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DESIGN AND EXPERIMENT NEW FORMATIVE AND EVALUATION PROTOCOLS FOR MOTOR AND SPORTS SCIENCES FROM A DIDACTIC-PEDAGOGICAL POINT OF VIEW

PROGETTARE E SPERIMENTARE NUOVI PROTOCOLLI FORMATIVI E VALUTATIVI PER LE SCIENZE MOTORIE E SPORTIVE IN CHIAVE DIDATTICO-PEDAGOGICA

Davide Di Palma
University of Naples "Parthenope"
davide.dipalma@uniparthenope.it

Abstract

Motor and sports education as a formative tool for young people is a topic of considerable interest in the sphere of pedagogical sciences and needs to continue research and studies aimed to experimenting new didactic protocols and new evaluation approaches that are able to enhance the potential educational interests rather than of a mere "performance" nature. In this regard, this research study aims to frame a suitable assessment scheme that is able to measure the formative and educational evolution generated by an experimental didactic protocol oriented for primary school children and based on motor and sport activity. This, at the same time, also through an innovative growth path of sport in the panorama of educational sciences. The research was conducted through the preparation of two homogenous groups of 100 children each, between 5 and 8 years of age; first group (sample group) followed the didactic experimentation and the second (control group) continued with the traditional didactic-training approach provided by their own schools. Finally, educational progress within and between groups was assessed and compared in order to analyze the related pedagogical considerations that emerged.

L'educazione motoria e sportiva intesa quale strumento formativo per i giovani è un tema di notevole interesse nella sfera delle scienze pedagogiche e necessita di continue ricerche e studi volti a sperimentare nuovi protocolli didattici e nuovi approcci di valutazione che siano in grado di valorizzare il potenziale educativo anziché gli interessi di mera natura "prestativa". A tal proposito questo studio di ricerca si pone l'obiettivo di inquadrare un idoneo schema di valutazione che sia in grado di misurare l'evoluzione formativa ed educativa generata da un protocollo didattico sperimentale orientato per dei bambini della scuola primaria e basato sull'attività motoria e sportiva. Ciò, allo stesso tempo, consentirà anche di proporre un innovativo percorso di crescita attraverso lo sport nel panorama delle scienze educative. La ricerca è stata condotta attraverso la predisposizione di due gruppi omogeni di 100 bambini l'uno, tra i 5 e gli 8 anni; un gruppo (gruppo campione) ha seguito la sperimentazione didattica ed il secondo (gruppo controllo) ha proseguito con il tradizionale approccio didattico-formativo erogato dai propri istituti scolastici. Sono infine stati valutati e confrontati i progressi educativi intra-gruppo e tra gruppi al fine di analizzare le relative considerazioni pedagogiche emerse.

Keywords

Motor and Sports Didactics; Experimental Pedagogy; Educational Evaluation; Innovative Research; Primary School

Didattica Motoria e Sportiva; Pedagogia Sperimentale; Valutazione Educativa; Ricerca Innovativa; Scuola Primaria

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Introduction

Motor and sports sciences have now become one of the main drivers of educational development, able to involve subjects of any age, and represent one of the main educational paths to pursue for young people (Armour, 2011; Bailey et al, 2009; Kirk & Haerens, 2014; Wallhead & O'sullivan, 2005). In the field of educational research it is fundamental to concentrate efforts aimed at structuring innovative proposals, both in the perspective of the fields of action for transmitting knowledge and pedagogical principles and in the sphere of the evaluation strategies, so as to concretely succeed in appreciating the educational and pedagogical value of what has been implemented (Ambra, 2019; Sibilio & Aiello, 2011; Lipoma, 2019; Sibilio, Galdieri & Carlomagno, 2008). The experimental project descried in this paper, in this regard, aimed to demonstrate how the spheres of teaching-learning and motor skills are related to each other. By introducing an innovative evaluation process, the aim was to go beyond the schemes traditionally used in schools, which are often ineffective as they tend to reduce the pedagogical perspective of motor skills to the benefit of the analysis of a final "task", often limited to the performance of an athletic gesture or a specific motor act. Instead, it needs to take into account all the inseparable pedagogical structures that link the spheres of movement and learning process, thus seeking to evaluate not only the development of the motor skills of the subjects, but also the importance that the development of the latter and the knowledge of one's own body can have in terms of personal, social and emotional growth (Colella, Invernizzi & Ceciliani, 2021; Lipoma, 2014; Munafò, 2017; Sibilio, M., Galdieri, M., Carlomagno, 2008). The choice of the karate discipline is inevitably associated significantly with the above-mentioned issues, which strongly link motor development to the subject's training process. Before being a sport, Karate is part of the martial arts and thus has a code of rules, principles and tools that are directly aimed at training physical, educational and moral spheres, and at consolidating the character of its practitioners (Bove, 2012; Di Palma & Cusano, 2020; Topino, Invernizzi & Eid, 1998).

1. The motor-sport evaluation process in a didactic-pedagogical key

What is traditionally referred to as "evaluation" comprises two distinct operations (De Landsheere, 1973; Morganti, 2006; Vertecchi, 2003):

1. *A measurement*, carried out through oral and written tests, and aimed at verifying learning;
2. *An evaluation*, which takes into account all the factors determining a performance or a process; these include commitment, interest, participation, and starting situation. Learning evaluation must therefore be coupled with the evaluation for learning, i.e. an evaluation that takes into account the student’s socio-cultural and affective-emotional spheres, motivation, commitment and willingness.

Therefore, in the evaluation process, it needs to correctly combine the evaluation of knowledge and skills with the personal path of the student over time. The evaluation of disciplinary learning is carried out through ongoing tests during the didactic activity, and summative tests at the end of every didactic path.

We can distinguish between (Calenda, M., & Milito, 2020; Capperucci, 2011; Maccario, 2012; Zanazzi, 2019):

- Formative evaluation, carried out during the didactic activity to identify the way students acquire new knowledge. This type of evaluation must reflect the criterion of usefulness rather than that of validity and reliability. This means that it must be useful, and must adapt the didactic activity to the student's different needs and characteristics.
- Summative evaluation, carried out to measure knowledge and skills at the end of the learning units. This evaluation also has a formative function for it allows to obtain the last data on the learners' learning process, and to provide them with feedback on their performance level; moreover, it enables to correct possible errors and to carry out the last didactic interventions before moving on to another content area.

The evaluation process of motor skills has always been characterized as a difficult factor to integrate into the school curriculum. In fact, within the process of evolution and development of school evaluation, the motor sphere has been characterized as a highly specific field, the singular characteristics of which have not made it easy to be harmonized with the other docimological approaches and tools adopted in educational contexts. In fact, nowadays, it seems necessary to re-determine the relationship between evaluation theory and practice, and to acquire schemes capable of re-constructing and re-appreciating the meaning that motor experience can take on in the didactic-educational field. In fact, motor evaluation in the educational field has not yet succeeded in fully freeing itself from the prevailing and simplified use of the "testing", which has significantly narrowed the horizon of the didactic-motor research, hindering the appreciation of the possible and different meanings that motor experience can assume in the teaching-learning process. The skills evaluated through the testing have often been hardly transferable to other contexts and, in most cases, have been limited to technical and situational performance as responses to specific motor tasks. In this sense, and for these reasons, the didactic-motor evaluation in the educational field would have needed a theoretical restructuring, able to provide new keys to interpret the characteristics of the movement in relation to educational and training objectives, taking into account the interdisciplinary dimension of the specific object of study. Indeed, every process of evaluation of the movement in the educational field should provide tools and protocols which do not undermine the fundamental characteristics that the movement can assume in the learning process; they should rather enhance its educational-formative functionality at interdisciplinary level, through the harmonization between docimological concepts typical of the sports and performance field with those widespread in the educational field, thus striving for their complementarity. In this sense, the evaluation activity in the motor field would require the identification of specific indicators (Alexander, K., & Luckman, 2001; Ascione & Di Palma, 2019; Sibilio, 2012):

- Movement pattern;
- Space covered by movement;
- Time to execute the movement;
- Relationship between movement and other subjects and objects;
- Execution style linked to the context and type of task.

Consequently, each specific phase of the action to be evaluated cannot be appreciated with a summative approach, but responds to a principle of functionality.

Motor evaluation at school has further elements of complexity that can be referred to (Capperucci, 2011; Giannandrea, 2009; Sibilio, 2012):

- The place where the movement is performed; this can include both coded and uncoded environments, and consequently do not always enable an ideal observation perspective for the evaluator.
- The plural dimension of the meanings that movement can assume; in fact, in the teaching activity, movement can be an outcome visible in the performance of the action, and a modality used by the teacher to make his/her activity more effective and to encourage different forms of learning, by means of an interaction that also makes use of kinesthesia besides the traditionally used means.

The multiple application of the movement in the educational field requires a reconceptualization of the epistemological principles leading to a vision of evaluation that considers a new cognitive horizon, consisting of a need for "understanding" and "interpretation" of the meanings assumed by the movement in the educational field. The evaluation would require an integrated training of different types of knowledge belonging to different scientific fields, which allow to recover the cognitive, relational and affective elements that see the body and motor dimension fully involved in the person's formation. In conclusion, the attachment of a formative value to the body and movement, now confirmed by numerous scientific studies, gives the motor experience in the teaching activities a privileged position for the didactic planning of the school curricula, consequently requiring new evaluation methods that take into account the complexity and specificity of this area. As for the relationship between education and motivation, it is possible to recall Arnold's classic model, according to which three formative dimensions can be identified in the relationship between movement, teaching and educational processes (Arnold, 1988; Sibilio, 2012):

- Education ‘about’ movement, which translates into the rational and critical study of various motor aspects, elaborated in different disciplinary fields;
- Education ‘through’ movement, linked to the acquisition of physical, social, intellectual and moral skills through the motor action;
- Education ‘in’ movement, which refers to the experiential and informal knowledge inherent in the elaboration process during the movement.

This perspective should be able to foster the appropriate evaluation of motor learning, and to take advantage of the possibilities offered by the body and movement to attribute wider, multidimensional and multisensory meanings to knowledge itself.

2. Characteristics of the Experimental Project of Motor and Sports Education: Innovative Didactic and Evaluation Protocols

The experimentation process involved 5 primary school institutes in the city of Naples, where a sample group of 100 children who followed the innovative motor and sports education protocol and were subjected to the related experimental evaluation process, and as many 100 children who did not follow the experimentation, but were equally evaluated with the innovative approach created ad hoc, in order to analyze and consider any differences in results in educational growth. The two groups had an average age of 6.8 years (sample group) and 6.9 years (control group) with an equally uniform gender distribution (67% male and 33% female for the sample group and 64% male and 36% female for the control group).

The innovative motor and sports didactic protocol was centered on the discipline of karate oriented towards the playful-educational dimension.

The process established in the implementation of the project consisted of 5 phases:

- Creation of an ad hoc docimological approach for formative evaluation;
- Initial evaluation of the control group and the sample group;
- Period of administration of an experimental didactic protocol oriented towards motor-sports education lasting a total of 3 months for the sample group (the control group followed the traditional didactic-training approach, not conducting the didactic experimentation);
- Final evaluation of the control group and the sample group;
- Comparison and considerations of the results obtained.

The dual purpose of the project is, on the one hand, to verify the possible variations in the educational development of the subjects involved in the experimentation, both by comparing the initial evaluation with the final one, and in relation to the development experienced by the control group, on the other hand to structure an appropriate scheme docimological for this evaluation. The evaluation grids, in this regard, were composed of 10 different items, each one referring to a different aspect involved in the subjects' growth and training process and related to the movement and discovery of their body, as well as to their ability to get involved, to comply with the rules and to be able to integrate within a group. Each of the items was then divided into learning levels with different characteristics and difficulties. Each subject was assigned a score ranging from 5 to 10 for each of the main items, which was calculated according to the average of the scores obtained for each of the different learning levels related to the item in question. Each of the results obtained was associated with a short explanation, necessary to describe elements of the subject's behavior and abilities, as well as to provide the motivations that led to the choice of a particular assessment.

- *Description of the experimental didactic work protocol*

The type of weekly meeting session structured during the months of the project presented a certain degree of variability; this was made possible first of all thanks to the educative-recreational nature of the course, proposing to the subjects the discovery of their own body and psychomotricity without being involved in the real "sport" practice, and to the multitude of training models of which the practice of karate is composed (open-skill, closed-skill, proprioceptive training, training of the ability to react to stimuli, interaction with a companion/opponent).

During the three-month period in which the experimental research was carried out, the lessons were designed with well-defined structural lines, dividing different types of work into specific moments, with the aim of helping the subjects recognize and getting familiar more easily with the different work systems, creating a context that was not chaotic or excessively misleading, and thus risking to affect attention and interest.

The first phase of the lesson included a group warm-up consisting of exercises recalling the basic motor patterns, stretching exercises and technical karate gestures. At the beginning, the instructions were given exclusively by the teacher while the athletes were limited to perform them, but lesson by lesson, the athletes themselves were required alternately to play the role of group leader, performing the exercises and making sure that their companions would do the same.

The second phase of the lesson was mainly related to learning the specific techniques of karate, which has many specialties (Kata, Kihon, Kumite) characterized by very different training methods. Some involved the performance of the techniques in solo mode, maintaining a correct shape of the body segments and stimulating significantly proprioception, while others involved performing techniques together with a companion, who acted as an opponent, thus focusing on other types of stimulations. After the purely technical part, the lesson continued by performing a path consisting of exercises

recalling the basic motor patterns, and aimed at strengthening coordination skills. The course was initially designed by the teacher and performed by the athletes, but once become familiar with the various exercises, they were asked to create the course themselves or to perform freely-chosen exercises on prearranged obstacles, in order to allow the athletes to express their ideas, knowledge and skills. The last part of the lesson was purely recreational and consisted of a group game. Both the beginning and the end of the lesson were marked by a particular ritual. The first was the "greeting" (dojo-kun), which is a coded series of movements to be performed jointly with the group, both before starting the lesson and before leaving the gym.

- *Evaluation grids*

Below an outline of the whole innovative evaluation process, which aims at framing an analysis structure able to enhance and fully appreciate the pedagogical dimension of motor and sports sciences, through the measurement of children's formative growth that goes totally beyond the mere performance of an athletic or sports performance.

Table 1: Learning levels

ITEM	LEARNING LEVEL
MOVEMENT	1) Masters complex motor actions in variable situations, providing personal solutions 2) Uses simple motor actions/controls motor actions in simple situations
BODY AND COMMUNICATION	1) Masters multiple communicative and expressive languages by transmitting emotional content 2) Uses communicative and expressive languages in a personal way 3) Uses coded communicative and expressive languages, if guided
HEALTH AND WELL-BEING	1) Applies behaviors that protect personal health and safety, and well-being 2) If guided, applies behaviors essential for protecting health, personal safety and well-being
INVOLVEMENT IN THE EDUCATIONAL PROCESS	1) Shows interest, motivation, participation and willingness to organize and take on roles/tasks 2) Shows interest and constant attention, and actively contributes to creating a positive atmosphere in the didactic process.
GAME-SPORT & TRAINING	1) Uses technical skills in the game and in sports performance, respecting the rules and collaborating with correct behaviors. 2) If guided, in the game and in sports performance, uses technical skills and cooperates by respecting the main rules.

COMPLIANCE WITH THE RULES AND RESPONSIBILITY	1) Autonomously respects the rules, and demonstrates self-control and responsibility. 2) If guided, respects the main rules.
ACCEPTANCE OF SELF AND GROUP	1) Accepts to attend the lesson in the absence of parents, is aware of being part of a group and agrees to get to know and be known by others, expressing his/her feelings and emotions.
LANGUAGE AND RELATIONSHIP WITH THE NEIGHBOR	1) Uses simple sentences in a clear way, and communicates with both adults and his/her companions 2) Uses simple sentences and, if guided, communicates with both adults and his/her companions 3) Stores and interprets languages and symbols

Table 2: Evaluation Criteria for each specific Item

EVALUATION CRITERIA (MOVEMENT)	
10	Has fully acquired skills, masters complex actions in variable situations by providing personal solutions. Controls and uses the equipment with dexterity.
9/8	Has acquired skills, uses motor actions in combined situations
7/6	Has fairly confident skills. Masters the equipment in simple situations.
5	Has not yet fully acquired basic motor schemes and lacks mastering of the equipment.
EVALUATION CRITERIA (BODY AND COMMUNICATION)	
10	Masters multiple communicative and expressive languages by conveying emotional content
9/8	Has good ability to use body language in a personal way
7/6	Has fair skills, uses languages in a coded or partial way
5	Is unable to express himself/herself and communicate through the use of languages
EVALUATION CRITERIA (HEALTH AND WELL-BEING)	
10	Shows confident and thorough knowledge, applies autonomously behaviors that protect health and safety for himself/herself and his/her companions, and is aware of the well-being associated with motor practice
9/8	Shows good knowledge, applies behaviors that protect his/her own health and personal well-being, and that of his/her companions
7/6	Shows fair knowledge, and if guided, implements essential behaviors that protect his/her personal health. Not always uses correct behavior.

5	Shows poor, fragmentary and inadequate knowledge, often demonstrates poor sportsmanlike conduct.
EVALUATION CRITERIA (INVOLVEMENT IN THE EDUCATIONAL PROCESS)	
10	Has excellent skills. Proves to be constantly interested in the lesson and motivated to learn. Has no problems with roles and tasks assigned by the teacher, and tries to create an optimal atmosphere for the lesson.
9/8	Has good skills. Shows to be interested in the lesson. Can carry out roles or tasks assigned by the teacher with the support of the latter. Seeks an ideal atmosphere for the lesson.
7/6	Has fair skills. Is interested in the lesson, even if he/she has difficulty in staying constantly focused. Frequently alienates himself/herself from the context and undermines the serenity of the learning moments, requiring the teacher's encouragement to maintain an adequate behavior.
5	Is not interested in the lesson or has great difficulty in staying focused on the work done by the group. Alienates himself/herself and implements egocentric behaviors, detaching himself/herself from the work carried out by the companions and causing disturbance to the didactic space.
EVALUATION CRITERIA (GAME-SPORT & TRAINING)	
10	Shows confident and thorough knowledge. Masters technical skills and chooses tactical solutions in a personal way by adopting a correct, responsible and collaborative behavior.
9/8	Shows good knowledge. Uses technical skills while respecting the rules and collaborating with his/her companions.
7/6	Shows fair knowledge. If guided, uses technical skills and cooperates by respecting the main rules of the game. Not always maintains a correct behavior.
5	Shows poor knowledge, often adopts poor sportsmanlike conduct.
EVALUATION CRITERIA (COMPLIANCE WITH THE RULES AND RESPONSIBILITY)	
10	Has excellent skills. Proves to be able to respect the rules in the various educational moments, respecting the time and space of game and learning. Applies appropriate and safe behaviors for his/her well-being and that of his/her companions. Demonstrates interest and curiosity about rules and anecdotes concerning the discipline of karate.
9/8	Has good skills. Shows knowledge about and respect of the rules in the game and learning space. Engages in learning the principles of karate.
7/6	Has fair skills. Knows the rules and respects them, often also needing the teacher's encouragement.

5	Shows partial or absent knowledge of the rules, and often implements egocentric behaviors that cause disturbance to the didactic space, influencing also the learning process of the group.
EVALUATION CRITERIA (ACCEPTANCE OF SELF AND GROUP)	
10	Has excellent skills. Makes explicit interventions elaborated by himself/herself. Has no problem communicating by turning to the group, arguing his/her own ideas and converting the recreational space into a moment of confrontation and learning.
9/8	Has good skills. Has developed good personal identity, lives the lesson serenely even in the absence of his/her parents, and has no problems dealing with the other members of the group.
7/6	Has fair skills. Has some difficulty with the separation from his/her family. Knows and respects the rules of the group, and can compare himself/herself with the other members calmly.
5	Lives with discomfort the separation from his/her parents. Often behaves self-centeredly while playing, and does not respect the rules. Expresses his/her opinion, but often without respecting that of the others, or necessarily requires the teacher's question to express his/her own thoughts.
EVALUATION CRITERIA (LANGUAGE AND RELATIONSHIP WITH THE NEIGHBOR)	
10	Has excellent skills. Shows excellent knowledge of the Italian language. Elaborates his/her own thoughts and often requires explanations on some meanings, in order to enrich his/her linguistic background.
9/8	Has good skills. Shows good knowledge of the language, fluently articulates speeches and explanations or asks questions.
7/6	Has fair skills. Knows the language and expresses thoughts and opinions, often requiring the teacher's encouragement. Is interested in listening to stories and tales.
5	Expresses himself/herself with difficulty and the vocabulary used is not very rich and accurate. The articulation of the sentences is often complex, and is marked by multiple pauses and re-elaborations.

3. Evaluation and Pedagogical Concluding Considerations

Below are the results obtained from the two evaluation phases (initial and final) on the sample group and on the control group. In a full pedagogical perspective, the average evaluation (rounded down to the first decimal place) of the group was analyzed, without dwelling on the result obtained by the individual but on that achieved by the whole group, in order to appreciate the educational and formative value of the experimental protocol and of the specific evaluation tool created.

Table 3: Results of the Experimental Evaluation on the Sample Group

ITEM	Evaluation		Differential
MOVEMENT	Initial	7	**+ 0,6**
	Final	**7,6**	
BODY AND COMMUNICATION	Initial	6,8	**+ 0,8**
	Final	**7,6**	
HEALTH AND WELL-BEING	Initial	6,8	**+ 0,6**
	Final	**7,4**	
INVOLVEMENT IN THE EDUCATIONAL PROCESS	Initial	6,6	**+ 1,0**
	Final	**7,6**	
GAME-SPORT & TRAINING	Initial	6,8	**+ 0,9**
	Final	**7,7**	
COMPLIANCE WITH THE RULES AND RESPONSIBILITY	Initial	6,8	**+ 0,7**
	Final	**7,5**	
ACCEPTANCE OF SELF AND GROUP	Initial	6,7	**+ 0,8**
	Final	**7,5**	
LANGUAGE AND RELATIONSHIP WITH THE NEIGHBOR	Initial	6,5	**+ 1,2**
	Final	**7,7**	

Table 4: Results of the Experimental Evaluation on the Control Group

ITEM	Evaluation		Differential
MOVEMENT	Initial	6,8	**+ 0,1**
	Final	**6,9**	
BODY AND COMMUNICATION	Initial	6,9	**+ 0,2**
	Final	**7,1**	
HEALTH AND WELL-BEING	Initial	6,5	**+ 0,1**
	Final	**6,6**	
INVOLVEMENT IN THE EDUCATIONAL PROCESS	Initial	6,8	**+ 0,3**
	Final	**7,1**	
GAME-SPORT & TRAINING	Initial	6,6	**+ 0,2**
	Final	**6,8**	
COMPLIANCE WITH THE RULES AND RESPONSIBILITY	Initial	7,1	**+ 0,3**
	Final	**7,4**	

ACCEPTANCE OF SELF AND GROUP	Initial	6,9	**+ 0,5**
	Final	**7,4**	
LANGUAGE AND RELATIONSHIP WITH THE NEIGHBOR	Initial	6,7	**+ 0,3**
	Final	**7,0**	

In the light of the work carried out, the results obtained and the involvement of the young students examined, we can say that the project in general proved to be a valid support in ascertaining the importance that the body, the psycho-motor development, the relationship with the other, and the self-expression through movement can assume in the process of the child's formation and educational development. In fact, the positive result is not only obvious through the purely mechanical improvement of the athletic gesture, but it can be found mainly in the subjects' level of development of all those skills that, although not directly associated with movement, are responsible for it; these include self-confidence, awareness of one's own means, the ability to relate and express oneself in a collective context, and the respect for the others and for the rules. This result takes on further significance if compared to the training development obtained by the control group in the same items; following a traditional didactic path, the children involved, in an aggregate average evaluation, in fact recorded a significantly lower progress than the control group. The experimental didactic intervention oriented towards motor and sports education has therefore proved to be an effective training tool capable of supporting children in the acquisition of educational skills useful for their personal growth and the related identity creation within a society. It should also be specified that the experimental approach was designed for a period of 3 months, but it could certainly be programmed with a wider time horizon; nevertheless, the positive feedback already obtained in this period is a symptom of the validity of a step-by-step programming that examines the student in a holistic way in all his/her variables, enabling a comprehensive development that could result in a greater awareness of himself/herself and his/her adaptation ability during the growth process.

Furthermore, the validity of the evaluation system devised and used during the course of the project was ascertained; on the one hand, it allows the student to be taken into consideration comprehensively, and on the other, gives the operator the possibility to establish short-term objectives and to evaluate them during the project implementation, in order to make more conscious and effective decisions which could be applied in the long term. In fact, the evaluation scheme makes it possible to focus on parameters that go beyond sports performance, to the benefit of the pedagogical sphere naturally embedded in motor and sports sciences. Both the protocol of action and the evaluation scheme are valid tools to be used in training projects involving the use of motor and sports activities as a preparatory means for the educational growth of young students.

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