EVALUATION TECHNIQUES AND STRATEGIES APPLIED TO EXPERIMENTAL EDUCATIONAL PROJECTS FOR MOTOR LEARNING THROUGH THE PRACTICE OF KARATE

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Abstract
Training young people through motor and sports education is an element of considerable interest in the sphere of pedagogical sciences; it requires continuous research and studies aimed at experimenting with new protocols of action, and new evaluation strategies capable of appreciating and bringing to the fore educational aspects rather than those "performance-based" ones. In this regard, the aim of this research study is to frame a suitable evaluation scheme that can measure the formative and educational evolution, generated by an experimental protocol for the formative growth of 100 young people aged between 5 and 8 years, based on motor and sports activity. Furthermore, this will also make it possible to propose an innovative path of growth by means of sport in the landscape of the educational sciences.

Key words: *experimental pedagogy; educational evaluation; motor education; karate; innovative research.*

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 (Ascione, Di Palma, Rosa, 2019; Ascione, Madonna, Di Palma, 2019; Bellantonio, 2014; Cunti, 2016; Di Palma, Ascione, 2020; Di Palma, Iovino, Ascione, 2019; Di Palma, Maulini, Ascione, 2020; Isidori, 2017). 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. 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. 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.

The issue of the motor evaluation process in the educational field

What is traditionally referred to as "evaluation" comprises two distinct operations:

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 (Sibilio, 2012):

- 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 errorsand 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 (Di Palma, Ascione, 2020; Di Palma, Agosti, 2020; 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 (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.

Experimental Project: Innovative Motor Education Protocol and Evaluation Scheme

The experimentation process was carried out on a group of 100 children aged between 5 and 8 years, all of them practicing karate at a recreational level. The process established in the implementation of the project consisted of 3 phases:

- Initial evaluation;
- Period of administration of an experimental working protocol (3 months);
- Final evaluation.

The twofold aim of the project was to verify possible positive or negative changes in the subjects in the comparison between initial and final evaluation, with reference to specific indexes displayed in specific tables, and to identify simultaneously an appropriate docimological scheme for such 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 working 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 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	Masters complex motor actions in variable situations, providing personal solutions Uses simple motor actions/controls motor actions in simple situations

BODY AND COMMUNICATION	Masters multiple communicative and expressive languages by transmitting emotional content Uses communicative and expressive languages in a personal way Uses coded communicative and expressive languages, if guided
HEALTH AND WELL-BEING	Applies behaviors that protect personal health and safety, and well-being If guided, applies behaviors essential for protecting health, personal safety and well-being
INVOLVEMENT IN THE EDUCATIONAL PROCESS	Shows interest, motivation, participation and willingness to organize and take on roles/tasks Shows interest and constant attention, and actively contributes to creating a positive atmosphere in the didactic process.
GAME-SPORT	Uses technical skills in the game and in sports performance, respecting the rules and collaborating with correct behaviors. If guided, in the game and in sports performance, uses technical skills and cooperates by respecting the main rules.
FAIR PLAY AND PRINCIPLES OF KARATE	Autonomously respects the rules, and demonstrates self-control and responsibility. If guided, respects the main rules.
RELATIONSHIP WITH HIMSELF/HERSELF AND THE OTHERS	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.
SPEECH AND WORDS USED	Uses simple sentences in a clear way, and communicates with both adults and his/her companions Uses simple sentences and, if guided, communicates with both adults and his/her companions 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	Showsfair 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)	
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 (FAIR PLAY AND PRINCIPLES OF KARATE)	
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 (RELATIONSHIP WITH HIMSELF/HERSELF AND THE OTHERS)	
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 (SPEECH AND WORDS USED)	
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.

Evaluation and Concluding Considerations

Below are the results obtained from the two evaluation phases (initial and final) by the sample of 100 children. 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.

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	Initial	6,8	**+ 0,9**
	Final	**7,7**	
FAIR PLAY AND PRINCIPLES OF KARATE	Initial	6,8	**+ 0,7**
	Final	**7,5**	
RELATIONSHIP WITH HIMSELF/HERSELF AND THE OTHERS	Initial	6,7	**+ 0,8**
	Final	**7,5**	
SPEECH AND WORDS USED	Initial	6,5	**+ 1,2**
	Final	**7,7**	

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. 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.

Contributions

The manuscriptis the result of a collective work by the authors, the specificcontribution of whichis to be referred to as follows: The "Abstract" and "Introduction"are to be attributed to Pompilio Cusano; "1. The issue of the motorevaluationprocess in the educational field" – "2. Experimental Project: Innovative Motor Education Protocol and Evaluation Scheme" – "3. Evaluation and Concluding Considerations" to Davide Di Palma.

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