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IMPROVING MOTOR LEARNING WITH LEARNING STYLES

Summary

How should we learn in order to achieve the best possible effect? What should we do to help a child in motor learning and practicing if we know which learning style is the most suitable for him/her? This paper offers answers to these and similar questions which might be very useful for coaches and PE teachers and help them get a true insight into the possibilities they have at their disposal in the work with every person individually. Having explained the definition and certain types of learning styles, the emphasis is placed on the pedagogical implications of a specific model of learning styles in the realm of sport and physical activities. The recommendations for the coaches and PE teachers in their work enable continuous improvement of motor learning through a planned and systematic application of psychological findings on learning styles in kinesiology.

Key words: learning styles, learning, motor learning, physical education

The importance of learning styles is evidently manifested in everyday activities; in an individual approach to learning and acquiring of information, as well as through our relationship with others, in other words through our teaching. For instance, some find it more suitable to study alone, while others are more comfortable in doing so with a group. Some find noise quite distracting while studying, whereas others cannot concentrate on the subject matter in absolute silence. Some, on the one hand, prefer to have things they need to learn explained to them, while others,

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on the other hand, prefer to be left alone and work out the solutions themselves. Some try to gain insight into the whole matter first and then to go into details, while others are primarily interested in the number of pages they need to study and whether the teacher will test what they have learnt right in the next class or, perhaps, in three week's time. All the mentioned approaches to learning, however diverse they might be, are unified in the term - learning styles. However, as these examples have already shown, it is clear that learning styles cannot be equated with visual or auditory approaches to learning only, which turns out to be the most widespread classification of learning styles in general that takes into account only the differences in perceptual modalities among the students (Caldwell et al. 2005; James and Galbraith 1985; Tubić 2003; Wislock 1993). Nor can learning styles be equated with the learning methods, e.g. time-based or structured learning method, i.e. analytical and synthetic method, etc. (Tubić 2004c). To put it simply, learning styles are different modes of learning that demonstrate the way a person learns new things (Kocinski 1984; Sims and Sims 1995). However, the object of psychological science is not merely to ascertain the differences in learning, but to take hold of the *most common* way or the *easiest* way for one to learn. This more precise description makes a seemingly simple definition of learning more complex since the determinants *the most common* or *the easiest* actually hide the personality traits of students. In other words, *the easiest* way to study for each and one of us is the one that best suits our individual features; hence using a particular learning style is determined by a person's character.

Similarly, preferences regarding a particular learning style are also invariably evident when teaching other people (Byrne et al. 2002; Grasha 1996; Ramsden 2003, Tubić and Hamiloglu 2008). Take for example, a coach who is supposed to teach a child how to swim the front crawl. The way the coach will approach this task will tell us a lot about his previous experience, but also about the teaching style which, as it was already stated, suits his personality traits, which furthermore, among other things accounts for the differences in efficiency of certain coaches. Therefore, the coach can simply give the order of the exercise a child needs to do during the practice or in the period to follow without previously giving any kind of explanations. The coach might also approach this task by making a logical sequence of movements that a child needs to acquire, thus following the rhythm only a child can follow e.g. *arm-pull-leg-leg*. The coach can also start by emphasizing the essence of certain elements of this style, e.g.: 1. the leg movement maintains the streamline position of the body 2. the arm movements pull the body forward, that is push it through the water, etc. Apart from that, there are coaches who will, in the very beginning, make a comparison with something the child already knows motivating him/her to learn something new. For instance, *the arms in this style are positioned as if on ladders, pulling beneath the body, while legs instead of climbing as if on stairs, should be straight but kicking*.

Opting for a learning/teaching style should not be the result of a random pick or intuition for that matter, as the predominance of a particular style over others is most often explained. This is also supported by the results of a psychological research on learning styles. No matter how much loaded with methodological problems the obtained results were (Coffield et al. 2004), they still confirm the significance of this area for more successful and functional lives of individuals irrespective of the activity they are engaged in. In the same way, it was found out that e.g. a teacher/a coach who is simply aware of differences in learning styles in different students, i.e. who is more attentive to individual needs of the students, will make them more involved in the activities in the class or during the practice (Blackmore 1996). Researches focused on the school environment, the area where learning styles have most often been applied, proved that adapting teaching styles to the learning styles of students they find most suitable increases the efficiency of all the students, irrespective of their age, intellectual abilities and other individual traits (McKeachie 1980, 1995; Montgomery and Groat 1998; O`Connor 2000). Furthermore, the researches (Felder 1993, 1996) have also proved that the students who use learning styles consistent with the teaching styles of the educators seem to retain information much longer, apply it more efficiently, while their attitudes toward the learning material seem to be more positive than those of the students whose learning styles tend to be inconsistent with teaching styles of their educators. (This way, educators, unconsciously, favor those students whose learning style matches their teaching style).

Sport/kinesiology represents the field of scientific researches that seems to have escaped any methodical and systematic influence of psychological findings about learning styles, and thus, it was impossible to use learning styles of the individuals engaged in different types of physical activities in the process of acquiring motor skills at certain contests and other sporting events. Having a considerable number of methodical flaws, sporadic attempts to practically apply the findings on learning styles among the sportsmen failed to offer a proper method of introducing and developing learning styles by means of a model that would be fully suitable for practical application among coaches and sportsmen (Moran 1998; Owens and Stewart 2007; Peters et al. 2008).

The basic aim of this paper is to offer actual possibilities for the application of learning styles in the work of coaches and teachers, thus increasing their efficiency while working with individuals who evidently need and use different learning styles. Therefore, we first identified and presented learning styles which form the starting point for this paper. Then we presented certain learning style models where three key criteria were taken into account: theoretical importance for the field in general, broad applicability both academic and commercial, as well as the impact on other learning models. The focus is on a two-dimensional model of

learning styles introduced by Lois Krause (Krause 1996, 2003) in the area of motor learning, i.e. of sport and physical activities in the widest sense. This model was chosen because it is suitable for being applied to kinesiological researches, as it underlies personality theories and offers the possibility of including the assessment of a cognitive sphere, but also of conative and affective spheres of functioning in a person in sports situations. Another reason for choosing this model was its practical component, i.e. simplicity during the testing itself and processing of the obtained data, and their interpretation with respect to specific, daily forms of behavior.

LEARNING STYLES: CONCEPT AND TYPES

Learning styles, as a psychological problem, represent the result of knowledge integration, in other words practical superstructure of at least three findings that have emerged in the psychological science from the 1950s till the present day:

First of all, the discovery of discussion groups dynamics supported by Lewin's conception of the active learning (Lewin 1951), which creates conditions for the introduction of a new form of teaching where spontaneous and free activities are applied in classes, as opposed to the authoritative role of a teacher where each class is 45 minutes long;

- The next impetus for the study of learning styles is the applied learning, the term which was introduced to psychology via informatics revolution in the mid-1970s. At that time learning was just beginning to be seen as incomplete if based on the knowledge acquired from the books and teacher's lectures only. Slides and overhead projectors, audio and video tapes were made part of the teaching process, but what made the applied teaching a true milestone in a conception of teaching in the widest sense of the word, was actually the possibility for students to determine their own work pace, as well as to get feedback about their work. This working method is based on Skinner's model of operant conditioning and it is widely used in learning via Internet, distance learning, etc. (Stahl 1999);
- The third impetus for the learning styles application in teaching is experiential learning, the term introduced by Kolb heavily relying on problem-based learning which is based on Dewey's understanding of learning again based on experience, i.e. Piaget's conception of intelligence as the result of interaction between a person and the environment. The researches have shown that experiential learning increases the retention of information up to 90% when compared to traditional learning (O`Connor, 2000). This emphasizes the essential characteristic of experiential learning – the focus on the student. This characteristic of experi-

ential learning is ingrained in the basic concept of learning styles. Based on all these impetuses for studying learning styles, we conclude that researchers who deal with this research problem are driven by the specific needs of individuals and the attempt to solve those problems. In other words, they are chiefly *practical-oriented*.

The most complete definition of learning styles that represents theoretical starting point of this paper was formulated by Keffe (1987, 4). According to him, learning styles are *cognitive, affective and physiological personality traits which represent relatively permanent indicator of how students perceive and how they behave toward the environment which serves as the source of their knowledge*. The following determinants of learning styles stem from this definition:

- Learning styles are personality traits, which determines their relative permanence, i.e. behavior consistency;
- Learning styles include cognitive, affective and physiological aspects of a person's functioning in a learning situation;
- The combination of these three aspects of a person's functioning enables a unique approach towards learning within the predetermined categories, i.e. learning styles;
- Learning styles represent the product of the interaction between a person and the environment which apart from the physical influence includes the influence of other people as well (for example, teachers, coaches, parents, peers) in a learning situation making a relevant source of knowledge.

Even though no widely accepted classification exists for learning styles, the overview of relevant bibliography will certainly make it possible to single out a few criteria for the division of learning styles based on the frequency of occurrence:

- *Perceptual modality as the criterion for the classification of learning styles* refers to biological reactions of the organism to physical environment. When acquiring knowledge every person gives precedence to the information they perceive through a specific sense modality, and thus using that specific information they learn most efficiently. The basic typology of learning styles according to the perceptual modality comprises of visual, auditory and tactile/kinetic learning style. Each and one of us can easily recognize the sense modality they give precedence to during knowledge acquisition. Imagine you come across a person you met several years ago. If you can remember the face or the place where the two of you met, but you can't remember the name, you are probably a visual type. If you can remember the person's name or what you were talking about, you are an auditory type and if you can remember what you were doing together,

then you are a tactile or kinetic type. How do you interpret someone's mood? Is it based on their facial expression? Or is it by the sound of their voice? Or maybe you do that based on their body positioning and the moves they make?

- *The method of information processing as the criterion for the classification of learning styles* emphasizes the differences between people when it comes to ways of perception, organization and retention of information, which further reflects on the way of thinking and problems solving. The basis for this criterion represents the idea about different functioning of left and right brain hemispheres implemented in Herman's typology of learning styles (Herrmann 1990), but also into a much more famous Kolb's typology of learning styles (Kolb 1984, 2005). Starting from the differences in the ways of perception among people, in other words in the way of information processing, Kolb developed a model that would be widely accepted and applied in different areas of a person's functioning (Healey and Jenkins 2000; Stice 1987; Svinicki and Dixon 1987; Vince 1998).
- *Personality traits as the criterion for the learning styles classification* which has as its starting point the fact that learning styles are based on the theories on psychological types is singled out as a complete approach to distinguishing differences between learning styles. Myers-Briggs typology of learning styles (Myers and McCaulley 1986) is the result of a consistent application of Jung's theory on psychological types in studying learning styles (and it is the most complete representative within this grouping of models). However, this typology consists of 4 bipolar indicators, i.e. 4 dimensions (dimension - *orientation to the world*, learning style - *extrovert or introvert*; dimension -*perception*, learning style - *sensory* or *intuitive*; dimension - *decision making,* learning style - *reflective* or *emotional*, as well as dimension - *attitudes towards the world outside* and learning styles *judging* or *perceptive*), whereas a learning style of a particular person is a combination of prominence of these opposite poles of the dimensions. Thus, someone for example can be an Extravert, Sensory, Judger, Thinker (in the original text of the author the abbreviations are used instead of the full names of styles, so the mentioned style would be labeled as ESTJ), while somebody can be described as INFJ - Introvert, Intuitive, Feeler, Judger, etc. All these things concerned, we conclude that the described model would, however complete, create problems for researchers, especially in applied researches due to both test duration and the interpretation of the obtained scores for concrete purposes. Therefore, in practice as much more frequently used seem to be some

of the learning style models that represent derivative of Myers-Briggs typology based on Jung's theory on psychological types, but also suitable for the concrete target groups and research goals. One of the most frequently used models in the field of education is the Cognitive Profile Model introduced by Lois Breur Krause, which includes two out of four of Jung's bipolar indicators that are the most discriminative for the purposes of the study of learning styles, previously verified by the researches (Krause, 1996).

Further in the paper we analyze the possibilities of this model's application for the purposes of improving both motor learning and teaching.

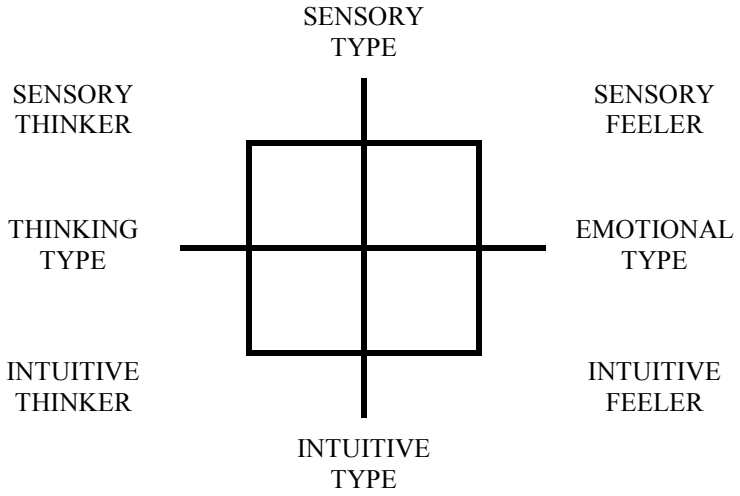
THE APPLICATION OF A TWO-DIMENSIONAL MODEL OF LEARNING STYLES TO MOTOR LEARNING

The Description of the Learning styles model introduced by Lois Krause

Unlike some other approaches to the study of learning styles which are based on the principle that a learning style that suits best our personality traits must be first identified and then developed in such a manner to increase the efficiency in the undertaken activities (Coffield et al. 2004), according to Lois Krause, each of us possesses a huge variety of the abilities specific to different learning styles. Understanding learning styles helps us identify the style which is the most prominent in our case, but it also helps us understand how to develop our skills in less prominent spheres of our personality. In addition to this, even a more important characteristic of this model may be that it does not only consider the way we gain information, which is the case with perceptual models for example, but also what we are to do with the information when we have already gained it.

This model, as the name suggests, consists of two dimensions: the dimension that refers to the *manner of making decisions* (represented by the *x*-axis) where one pole stands for emotional types (Feelers), and the other one for the reflective types (Thinkers); the dimension which refers to the type of information a person gives precedence to while learning (represented by the *y*-axis), where one pole stands for sensory types (Sensors), and the other one for the intuitive types (Intuitives**)**. The Thinker makes decisions based on the facts or information, unlike The Feeler whose decisions are based on feelings, personal values and interpersonal relations. As far as Sensors are concerned, in the course of learning they give precedence to concrete information they perceive through their senses, they solve problems using familiar and verified procedures, they don't like complicated tasks and pay attention to details, unlike Intuitive students who give precedence to the information derived from thinking, memories and imagination, they are focused on the abstract concepts,

theories and formulas, prone to day-dreaming, they like variety in work and get bored when there are too many details and repetitions. Crossing of the poles of the aforementioned dimensions the following learning styles are obtained as shown in the Graph 1 (Krause 1996).



Graph 1. Cognitive Profile Model

In short, a sensory thinker is a typical product of traditional teaching – lecture method, because he/she learns what they have been given relying on their memory and advancing from details towards concepts and theories, whereas a sensory feeler mainly relies on their own experience and, just like the former, on the information he/she gains through the senses. Due to prominent sensitivity, sensory feelers most easily memorize the subject matter when there is a possibility of relating it to their own experience and examples from their environment. An intuitive thinker is the type of a scientist or a researcher; he/she thinks and infers, whereas an intuitive feeler is an artistic type (Tubić 2003, 2004a, 2004b). Even though every one of us certainly possesses the elements of all the learning styles mentioned here, only one of them gives the best results for a specific person, since it suits best that person's personality traits. Aside from that, as we may presume, persons who are distinct representatives of a particular learning style (Tubić 2005) will more easily recognize their own style due to a greater similarity between their way of learning and the specificities of certain learning styles in this (theoretical, though) model and vice versa. Thus, it is highly important for teachers and coaches to be informed about the basic psychological findings on learning styles, we have already discussed, as well as about the possibilities of their development and improvement applying suitable techniques, which the rest of the paper is devoted to.

Recommendations for coaches and teachers on how to practically apply learning styles

The first step in improving motor learning by means of learning styles is identification of the style preferred by an individual learner. This can be achieved by application of proper questionnaires (Felder 1996; Kolb 1984; Myers and McCaulley 1986), one of which is standardised for our conditions (*Learning Styles Test,* Tubić, 2003). In addition, data of learning styles can be accessed by a less formal manner, by observing a learner in learning situations. Naturally, observation must be based on understanding specificities of particular learning styles. So, how should we study in order to make it as efficient as possible? How should coaches and teachers plan trainings or classes to make sure all the students or players are involved in the best way possible? How should we help a child in motor learning and practicing if we are well aware of the learning style that is best for him/her? The answers to these and similar questions that emerge from the theoretical findings represented so far on leaning styles can actually be quite useful for the coaches and PE teachers when considering the possibilities they have at their disposal with the purpose of achieving better results in work with each and every individual, irrespective of their individual abilities.

Table 1. Recommendations for the work with the persons using the style of sensory thinker

How to help a sensory thinker in motor learning and performance?
• Use analytical method in work: divide the learning material into the simplest elements, through numerous repetitions gradually reassemble them into a whole, in the end practice the whole element to the point of automatization;
• Before the training begins, the learning material taught in the previous class or training has to be revised;
• It is best for a child to start learning simple movements in order to gradually move on to the more complex ones;
• Give a set of repetitive tasks which emphasize his/her persistence;
• Put an emphasis on details;
• Try to make him/her aware of the purpose and the ultimate goal step by step, not beforehand;
• A coach or a teacher should be present and supervising, but not disturbing or interrupting, because the students work best on their own;
• It is difficult to provide all the working conditions for the Sensory Thinker, because what is particularly important to him/her are the constant conditions regarding the time when and the place where the practices take place; no crowd around and with the suitable devices.

Table 2. Recommendations for the work with the persons using the style of sensory feeler

How to help a sensory feeler in motor learning and performance?
• Apart from demonstrating a movement, for these students it is very important to have it explained how the move is performed and when it is used, it is also necessary to insist that players use the movement in the situations that resemble the game; • While talking to a student try to pinpoint the mistakes by reminding him/her of the games where he/she performed that task well; • Analyze the problems in such a way so that the emphasis is placed on the implementation of their overall experience; • Group work is the best option; the coach should give as many examples as possible from personal experience in order to create a realistic atmosphere; • Verbal appraisal and criticism appear to be particularly useful in the work with this kind of students • If a student has mastered certain movement, he/she needs to be involved in helping other players who have difficulties with this element; in this way he/she learns and revises; • Do not generalize, but give specific concrete tasks and questions, point to you own experience, either positive or negative; • Pay more attention to the talk on the content than to the exercise itself, because when we get them interested in exercising, they will do it with pleasure.

Table 3. Recommendations for the work with the persons using the style of intuitive thinker

How to help an intuitive thinker in motor learning and performance?
• The student using this learning style observes the movement as a whole, so it is necessary to employ a synthesized method in this case: explain all the rules, show the entire movement and only then ask students to perform it; • Solve problems logically, assign more complex exercises which require logical thinking and reasoning • Put them into situations where they would have to decide themselves when exactly the acquired element should be used (the so-called "situational method); • While explaining avoid unnecessary details and information; • Persons using this learning style consider it important to be aware of the whole entity and the ultimate goal. If this condition is fulfilled, they can easily fit pieces into the knowledge they already possess, which at the same time motivates them since they already know what they have to learn and how the elements are related.

• Point out the exercise regularity, i.e. the pattern of it; • Bring him/her into the problem situations to deal with the information given and asked for, which require employing higher cognitive functions; learning should rely on the observation of things, understanding the relationship between elements, situations that require analysis, synthesis, assessment, comparison, etc. • They'd rather have the coach only explain the exercise and tell them what they are asked to do.

Table 4. Recommendations for the work with the persons using the style of sensory feeler

How to help an intuitive feeler in motor learning and performance?
• After the usual standard way of demonstrating the exercise, ask the students to think up a new way of figuring out the same solution; • Give them the assignments which will highlight their ability to draw analogical conclusions and practically apply what they know to other different areas; • Encourage creativity and imagination through examples and comparisons explain them what they have to learn; • Always give them different and interesting exercises; while setting a task use metaphors they are familiar with; • While representing the exercise identify the movement with the sports player who brought it to perfection, e.g. as it is the case with Federer's and his mastering the one-handed backhand; • Use different types of games that encourage and improve the efficiency of a certain activity, so that students and sportspeople could acquire the necessary moves and improve the technique by means of other activities, too; • Try and explain as vividly as you can the process of the problem solution; • In a relaxed atmosphere, jokingly, show the exercise to children; tell them or remind them of an anecdote they remember happened in a training, when they were only starting to learn that particular exercise or when they were making more mistakes than now.

INSTEAD OF A CONCLUSION

Since the initial premise was that practical applicability of psychological findings represents a precondition for professional competence in general, while outlining this paper we specifically took into account the maintenance of balance between the need to reach a certain level of skill and competence on behalf of the coaches and PE teachers within the field of psychology on the one hand, and on the other with limitations that re-

sult from the practical application of psychological findings and methods and that really present problems for non-psychologists.

Apart from that, the current problems concerning the very area of studying the problems and pitfalls of learning styles which result from the fact that no agreement or consistency exists among different authors when it comes to defining terms and their strict terminological distinction, their operationalization and the used measuring instruments (Cassidy 2004; Coffield et al. 2004; Sims and Sims 2006), made the author of this paper actively search for the minimum of the achieved or esteemed consensus in the empirical and theoretical sense which would represent the starting point for the integration of seemingly unrelated typologies of learning styles and their more solid theoretical establishment, but which would also allow for practical upgrading within scope of motor learning, which in fact was the principal aim of this paper.

We may draw a conclusion with how much success the specified problems were overcome based on the following example as a sum-up of practical usage of learning styles in the work with children while they were acquiring certain motor skills or techniques:

The example of learning how to serve in tennis using different learning styles

If we know that a person belongs to the type of a Sensory Thinker*, when teaching him/her how to serve in tennis, the coach should first demonstrate the position the player takes while serving, then the way to hold the racquet (grasp), and finally throwing and hitting the ball with the racquet. Thus, demonstration is done gradually and repeatedly. When students realize they have acquired motor unit, the next step…*

To a Sensory Feeler *we would demonstrate the serving technique using as many words as possible while explaining the technique. The experience of the coach might serve as the illustration of the easiest and the fastest way to acquire the technique.*

The Intuitive Thinker *would find it most suitable to have the technique demonstrated as a whole while insisting that students must try and perform the technique on their own reasoning and making conclusions so that the technique looks compact.*

It would be best for the Intuitive Feeler *to have the serving technique explained by describing how this technique was/is performed by the top tennis players. Or it would be good to find out which serve that he may have seen on TV for example seemed the best to him and then teach him to perform it that way. While practicing the serving technique it would be quite useful to have a player on the other side of the net who would return the serve and thus make the class more interesting and creative, and eventually more efficient!*

The example given speak in favor of the possibility of improving motor learning by means of a planned and systematic application of psychological findings on learning styles, as here is the case, to kinesiology. Even though this paper is the pioneering attempt yet to be confirmed in empirical researches, nonetheless it clears the way for the future researches in this area by mere indicating the need for developing sensitivity in coaches and PE teachers to differences among people with respect to learning styles. Since learning styles include the person's cognitive, affective, even physiological features that determine the approach to the content to be learnt and acquired, whether it is a verbal or motor one, it is logical to assume that a coach or a PE teacher implementing these psychological findings into everyday activities with the students or players stands good chances to make learning faster, easier and consequently more efficient. It is also important to mention here that a great number of differences among the people are taken into account and respected and still, the preparation and realization of the class or training do not become too complex.

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СТИЛОВИ УЧЕЊА У ФУНКЦИЈИ УНАПРЕЂИВАЊА МОТОРИЧКОГ УЧЕЊА

Резиме

Како учити да би ефекат био најбољи могући? Како да тренери и наставници планирају тренинге или часове да би били сигурни да су сви ученици или играчи укључени на оптималан начин? Како помоћи детету при моторичком учењу и вежбању ако знамо који стил учења му највише одговара? У овом раду су понуђени одговори на ова и слична питања који могу да помогну наставницима физичког васпитања и тренерима у сагледавању могућности које им стоје на располагању у циљу постизања што бољих резултата у раду са сваком особом појединачно. Након упознавања са дефиницијом и појединим врстама стилова учења, акценат у раду је на педагошким импликацијама конкретног модела стилова учења у области спорта и физичких активности. Препоруке за рад тренерима и наставницима физичког васпитања омогућавају унапређивање моторичког учења помоћу планске и систематске примене психолошких сазнања о стиловима учења у кинезиологији.

Кључне речи: стилови учења, учење, моторичко учење, физичко васпитање.