

Scientific Paper##

THE EFFECTS OF SPECIFIC PRELIMINARY EXERCISES ON THE QUALITY OF KNOWLEDGE AND EXECUTION SUCCESS OF JUDO TECHNIQUES

UDC 796.853.23 : 015

Milovan Bratić¹, Patrik Drid², Mirsad Nurkić¹, Slavko Obadov²

¹The Faculty of Sport and Physical Education, University of Niš, Serbia

²The Faculty of Sport and Physical Education, University of Novi Sad, Serbia

E-mail: bratic_milovan@yahoo.com, bratic@ffk.ni.ac.yu

Abstract. *The aim of this research was to determine the effects that specific preliminary exercises have on the quality of knowledge and the performance techniques in judo. The quality with which the techniques were performed was studied for ten techniques. The research was carried out on a sample 224 students, all from the Internal Affairs High School in Sremska Kamenica, who, during the 2003/04 school year, had three judo classes a week. The basic problem that arises in learning judo techniques is that the qualitative characteristics of movement, self-movement and movement used to exemplify the learned techniques should be improved at the same time the techniques are being acquired. The experimental factor, consisting of 50 special preliminary exercises, was used on the experimental group. The control group studied judo techniques in the standard (traditional) manner. The experiment lasted for the duration of one school year. The qualitative characteristics of the presented techniques were evaluated by five experts. The results of this research have indicated that the application of specific preliminary exercises affected the process of determining the significant statistical difference in the quality of movement and motion in five of the ten studied judo techniques. At the end of the experiment, the execution of five techniques on the part of the subjects of the experimental group was given a better evaluation in comparison to the execution of the techniques on the part of the subjects of the control group. This in turn proved the effect of the experimental factor, the specific preliminary exercises.*

Key words: *motor learning, specific preliminary exercises, judo technique, transfer, effects*

1. INTRODUCTION

Motor learning is the process of enlisting, fulfilling and implementing motor information, knowledge, experience and motor programs (Adams, 1976). It is a process

closely connected to psychological characteristics, motor skills, foreknowledge, cognitive, conative characteristics of individuals and the knowledge of the theoretical bases of movement technique. In his biomechanical study, Hay (1985) determined that more than eighty muscle groups and forty-six bones of the locomotor system take part in the most basic form of man's mobility – running. For the successful execution of motor activities, the optimum coordination of motions is necessary.

Abrenthy et al. (1997) distinguished three phases in the learning process: the verbal-cognitive phase, the associative phase and the autonomous phase. In the verbal-cognitive phase it is necessary to recognize and understand the new motor structure ahead of time. During the associative phase it is necessary to combine several elements of motor structure into a whole and adjust it to the changeable autonomous phase, if automatic movement with a small number of mistakes takes place. During the first phase, the beginner performs unnecessary motions, activating muscles which are not important to the execution of the motion, and he does not have the necessary balance. The consequence is an incorrect initial position, incorrect movement rhythm and "rigidity". This degree of motor learning lasts from 15 up to 30 hours. During the second associative level the quality of the movement improves significantly. Movement is connected and relaxed, and the excess motions have decreased. In the motor section of the central nervous system this is exemplified in the form of a motor stereotype. This degree of knowledge lasts from three to five months. The third autonomous phase is the degree of to which the movement is automatic. During this phase individual kinematic and dynamic movement parameters are optimally coordinated in their entirety. It lasts for more than a year and is never completely finished. The motor stereotype can be disturbed due to unpredictable situations such as: exhaustion, stress, etc.

For the motor learning of sports technique a certain plan is necessary, one that Schmidt (1975; 1977) called a scheme, which should be remembered in the motor memory. The movement scheme is made up of four elements:

- Information about the environment, about the position of certain body parts, about the position of the props, about balance,
- Information about the speed of the swing, the amplitude of the swing, the force of the swing,
- Information passed on to us from our kinetic receptors about the movement process,
- Information about the how successful the answer is in relation to the set goal.

The movement process begins with the determination of the desired goal and with the determination of the initial conditions. On the basis of the information stored and connected to the previous movement, gaining experience begins with the execution of the motor program. A requirement for the successful execution of motor learning is the precise presentation of movement. The presentation of movement rests on visual and motor knowledge, along with verbal and mental possibility, the activation of already existing concepts which can be found in each individual (Tancig, 1996).

The perceptual similarities of the components of certain skills and the degree to which two skills require a similar type of cognitive process influence the *singleness* of the transfer (Čoh, Jovanović-Golubović and Bratić, 2004).

In experiments dealing with learning transfer, experts have attempted to determine the influence of previous experience on the learning of a new task. It is achieved by using an experimental plan in which all the participants complete or study an initial task, before they move on to learn a second one. The control group has no experience which relates to

the initial task and studies only the second task. When the previous experience with the initial task aids the execution of the second task (this is determined in comparison with the control group), positive transfer is assumed to exist. If the previous experience is harmful or has no influence at all, negative transfer is assumed to have taken place or that there has been no transfer at all.

The most frequent demonstration of transfer is probably a generalization which is sometimes known by the name "close transfer". In regards to the idea of learning through experience, generalizations have to do with the transfer involved in the execution of a skill, transfer from an instinctive situation to a defined context, such as sports competitions (Schmidt & Wrisberg, 2004).

There are several factors that need to be taken into consideration when including specific motor exercises into a training program. The most important of these are logic and experience. Programs must be planned and executed in the proper manner. One of the main tasks is to carry out an analysis of the needs, which will take into consideration the technique and the specific motions which the judoist must execute in order to execute a successful performance. The other tasks that need to be considered are age, experience, body build and the sport maturity of the athlete. In choosing the appropriate specific exercises for judo, and directing them towards the improvement of any motor skill, it is first of all necessary to study in detail, the structure of certain judo techniques or the activities of certain muscle groups involved in the execution of the technique. On the basis of that, we finally understand which muscles are engaged the most in the execution of certain techniques, a fact which is the starting point for the choice of a certain complex of specific exercises which will have the greatest impact. Apart from the development of certain muscle groups, by means of specific preparation we will also affect the development of those motor skills which we decide will, at a given time, condition the development of certain qualities characteristic of judo.

Changes to the "state of the athlete who is exercising" are most frequently manifested in the area of certain abilities and skills, and especially in the sphere of motor knowledge. All these anthropological characteristics can be altered in a quantitative and qualitative way. In practice, it is a well-known fact that the optimum organization of all relevant dimensions of personality are realized by means of the so-called situational modality of work, in other words, the kind of work where the training activity is executed under conditions which are similar or identical to those of a competition (Obadov and Drid, 2003; Bratić & Nurkić, 2005; Drid, 2005).

According to the theory of transformational procedures, the influence of the contents of various programs differ amongst themselves. The variability of the influence depends on the quality of the program contents and on the specific nature of the dimensions which we wish to influence.

The subject matter of this research is the specific training treatment used in the process of learning complex motor structures – technical elements in judo. In judo, knowledge is evaluated according to the number of learned techniques and the skills with which they can be adequately presented. In addition, a special topic of interest is also the quality of movement, self-movement and motions which the beginners demonstrate while displaying their technique, as the quality of the execution could be enhanced in the training process in different ways.

The basic aim of this research is to prove that the use of specific preparatory exercises can affect the improvement of the quality of knowledge, movement, self-movement and motions which are part of the judo techniques. What was assumed is that the introduction of specific preliminary exercises could contribute to the efficiency of the standard (traditional) methodological procedure in the process of learning judo techniques.

2. THE METHOD

The sample of subjects

The sample consisted of 224 male students of the Internal Affairs High School in Sremska Kamenica, who were all first-year students during the 2003/04 school year, and who were 15 – 16 years of age. All of the subjects underwent a general and specific medical examination, a check-up of their physical abilities, a check of the level of their cognitive and connative dimensions, as part of their enrolment. On the basis of the data gathered during the entrance exam, it was determined that the sample of subjects was extremely homogenous, of a satisfactory health status and without damage to the subjects' locomotor systems.

The sample of first-year subjects was divided into two groups, an experimental and control group. The experimental group consisted of 106 students, and the control group consisted of 118 students. The division was made at random.

Apart from their judo classes, all of the students took classes in sports games and athletics.

The sample of judo techniques

As part of this research, tests for the evaluation of the technical knowledge and skills of the judoists were used, among them (Fig.1):

- TOSGA=Osoto-gari;
- TOUGA=Ouchi-gari;
- TKUGA=Ko-uchi-gari;
- TUMAT=Uchi-mata;
- THRGO=Harai-goshi;
- TSONA=Seoi-nage;
- TNSEN=knee Seoi-nage;
- TTOSI=Tani-otoshi;
- TTNGE=Tomoe-nage;
- TUGOS=Uki-goshi.

The evaluation of the execution of judo techniques was carried out by a team of judo experts. All of the judges met the requirements for judo masters, and were masters from third to eighth *dans*. The success with which the movement was carried out, the self-movement and the motions of the subjects as part of their judo techniques were evaluated by means of the following criteria:

- Balance breaking (Kuzushi),
- Positioning for the throw (Tsukuri),
- Completion of the throw (Kake),
- The velocity of the technique execution,
- The strength of the technique execution,
- The amplituded of motion and movement of the technique execution.

Each of the criteria was awarded a numeric grade ranging from 1 to 5.

Each subject repeated his technique three times and each repetition was graded by the judges. The final grades for quality of movement, self-movement and motion of the subjects were calculated as the means of all of the grades awarded by the judges in all three repetitions for each individual technique.



Fig. 1. Judo techniques

The experimental procedure

This paper is based on an experimental method (a pedagogical experiment) involving an experimental and control group. Both groups worked according to the same judo class program. The experimental group, along with the standard (traditional) program for learning judo also used specific preliminary exercises.

Movement, self-movement and motions as part of the specific preliminary exercises were characterized by special strength, aimed in the same direction as the exercises, amplitude, precision and the number of repetitions. The exercises were executed both individually and in pairs.

The experimental classes took place three times a week over both school semesters of the 2003/04 school year. The experiment was carried out during the judo classes. At the beginning of the class, as part of the introductory part, a battery of specific motor exercises was used, exercises which required motions which occurred while executing certain judo techniques (15-20 minutes in duration). As part of the experiment, a complex of 50 specific motor exercises was used. Specific preliminary motor exercises were created in such a way so as to mimic basic movements, self-movements and motions in the judo technique (jumps, crawling under obstacles on the floor, outpulls, forcibly pulling your partner closer, turns and other exercises). Dosing an exercise with the correct number of repetitions was also clearly defined and depended on the complexity of the exercise. The exercises were dosed with 8 to 30 repetitions during one class. The experiment lasted for the duration of one school year. Specific mobility exercises, which were used on the experimental group were meant to facilitate the learning of new techniques and to enable improvement of the technique.

As part of its training, the control group used the traditional procedure to learn basic judo techniques. The traditional methodological procedure consisted of ways to learn a technique, with standard class structure and standard method of instruction.

On the basis of the analysis carried out on the data which was obtained from the tests of basic motor and cognitive abilities (the test for the evaluation of perceptive abilities, F1), it was determined that the subjects were a homogenous group in regards to motor skills and skills of perception (Table 1 and Table 2).

The evaluation of the techniques on the part of experts was organized at the end of the school year. The subjects demonstrated the techniques in pairs, and each of the subjects was graded individually for his display of technique.

Statistical method

For the analysis of the data obtained at the entrance exam, a multivariate analysis of covariance was used. The calculation of the analysis of covariance coefficients enabled the determination of the fact that, at the beginning of the experiment, there were no statistically significant differences in the general motor abilities and in the skills of perception. As part of the analysis of covariance, Wilk's coefficient was calculated and its significance was tested by means of an F-test.

In order to determine the differences in the grades awarded to the experimental groups, the F-test was used. The differences in grades for the displayed techniques were determined by means of a univariate F-test. Values for the degree of freedom were calculated (ss1 and ss2). Only those values of the F-test which met the significance level of $P = 0.01$ were considered significant.

Table 1. The multivariate analysis of variance for general mobility at the initial measuring

| Variable | Group | Means | Standard deviation | F-test | Significance |
|--|--------------|--------|--------------------|--------|--------------|
| MCS | Experimental | 210.95 | 18.43 | 0.03 | 0.87 |
| | Control | 210.56 | 17.82 | | |
| MSS | Experimental | 97.43 | 7.13 | 0.11 | 0.74 |
| | Control | 97.12 | 6.97 | | |
| MTE | Experimental | 177.14 | 8.81 | 0.37 | 0.54 |
| | Control | 176.42 | 8.76 | | |
| MPHB | Experimental | 10.12 | 1.79 | 0.32 | 0.57 |
| | Control | 10.26 | 1.85 | | |
| MHY | Experimental | 30.13 | 3.00 | 0.17 | 0.68 |
| | Control | 29.96 | 2.93 | | |
| MME | Experimental | 51.97 | 9.73 | 0.21 | 0.65 |
| | Control | 52.57 | 10.04 | | |
| MTMB | Experimental | 984.60 | 100.36 | 0.02 | 0.90 |
| | Control | 982.96 | 98.45 | | |
| MTB | Experimental | 233.27 | 6.03 | 0.34 | 0.56 |
| | Control | 232.80 | 6.10 | | |
| MSHJ | Experimental | 47.03 | 2.77 | 2.53 | 0.11 |
| | Control | 47.62 | 2.74 | | |
| MHT | Experimental | 37.97 | 2.07 | 0.69 | 0.41 |
| | Control | 38.22 | 2.33 | | |
| MHC | Experimental | 37.68 | 4.49 | 0.01 | 0.91 |
| | Control | 37.74 | 4.49 | | |
| MFT | Experimental | 21.74 | 1.80 | 0.18 | 0.68 |
| | Control | 21.85 | 1.95 | | |
| Wilk's L = 0.95 F = 0.83 ssl = 12 ss2 = 211 p = 0,62 | | | | | |

Legend: MCS=Climbing up and down a bench and Swedish ladder; MSS=Sidesteps;
MTE= Twisting into eights; MPHB=Push-ups on the horizontal bars; MHY=Hyper-extensions;
MME=The mobility of the lying extensions; MTMB=throwing a medicine ball;
MTB=Throwing a basketball from the chest from a sitting position; MSHJ=Standing high jump;
MHT=Hand tapping; MHC=Hand circling; MFT=Foot tapping.

Table 2. The analysis of variance of the skills of perception from the initial measuring

| Group | N | Means | Standard deviation | F test | Significance |
|--------------|-----|-------|--------------------|--------|--------------|
| Experimental | 106 | 18.19 | 5.40 | 0.12 | 0.73 |
| Control | 118 | 17.95 | 5.00 | | |

3. THE RESULTS

Table 3 shows the obtained coefficients of the multivariate analysis of covariance of the grades awarded by the experts for the displayed judo techniques at the final evaluation. The statistical indicators show that the grades for the displayed techniques for the experimental and control group differ in a statistically significant manner for five of the ten studied techniques (Table 3).

Table 3. The multivariate analysis of covariance for the judo techniques

| Variables | Group | Means | Standard deviation | F-test | Significance |
|--|-------------------------|----------------|--------------------|--------|--------------|
| TOSGA | Experimental Control | 12.24 11.89 | 1.38 1.25 | 7.64 | 0.01 |
| TOUGA | Experimental Control | 11.84 11.68 | 1.48 1.33 | 3.01 | 0.08 |
| TKUGA | Experimental Control | 11.19 11.21 | 1.70 1.72 | 0.29 | 0.59 |
| TUMAT | Experimental Control | 10.82 10.00 | 2.30 1.77 | 18.83 | 0.00 |
| THRGO | Experimental Control | 11.55 11.04 | 1.93 1.66 | 10.38 | 0.00 |
| TSONA | Experimental Control | 11.96 11.40 | 1.56 1.37 | 16.58 | 0.00 |
| TNSEN | Experimental Control | 11.82 11.62 | 1.31 1.15 | 3.81 | 0.05 |
| TTOSI | Experimental Control | 11.79 11.36 | 1.94 1.68 | 8.01 | 0.01 |
| TTNGE | Experimental Control | 11.53 11.43 | 1.75 1.54 | 1.08 | 0.30 |
| TUGOS | Experimental Control | 11.79 11.74 | 1.69 1.60 | 1.64 | 0.20 |
| Wilk's $\lambda = 0.76$ $F = 6.29$ $ss1 = 10$ $ss2 = 201$ $p = 0.00$ | | | | | |

Legend: TOSGA=Osoto-gari; TOUGA=Ouchi-gari; TKUGA=Ko-uchi-gari; TUMAT=Uchi-mata; THRGO=Harai-goshi; TSONA=Seoi-nage; TNSEN=knee Seoi-nage; TTOSI=Tani-otoshi; TTNGE=Tomoe-nage; TUGOS=Uki-goshi.

The significance of the differences in the obtained coefficients for the awarded grades indicates that the subjects of the experimental group displayed their technique in a way which showed greater quality than the display of technique of the control group. This conclusion indicates that the subjects of the experimental groups differ in how well they know how to execute the necessary motions and in their acquired habits in demonstrating judo techniques.

The Wilk's λ coefficient was tested by means of the appropriate F-test and is statistically significant at the $p=0.01$ level. This leads to the possible conclusion that there are statistically significant differences in the grades given for training or the extent to which the subjects of the experimental and control group are acquainted with judo techniques.

By analyzing the means of the grades given by the experts, using the univariate analysis of covariance for the knowledge of judo techniques (which were given a practical

demonstration), statistically significant differences in the grades for the following techniques can be seen: Osoto-gari (TOSGA), Uchi-mata (TUMAT), Harai-goshi (THRGO), Seoi-nage (TSONA) and Tani-otoshi (TTOSI) at the $p=0.01$ and the TENSEN technique (the knee Seoi-nage) at the $p=0.05$.

On Chart 1, the statistically significant values of the grades of all technical elements can be seen. These results clearly indicate that the subjects of the experimental group have achieved significantly higher success in their technical elements, which in their structure of movement allow for greater motion amplitude.

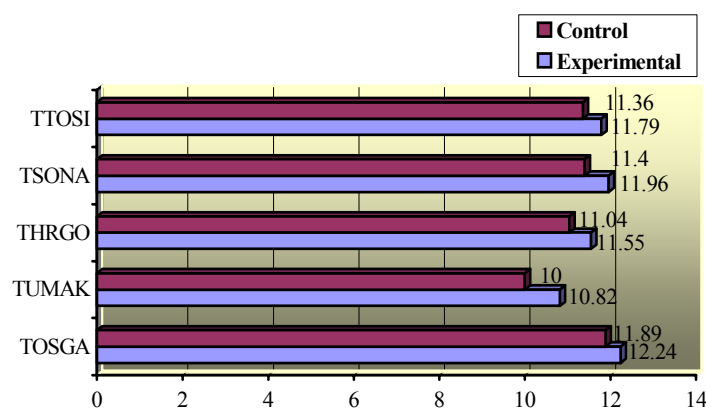


Chart 1. The difference in the means of judo techniques

4. THE DISCUSSION

The analysis of the knowledge of judo techniques indicates that the subjects of the experimental group have higher grade values, which is statistically significant. The reasons for the better values which are presented in the form of grades for the experimental group should be looked for in the applied specific exercises. The application of 50 specific preliminary exercises contributed to the fact that the subjects of the experimental group have demonstrated movement, self-movement and motion in judo techniques, all of greater quality, which the experts have evaluated by awarding numerically higher grades. Another possible explanation is that the special preliminary exercises have enabled the subjects of the experimental group to repeat standard technique elements in a more correct and efficient manner, which has enabled them to execute judo techniques with higher quality than the subjects of the control group. These conclusions can confirm the hypothesis that the use of specific preliminary exercises can decrease the time necessary for learning judo techniques and in that way improve the standard traditional methodological process of learning judo techniques.

The obtained grades for the techniques lead to the possibility of claiming that the subjects of the experimental group have achieved significantly higher grades for technical elements as a consequence of the use of specific exercises which were characterized by the effect they had on the increase on the amplitude of movement, self-movement and motions as part of the studied techniques. The techniques with structures and movement and motion execution marked by shorter amplitude have contributed to the fact that the

subjects of the control group were given worse grades than the experimental group. The preliminary exercises with greater amplitudes enable a more rational use of time and energy. The techniques which were awarded significantly higher grades at the end of the experiment were marked by an expanded amplitude of movement, self-movement and motions in the following manner:

- the direction in which the balance was broken was forward,
- hand position in relation to the opponent was approximately the same,
- engaging with the opponent was approximately the same,
- the leg work was approximately the same as part of the execution of the chosen judo techniques,
- the body rotated around a vertical axis, which was identical for all the technical elements.

The results of the research carried out with the aim of determining the effects of various methodological procedures used in the learning of foot techniques in judo on a student population (Bratić, 1997) have unequivocally indicated that the experimental methodological procedure is superior to the traditional methodological procedures. The characteristics of the studied methodological procedure were enhanced by the specific training exercises which were adjusted to the abilities and characteristics of the subjects in the sample. In the traditional methodological procedures the individual abilities and characteristics of the subjects were not enhanced.

One group of techniques was studied (the cleansing technique), part of whose execution are the important techniques which enhance the directions in which the balance is broken, the coupling of forces, throw control, so it could, therefore, be concluded that the methodological procedures which take into account individual abilities and characteristics (in the experimental, training and classroom treatment) have a greater chance of training the judoists in a quicker and better manner in the execution of the complex technical elements of judo techniques.

4. CONCLUSION

As part of the results of the experimental research of the effects of the application of specific preliminary exercises on the quality of knowledge and success of technique execution in judo, and on the basis of the evaluation of the experts at the end of the experimental treatment, it has been determined that the application of specific preliminary exercises has influenced the improvement of the success with which the judo techniques have been realized for the experimental group in the five of the ten studied techniques. The results and the discussion point to the conclusion that the methodological procedure in which specific preliminary exercises are used has precedence over the standard, traditional, methodological procedure.

Special attention should be paid to the specific preliminary exercises which increase the amplitude of motion. This has confirmed the hypothesis that the application of the specific preliminary exercises can contribute to the statistically significant differences at the level of motor knowledge and success in the demonstration of judo techniques on the part of the students.

REFERENCES

1. Adams, J. (1976). Issues for a closed-loop theory of motor learning. In Stelmach, G.E.: *Motor Control*. New York: Academic Press, pp. 87-107.
2. Abernethy, B., Kippers, V., Mackinnon, L., Neal, R., Hanrahan, S. (1997). *The Biophysical Foundations of Human Movement*. Champaign IL: Human Kinetics
3. Bratić, M. (1997). *Komparacije efekata različitih metodskih postupaka u džudou primenjenih u učenju nožnih tehnika bacanja (Ashi-Waza) (The comparison of the effects of different methodological procedures in judo and the learning of new foot throwing techniques (Ashi-Waza))*. PhD thesis. Beograd: Fakultet fizičkog vaspitanja.
4. Bratić, M., & Nurkić, M. (2005). Modelovanje treninga džudista prema inovacionim tehnikama. The modeling of a judo training session based on innovative techniques. R. Izet (ed) *Naučni simpozijum Nove tehnologije u sportu* (str. 69-73). Sarajevo: Fakultet sporta i tjelesnog odgoja.
5. Čoh, M., Jovanović-Golubović, D., Bratić, M. (2004). Motor Learning in Sport. *Facta Universitatis, Series Physical Education and Sport*, 2 (1), 45-59.
6. Drid, P. (2005). *Uticaj specifičnih motoričkih vežbi na efikasnost motornog učenja elementarnih džudo tehnika (The influence of specific motor exercises on the efficiency of the motor learning of elementary judo techniques)*. PhD thesis. Novi Sad: Fakultet fizičke kulture.
7. Hay, J. (1985). *The Biomechanics of Sport Techniques*. Prentice-Hall, Inc. Englewood Cliffs.
8. Obadov, S. i Drid, P. (2003). Specifične motoričke vežbe u funkciji uspešnog usvajanja "SEOI" tehnika u džudou (Specific motor exercises in the function of the successful acquisition of the "SEOI" judo techniques). D. Jovanovic (ed) *Zbornik radova FIS Komunikacije* (proceedings) (str. 25). Niš: Fakultet fizičke kulture.
9. Schmidt, R.A. (1975). A schema theory of discrete motor skill learning. *Psychological Review*, 82, 225-260.
10. Schmidt, R. (1977). Schema theory—Implication for Movement Education. *Motor Skills – Theory and Practice*, 2.
11. Schmidt, R.A. & Wrisberg, A.C. (2004). *Motor Learning and Performance*. Champaign IL: Human Kinetics.
12. Tancig, S. (1996). Razlage psihomotoričnoga učenja, Teorija motoričnoga programa, teorija sheme in neopiagetova teorija (The stages of psycho-motor learning, the theory of motor programs, the theory of schemes in the neopiaget theory). *Psihološka obzorja*, 4, 105-116.

EFEKTI SPECIFIČNIH PRIPREMNIH VEŽBI NA KVALITET ZNANJA I IZVOĐENJA TEHNIKA U DŽUDOU

Milovan Bratić, Patrik Drid, Mirsad Nurkić, Slavko Obadov

Cilj istraživanja je da se utvrde efekti specifičnih pripremnih vežbi na kvalitet znanja i izvođenja tehnika u džudou. Kvalitet izvođenja tehnika u džudou je istraživao u deset tehnika. Istraživanje je sprovedeno na uzorku od 224 učenika Srednje škole unutrašnjih poslova u Sremskoj Kamenici, koji su u toku školske godine slušali po tri časa džudoa nedeljno. Osnovni problem u učenju tehnika džudoa je da se uporedo sa učenjem tehnika poboljšaju kvalitativne karakteristike kretanja, samokretanja i pokreta u prikazivanju naučenih tehnika. Eksperimentalni faktor od 50 specijalnih pripremnih vežbi primenjen je u eksperimentalnoj grupi. Kontrolna grupa je učila tehnike džudoa na standardni (tradicionalni) način. Eksperiment je trajao jednu školsku godinu. Kvalitativne karakteristike prikazanih tehnika ocenjivalo je pet eksperata. Rezultati istraživanja su pokazali da je primena specifičnih pripremnih vežbi uticala da se utvrdi značajna statistička razlika u kvalitetu kretanja i pokreta u pet od deset istraživanih tehnika džudoa. Na kraju eksperimenta, izvođenje pet tehnika ispitanika eksperimentalne grupe je bolje ocenjeno u odnosu na izvođenje tehnika kontrolne grupe, čime je dokazano delovanje eksperimentalnog faktora, specifičnih pripremnih vežbi.

Ključne reči: motorno učenje, specifične pripremnne vežbe, tehnika džudoa, transfer, efekti.