

Evaluation of the Reciprocal Teaching Style in Tennis

Dimitrios Kyritsopoulos, Ioannis Athanailidis, and Nikolaos Digelidis

ABSTRACT

The purpose of this study was to evaluate the Reciprocal Teaching Style (hereinafter R.T.S.), in basic strokes of tennis, such as forehand, backhand and service, and at the same time to investigate whether it affects the development of motor skills. The first part of the research consisted of 102 children aged 14–15 years with no previous experience in Tennis. There were held 12 lessons for the first two strokes (forehand and backhand) and then 8 lessons for the service to students in 6 classes of third -grade Junior High School students in 2 different schools. The sample members were divided into two groups (experimental and control), and the data were processed in the statistical program IBM SPSS 24 using the t-test for independent samples before and after the intervention with a significance level of ($p < 0.05$). The survey showed that the performance of the participants was improved in tennis in the forehand, backhand and service in both teams (especially in the E.G.), after finding a statistically significant difference in the scores (increasing the mean of consecutive strokes and accuracy). In the second part of the research, the sample consisted of 408 students aged 12–15, 204 students in High Schools of the Municipalities of Tanagra and Chalkida, as well as 204 from tennis clubs of the Municipalities of Larissa, Chalkida and Thebes. A detailed plan of one hour reciprocal teaching was applied to the 3 main aforementioned tennis strokes and at the end the participants were given as a measuring tool, anonymously and confidentially the questionnaire of Intrinsic Motivation Inventory (IMI) by McAuley *et al.* (1989). Data processing in IBM SPSS 24 via one-way variance analysis (One-Way Anova) gave the results: There is a statistically significant difference between the first-grade and second-grade High School classes in the effort which is due to a systematic factor and the pleasure, the perceived ability, the pressure, the attitude / opinion towards tennis, the intention to try tennis and the physical activity are influenced by the highest level of education completed by the father.

Keywords: high school students, Mosston's spectrum, physical education, tennis.

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I. INTRODUCTION

Scientific researches conducted in the field of Physical Education has shown that all teaching styles without exception are useful, depending of course on the goals that have been set in both psychomotor, cognitive and emotional fields. In recent years there have been studies that use the Mosston's Spectrum teaching styles, without however comparing or evaluating the methods themselves (Digelidis *et al.*, 2006), as they take for granted the Mosston hypotheses and Ashworth (1986, 2002) on the consequences of applying each method (MacFadyen, 2000). Due to the limited presence of the Reciprocal Teaching Style (R.T.S.) in the international-language bibliography, the present study sought to investigate its effect on the learning of new techniques in tennis among students, both in the Secondary Schools of Evia and Viotia, as well as to the Tennis Clubs of the Municipalities of Larissa, Chalkida and Thebes.

On the other hand, in the Greek literature there is a very limited number of researches that study - evaluate teaching styles in tennis and very few that study the sport itself. The purpose of this research paper is to evaluate the Reciprocal Teaching Style in terms of its effectiveness in teaching tennis to children aged 12–15 years, in improving the performance of students in the basic hits forehand, backhand and service.

Also, in the pleasure, in the effort they make, in the satisfaction from the participation, the feedback they receive, the cooperation, the effort, the value/usefulness of the style, the pressure and the perception of the competence in the tennis lesson. Individual goals are the influence on the development of motor and social skills, the investigation of the advantages and disadvantages of R.S.T. and the views of the students themselves about the style itself compared to students in the respective solar group who have prior knowledge and experience and come from tennis clubs.

II. MATERIAL AND METHODS

A. Participants

In the 1st part of the present research the sample consisted of 102 students at the 2nd High School of Chalkida and the Drosia High School of the Directorate of Secondary Education of Evia, while in the 2nd part of the research the sample consisted of 408 students aged 12–15 years, 204 students in junior high schools of the Municipalities of Tanagra and Chalkida, and 204 from tennis clubs in the municipalities of Larissa, Chalkida and Thebes.

B. Procedure/Measurements

The students came to a closed information room, where they received all the necessary information about the procedure within 20 minutes, and then they were divided into the Experimental group and the Control group. Then they completed a mini questionnaire of three (3) questions related to their demographic data and then entered the area of the tennis court, where their performance was recorded by the teachers of Physical Education. Regarding the style of R.T.S. the procedure was performed in pairs with distinctly defined roles. One student performed the exercise and communicated only with the student-observer, while the observer gave him individual feedback and communicated with the teacher of Physical Education. The teacher of Physical Education supervised the process and communicated only with the student-observer. For the forehand and backhand strokes, the students' performance was measured in the "on the wall" test, first in the 1st intervention lesson and then in the 12th intervention lesson and specifically in the "Wandtest" of Majer R. (1987). The students in question were standing behind a line eight (8) meters from the wall, on which a line of seven (7) centimeters was drawn at a height of ninety-one centimeters (91 cm) from the ground. Each student had as necessary equipment a racket and two balls. With the whistle of the P.E. teacher he was leaving the ball on the ground and hit it against the wall with forehand and backhand technique, continuously and aiming at the space above the drawn line. The assessment process for each student lasted about two (2) minutes. More specifically, each student had three (3) attempts of thirty (30) seconds each, the ball was also allowed to hit with a volley technique, while the observer verbally assisted, encouraged and counted only the continuous attempts during which the student in question hit the ball on the target and of course stayed behind the line of (eight) 8 meters. In an auxiliary basket there were additional balls to facilitate the process. Then the R.S.T. in tennis took place lasting twelve (12) intervention lessons using worksheets. At the end of the ten (10) week period, the two groups underwent a measurement of targeted hits in the same way as before the teaching of the Reciprocal Teaching Style.

In the learning and measurement of the service, the technique of serve-tennis was applied with an open racket above and behind the head, without arc-loop movement, i.e. service with "half swing," where an accuracy test was performed according to Avery-Richarson-Tennis-Servis (ARTST) which belongs to the tests "on the tennis court" for the measurements in the service, with twenty (20) consecutive services aiming at the front squares of the opponent's court. Students in pairs stood on opposite sides of the court. One student was performing the stroke and the other returned the serve with whatever key stroke he wanted. The server student was standing with both feet behind the two predefined and drawn lines between the imaginary extensions of the sidebar and the center point. The receiver was able to receive the service on his/her own side, without any specific spatial restrictions. The server he was throwing the ball with his hand in the air in any direction he/she wanted and before it touched the ground he/she hit it with his/her racket, strictly observing the rules of the sport.

The test that each student underwent-after 15 minutes of general warm-up-was to perform twenty (20) services, 10 (5+5) from the left and 10 (5+5) from the right side of the court directing the ball to the specific area of the service court. Prior to the start of the main test, each student had the opportunity to perform 10 test sets on each side. A break of one (1) minute followed. Half of the services were performed from a distance of 6.40 meters from the net and the rest from an engraved marked line that was nine (9) meters away. Specifically, each trainee was performing five (5) services from a distance of 6.40 meters to the right service field, went back to nine (9) meters, was performing the next five (5) services on the same goal, then again at 6, 40 meters performing the next five services to the left service field and completing with the last five services at the same target (left). The aim was to make as many accurate strokes as possible at the predetermined front service fields. Each targeted service was scored with one point, while for the unlucky ones no point was awarded. With the specific procedure, in 6 weeks, three (3) measurements were made in eight (8) lessons, the 1st in the 2nd lesson, the 2nd in the 5th lesson and the 3rd in the 8th and last lesson.

C. Skill Test Trial Through a Questionnaire/Data Collection a Statistical Analysis

Upon completion of the first part of the research, the collection of results and measurements, the data were coded and transferred to the IBM SPSS 24 statistical program to perform the statistical analysis. In the second part of the research, the R.T.S. was evaluated with the IMI: Intrinsic Motivation Inventory

(McAuley *et al.*, 1989) questionnaire, where participants' answers are given on a 5-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree). A detailed teaching plan of R.T.S. was implemented one hour in twelve (12) different classes of five (5) High Schools of the Secondary Schools of Evia and Viotia, as well as in eight (8) Tennis Clubs of the Municipalities of Larissa, Chalkida and Thebes, with the same exercise program aimed at the learning-improvement of the students in the three basic strokes of tennis, forehand, backhand and the service.

After the completion of the teaching intervention, the participating students relaxed with specialized stretching and were given time to hydrate and complete the anonymous-confidential questionnaire (IM) on an individual-personal level. They were kindly asked to contribute to the research, answering all the questions honestly, reading each question carefully and completing the answer that represents them the most. It was stressed that there are no right and wrong answers and that in our research we are interested in their own point of view and not that of the classmates sitting next to them. All the answers of the questionnaires of the students-participants in SPSS were recorded and an Analysis of Variance-ANOVA was performed.

III. RESULTS

The results showed the odds on forehand, backhand and service strokes in the sport of tennis before and after the application of R.T.S., where we observe that the performances were constantly improving in the three types of strokes. Checking the performance of the students after the application of R.T.S., we observe that the students of Experimental Group had an average of 11.62 strokes in the forehand (i.e. 5.37), while the students of Control Group 6.61 (i.e. 2.28) strokes on the forehand on average.

The mean values differ statistically significantly between the two groups ($p < 0.001$) and therefore we reject the null hypothesis H_0 and accept the alternative hypothesis H_1 , that is, the averages of continuous strokes in forehand differ statistically significantly between the two groups after the application of R.S.T. In the students' performance was observed that the Experimental Group (hereinafter E.G) before the application of R.T.S. had an average of 5.71 (i.e., 2.87) strokes in the backhand, while the Control Group (hereinafter C.G.) had an average of 5.06 strokes (i.e., 2.48). This difference was not found to be statistically significant ($p = 0.342$). After the application of R.T.S. the backhand strokes of E.G., increased to 11.0 (i.e., 5.98) on average, while the C.G. at 6.11 (i.e., 2.89). Average student performance differed statistically significantly between the two groups ($p < 0.001$).

Fig. 1 shows the service odds in the sport of tennis before the teaching of the reciprocal style in the E.G., during (average measurement) and after the application of R.T.S. in the E.G. We observe that the performances before the teaching of the reciprocal style were $M = 5.63$, in the middle measurement with the first application of the style $M = 7.62$, while after the completion of the style $M = 10.62$. Standard deviations ranged between [1.60–2.58].

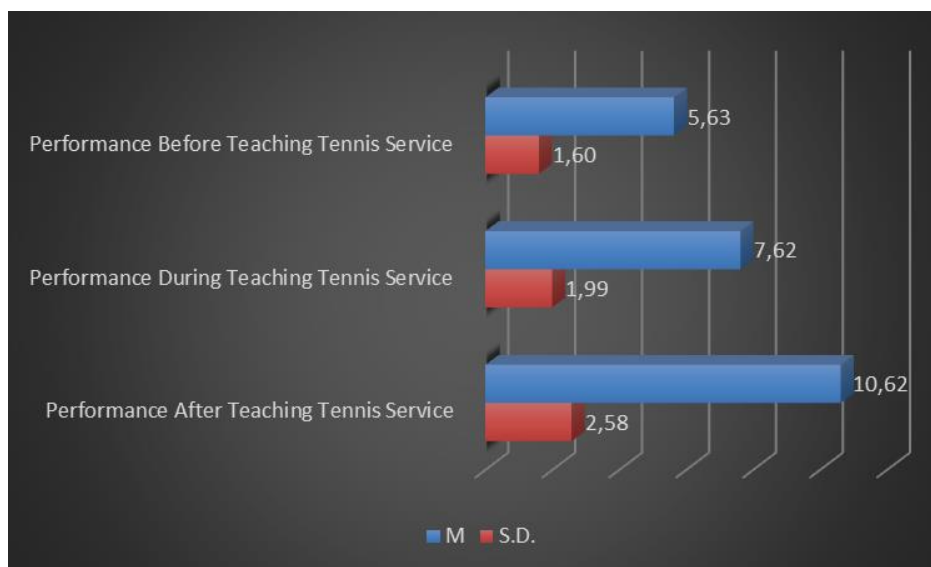


Fig. 1. Service performance in tennis via Reciprocal Style.

In the second part of the research the opinions and attitudes of 408 students high schools and tennis clubs on the R.T.S. were investigated. Students were taught with R.T.S. and finally asked to capture their views on the questionnaire. In Table I is presented the One-way analysis of variance between grouped together variables (pleasure, effort, perceived ability, pressure, attitude, intention, physical activity)

compared to the class of study, which the student attends, that is A', B' or C' grade of Junior High school.

TABLE I: DIFFERENCES IN CLASS OF STUDY

	1st Class of Junior High School		2nd Class of Junior High School		3rd Class of Junior High School		F	p
	M	S.D.	M	S.D.	M	S.D.		
Pleasure	4.17	0.59	4.11	0.68	4.15	0.63	0.37	0.692
Effort	3.84a	0.60	3.64a	0.63	3.77	0.74	3.31*	0.038
Perceived Ability	4.06	0.57	3.94	0.57	3.95	0.64	1.82	0.164
Pressure	3.91	0.67	3.97	0.67	3.86	0.79	0.78	0.459
Attitude	6.30	0.80	6.19	0.81	6.27	0.83	0.68	0.507
Intention	5.95	1.35	5.56	1.61	5.65	1.73	2.48	0.085
Physical Activity	3.22	1.32	2.99	1.16	3.12	1.61	1.06	0.347

* Statistically significant difference for $p < 0.05$.

a: the averages differ statistically significantly based on the Scheffe multiple comparison test.

In all the above variables the significance level $\text{Sig.} = P > 0.05$ which means that there is no statistically significant difference between the variables in relation to the class of study. However, in the variable effort $F(2, 405) = 3.31$, $\text{Sig.} = 0.038 < 0.05$, there is a statistically significant difference between the students attending the three different classes of the Junior High School. Consequently, the class affects the importance of the effort made by the students and in particular, the students at the 2nd junior High school seem to have made on average less effort compared to the students of the 1st and 3rd junior High school. The differences in the effort are located between the combination 1 and 2, i.e., of the A and B class of junior High school, where $\text{Sig.} = 0.040$, $p < 0.05$, there is a statistically significant difference between them, which is due to a systematic factor and not random. Table II shows the mean values and standard deviations of the grouped variables (pleasure, effort, perceived ability, pressure/ intensity, attitude/ view towards tennis, intention to test tennis, physical activity) compared to the highest level of education which has been completed by the father, i.e., Primary Education, Secondary Education or University/TEI (Technological Educational Institute).

TABLE II: DIFFERENCES BETWEEN THE FATHER'S EDUCATION LEVELS

	Primary School		Junior High School/ Lyceum		University/ TEI		F	p
	M	S.D.	M	S.D.	M	S.D.		
Pleasure	4.00	0.49	4.01a	0.70	4.23a	0.57	6.05*	0.003
Effort	4.20	0.51	3.67	0.70	3.80	0.63	3.06	0.048
Perceived Ability	3.76	0.71	3.85a	0.62	4.08a	0.56	7.47*	0.001
Pressure/ Volume	3.16a	1.25	3.84	0.71	3.99a	0.68	4.99*	0.007
Attitude	6.16	0.67	5.95a	0.94	6.45a	0.65	19.75*	0.000
Intention	4.60a	2.46	5.11	1.81	6.14a	1.21	24.22*	0.000
Physical Activity	3.20	2.25	2.71a	1.25	3.36a	1.36	11.57*	0.000

* Statistically significant difference for $p < 0.05$.

a: the averages differ statistically significantly based on the Scheffe multiple comparison test.

According to the table above, we observe in all the variables the significance level $\text{Sig.} = P < 0.05$ which means that there is a statistically significant difference between the variables in relation to the higher level of education completed by the father, we reject the null hypothesis H_0 and we accept the alternative H_1 , that the highest level of education completed by the father affects all the above variables. Because means were observed to be statistically significantly different from each other for all variables, the Post hoc multiple comparisons statistical test was used to identify differences between education levels.

From the multiple comparisons made with the PostHoc statistical criterion we observe that in the variable "effort/significance" the combinations of classes have $\text{Sig.} = p > 0.05$, which means that they do not show a statistically significant difference and any difference is due to either individual differences of participants, or in random errors. However, for the variables pleasure ($\text{Sig.} = 0.003$), perceived ability ($\text{Sig.} = 0.001$), pressure/intensity ($\text{Sig.} = 0.034$), attitude/view towards tennis ($\text{Sig.} = 0$), intention to test tennis ($\text{Sig.} = 0$) and physical activity ($\text{Sig.} = 0$), there is a statistically significant difference between the variables and the higher level of education completed by the father and specifically the differences are found between the levels of education of Junior High School/Lyceum and University/ TEI.

IV. DISCUSSION

Initially, the research was given special attention-emphasis on the correct application of R.T.S.

according to Mosston's Teaching Style Spectrum (1972). The duration of the intervention in the present research was much longer than previous research and was carried out by experienced teachers. During the research, an attempt was made to create those conditions, so that the intervention is carried out in an atmosphere of cooperation, creation and of course in a pleasant-fun environment for an important reason, saving more teaching time for better consolidation, understanding and learning of specific skills. Informing the students about the style of reciprocity, a style of teaching unknown to them, had the natural consequence of creating delays in comprehension and execution, due to the collaborative nature (roles) and its importance in the success of this style.

For many decades, students, in contrast to the above style, have been taught by the Command style, a teacher-centered style, in which students simply observe the teacher and then perform the exercise mechanically, according to his/her instructions. The main conclusion of the present research was that the application of R.T.S. in the intervention program that the participants followed was effective and contributed significantly to the increase of the performance of the students who participated in the Experimental groups in the three (3) skills-tennis strokes compared to the students of the respective Control groups. From the analysis of the data, the results showed that the R.T.S. greatly assists students in learning basic tennis techniques and motor skills.

The R.T.S. was also evaluated with a Detailed Tennis Teaching Plan through the Questionnaire IMI McAuley *et al.* (1989), a structurally valid questionnaire in which the reliability of the internal consistency of its measurements was performed using the Cronbach's α index. The selection of the sample from different geographical areas, the number of participating students, the large sample (408 participants), the different quality characteristics, i.e. students from different High schools and different Tennis Clubs, the fact that 72.8% of the participants were athletes either in tennis or in any other sport, they contributed positively to the drawing of important and reliable conclusions.

V. CONCLUSIONS

In the present research a total of 408 students participated in first, second and third grade, all junior high school students who attended schools in the Prefectures of Larissa, Viotia and Evia. The first conclusion is that the R.T.S. as a teaching style helps students to learn tennis by confirming the claims of past researches on the Spectrum of Teaching Styles (Mosston & Ashworth, 1994). The second conclusion is that the performance of all tennis stroke tests of all the students who participated in the research improved during the research.

However, the performance of the students to whom the Reciprocal style was applied, as a teaching style, improved more than that of the students to whom the classical teaching style was applied, therefore we conclude that the R.T.S. is a more effective style of learning the three specific skills. There was a statistically significant difference between the grades A and B in the "Effort" which is due to a systematic factor, and in particular the students of the 2nd grade seem to have made on average less effort than the students of 1st and 3rd grade. Also, the highest level of education completed by the father affects the variables pleasure, perceived ability, pressure/intensity, attitude/ view towards tennis, intention to test tennis and physical activity, and in particular the differences were identified between the levels of education High School/ Senior High School and University/TEI. There was a statistically significant main effect of the collaboration, of the feedback and a statistically significant interaction of the collaboration and the feedback in terms of "Pleasure." The better the quality of cooperation the students had with their classmates during the lesson, the more satisfied they said they were. Likewise, students with better feedback also felt happier.

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