there were no significant differences between the LS and MS groups (p>.05), whereas HS differ significantly to MS (p<.05), and LS (p<.001) groups. Figure 2 shows a trend to reduce the difference between the three groups from the posttest and the retention test for technique performance on handstand forward roll.

Table 1.
Composite pretest scores for skill performance by Subject Group.

Groups	N	M	SD	Range	Min-Max
LS	16	1.80	.27	.82	1.33-2.15
MS	15	2.55	.21	.58	2.22-2.80
HS	15	4.13	1.14	3.02	3.08-6.10

Table 2.

Descriptive Statistics for each test and group for outcome and technique performance on handstand forward roll.

Groups	N	pretest		posttest		retention test	
		M	SD	M	SD	M	SD
Outcome							
LS	16	2.40	.42	4.52	1.67	4.62	1.71
MS	15	3.34	.26	4.99	.74	4.90	.74
HS	15	5.20	1.30	6.53	1.27	6.56	1.25
Technique							
LS	16	1.19	.17	2.61	1.34	2.65	1.34
MS	15	1.77	.30	2.92	.42	2.88	.49
HS	15	3.05	1.00	4.07	1.14	4.11	1.17

Note. Outcome scores are total number of separate phases of movement executed in the best trial, while technique scores are the number of separate phases of movement demonstrated without mistakes in the best trial.
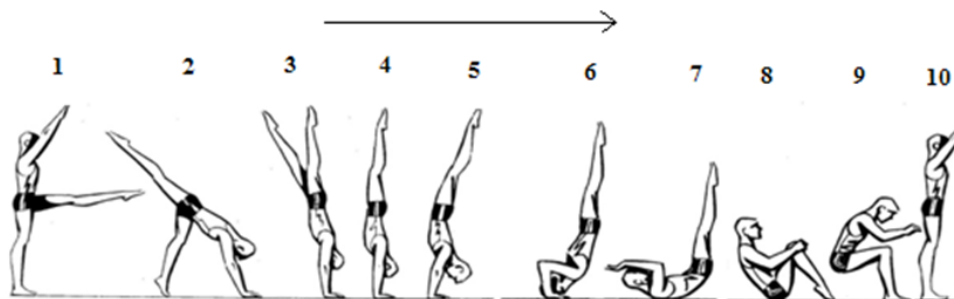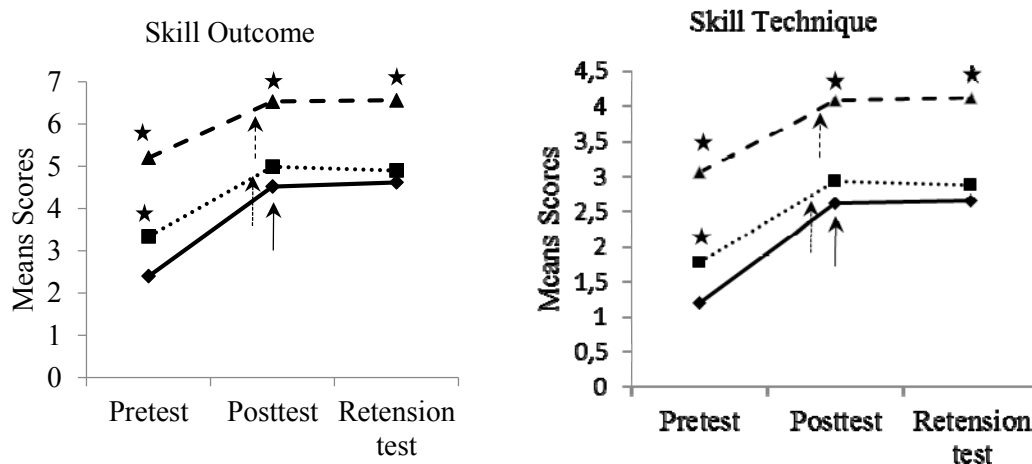

Figure 1. The ten selected phases of handstand forward roll performance.

Figure 2. Interaction between skill level group and test for outcome and technique performance on handstand forward roll. Low-skilled (continuous lines), medium-skilled (dotted dots), and high-skilled learner (dotted lines). Statistically significant differences at the 0.05 level between the three groups at each test are denoted by asterisks. Statistically significant differences at the 0.05 level between the three tests for each group are denoted by arrows. *Note: Outcome scores are total number of separate phases of movement executed in the best trial, while technique scores are the number of separate phases of movement demonstrated without mistakes in the best trial.*

DISCUSSION

In the present study the effect of practice style of teaching was examined in the *outcome* and the *technique* performance of the handstand forward roll, in high school first grade students. In addition, the differences among students of different skill level were checked in skill performance. The results of descriptive statistics revealed that all students showed a significant increase in average terms, from the pretest to the posttest and the retention test, showing more parts of the skill (*outcome*), and achieving better quality of movement (*technique*). These results suggest that learning took place during the teaching period and that teaching in the context of practice style had a positive effect, regardless of the students' skill level. These findings come in agreement with the results of other researchers (Babatunde, 2014; Beckett, 1991; Boyce, 1992; Goldberger & Gerney, 1986; Goldberger et al., 1982; Santana, Sánchez, & Bedoya, 2015).

The analysis of the multiple comparisons test showed that there were no changes among the scores of the posttest and the retention test (*outcome* and *technique*), for all groups. These findings confirm that learning was preserved significantly, during the two weeks retention period, regardless of the students' skill level. The above findings are reinforced by the findings of other surveys (Beckett, 1991; Boyce, 1992; Goldberger & Gerney, 1986), and are of particular interest, because, in the research of teaching style, the retention period was omitted. As is generally accepted the retention tests are very important in the evaluation of the effectiveness of the teaching method in learning providing information regarding motor skills that had been acquired or not and should be done after a short period of time (i.e. 1-2 wks), without any practice or feedback and under the same practice conditions (Magill, 2007; Schmidt & Lee, 2011). In the present study, it was decided to examine the retention of learning after a 2-week interval, which, according to the

above authors, was proportional to the period of the practice phase (12 wks). The fact that there has been significant retention in the improvement of the motor task goal after two weeks can be speculated that it is related to the possibility of maximizing the available practice time, since students in the practice style of teaching are practiced individually and privately, at their own pace. Also, based on the multidimensional nature of learning in PE, the above were strongly depentent on the type of motor skill (closed complex gymnastics skill), on the methodological approach (progressive partial strategy) and on the way of organizing practice (circular practice at stations) followed in this study. These findings could be verified by the findings of earlier studies that have shown that a "mini-circuit" organization provides a more comprehensive approach to gymnastics training methodology, which produces significant learning retention, and from a pedagogic perspective, is the best strategy for children (Ariza et al., 2011; Vernetta et al., 1996). The authors have highlighted the need to address the learning of these types of skills through specific practical strategies that enhance the relative relationship of the various components of skills (varied through global or individual exercises), also confirming the close relationship between increasing student practice and organizational strategy in mini-circuits, and providing frequent and qualitative feedback from the teacher.

Regarding the influence of the practice style of teaching to the learners' skill level, this study results showed that high-skilled learners excelled significantly the rest, medium- and low-skilled, which did not differ either in *outcome* or in *technique* performance of the handstand forward roll. However, LS learners showed the greatest progress, especially in relation to MS learners, covering important differences in skill *outcome*, while HS learners showed less improvement. The same image was also observed for skill *technique*, although there was no statistically significant interaction.

The above findings confirmed the assumption of research on differences in learning, in relation to the students skill level, and showed that the practice style of teaching has benefited more the low-skilled learners less the medium-skilled and even less the high-skilled learners. These findings contradict those researchers who argued that the practice style was most effective in medium-skilled learners (Boyce, 1992; Goldberger & Gerney, 1986; Goldberger et al., 1982; Jenkins & Byra, 1997), as well as those that showed it was equally appropriate to medium- and high-skilled learners (Beckett, 1991; Griffey , 1983). This study support the findings of Goldberger and Gerney, (1991). In their study, it was found that low-skilled fifth grade students in primary school, who have implemented two alternative forms of practice style of teaching, have improved most of the others, medium- and high-skilled, in a football punting skill performance. These findings also supports in part the research of Harrison et al., (1995) who found that the practice style helped more the low skilled college students in performance on spike in volleyball, while it did not work equally in the other skills (serve, set and forearm pass), where medium- and high-skilled students were better. These findings raise the question why low ability learners have increased their performance more than those of medium and high ability, since they started learning the handstand forward roll from a lower base. Also, on the other hand, it can be assumed that, learning this complex skill would facilitate in a greater degree the higher ability learners, as they present a better control and coordination of the body parts. These unexpected findings was difficult to justify and guesses are even made.

It is obvious that, although all students followed the same teaching style and they had the same amount of time to practice in the same tasks, using the same methodological approach, the style and structure of the teaching were not proportionally effective to the students in each skill level.Perhaps the freedom and

independence provided through the practice style of teaching has been more beneficial for low-skilled students to show more practice, since they did not expect to be in the series to practice the tasks. In addition, it is likely that the methodological process followed (progressive and gradual composition of skill) was more appropriate for lower-skilled students to be encouraged to practice separate segments of this complex skill. As Silverman reports (2005), practice difficulty can affect attitudes and practice. More easy goal tasks can help low-skilled students to have more appropriate practice trials. On the other hand, they may have worked negatively for higher-level students and have become inactive or disregarded for tasks. Possibly, implementing a holistic strategy would help them more, due to their acquired ability to improve performance. The complexity of the skill is treated differently by an experienced trainee and this allows for significant reduction in the number of segments in which the learning ability can be separated (Schmidt, 1991).

Trying to explain all the above findings, we can also speculate that: a) the low ability students showed the greater degree of progress because, in relation to the others they had much more room for improvement, as they were in a completely original stage of the skill learning, where learning is faster, b) high ability students showed the least increase possibly because they were at a more advanced stage of learning the skill that functioned as a ceiling effect, c) medium ability students had an average improvement, as they were on a modest stage of learning the skill, d) the predetermined practice time was not appropriate for every skill level, i.e., high ability students might need more practice time to show improvement in skill performance compared to low ability students, and e) the feedback given by the TPE benefited more the low ability students, a result that was found in similar studies (Ernst, & Byra, 1998; Rikard, 1991).

Regarding the significant improvement in skill *outcome* but not in skill *technique*,

this was possibly explained by the difficulty and complexity of the task. Perhaps this athletic skill required more teaching time for a more substantial improvement that is justified by the low scoring change in students' performance. This finding suggests also that beginners achieved easier and in a greater degree the coarse features of the skill, while they control less the subtle changes that need to be done to improve the quality of the movement.

CONCLUSIONS

In conclusion, the findings of this study provides evidence to verify that the practice style of teaching might be an appropriate choice for learning complex gymnastics skills, which require enough practice. The results, also, indicates that the practice style of teaching helps high school students to improve in both *outcome* and in *technique* of handstand forward roll, while it seems more effective for low-skilled students, particularly on skill outcome performance. However, the relatively small number of participants limits the generalization of results for every type of athletic skill. Further research will be needed in larger and differentiated samples in more and different type of skills, as well as in several areas of development (cognitive, emotional, social, moral).

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