

THE COMPLEXITY OF THE EDUCATIONAL RESEARCH IN THE TEACHING OF MOTOR ACTIVITIES

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Abstract

The need to identify an educational dimension of the motor activities to be practiced in school context requires a disciplinary intersection between the sciences of education and the sciences of motion that outlines a complex heuristic space where the Geisteswissenschaften and Naturwissenschaften can cooperate at a constant, rigorous and critical harmonization of different approaches, protocols and instruments of research.

Starting from the model proposed by Arnold (1988) that shows the wide range of possibilities offered by the movement to educational processes it is important to reflect critically upon the procedures and the adoption of specific research methodologies that can functionally integrate with the curriculum and the educational and organizational constraints of the school institutions and be suitable to define the best teaching practices to enhance the educational dimension of motor activities.

Key words: education, motor activities, qualitative research, quantitative research, teaching-learning.

Introduction

In the last decades the study of the motor activities, as educational experiences particularly effective in the cognitive, emotional and relational processes (Hay, 2006), required a disciplinary intersection between the sciences of education and the sciences of motion. It has so outlined a complex heuristic space where antithetic scientific traditions have met.

On the epistemological point of view, this has solicited a deep consideration on the nature of scientific knowledge in the teaching-motor field, which reopened the debate between nomothetic and idiographic positions (Wildebund, 1904) in the possible identification of new research methods to acquire a knowledge which may show the complexity of the teaching of motor activities with educational purposes.

The epistemological reflection has been particularly important in the definition of research methodologies needed to acquire a scientific knowledge in the motor field. These methodologies, on the one hand, help to experimentally analyze the motion and, on the other hand, to catch the specificity and significance of teaching and learning practices that use the motor activities in the educational processes.

The educational function of the motor activities requires the research to draw both on the *Geisteswissenschaften* and the *Naturwissenschaften* to operate at a constant, rigorous and critical harmonization of different approaches, protocols and instruments of research. The interaction between natural sciences and human sciences allows the use of different methodological approaches, that make use of “*understanding*” with regards to the bodily and movement potentialities in the educational experience, and „*explanation*” when it is aimed at analyzing the movement with specific educational goals.

Hence, it seems useful to establish interdisciplinary relationships that lead to consider a possible “*complementarity*” of traditionally opposed methodologies in the educational research on body and movement with educational aims.

The theoretical approach to the present study is aimed to identify the reasons supporting this idea of complementarity, justified by specific epistemological reflexions and the complexity of the object of the study.

The choice to conduct the research using a theoretical-argumentative approach, is supported by the recognized relevance of this methodology as scientific instrument traditionally used in educational research (Lucisano & Salerno, 2002).

The Educational Research on the Movement

According to Arnold's model (1988), in the relationship between education and movement it is possible to find three educational dimensions:

- knowledge about the movement, which is the rational and critical study of different motor activities, performed in different educational fields.
- knowledge through the movement, which is linked to physical, social, intellectual and moral skills through movement.
- knowledge in the movement, which refers to experiential and informal knowledge processed during the movement.

This model shows the wide range of possibilities offered by the movement to educational processes, which require an interdisciplinary approach that combines theoretical elements, traditionally referable to the psycho-pedagogical sciences, along with scientific evidences coming from domains traditionally ascribed to the sciences of motion.

Matching paradigms typical of human sciences with the knowledge and the results of studies and investigations in the field of experimental sciences, allows a wider knowledge of the body-motor function in education, curbing the risk of an explanatory reductionism typical of a mechanistic view of the movement.

The study of the role played by the body and the movement with teaching educational purposes demands also the definition of procedures and the adoption of specific tools and methodologies that can functionally integrate with the curriculum and the educational and organizational constraints of the school institutions (Sibilio et al., 2008).

The need to give ecological validity to the teaching researches in the motor field requires them to be carried out in real contexts. In order to find out teaching methods that can make out their educational value, these teaching researches should take place where it is possible to experience the perception of a mismatch between the expectations of those who are carrying them out and the true reality for a creative recombination of the individual's patterns of action (Lincoln & Guba, 1985).

In a complex view of the motor activities teaching with educational purposes, the context in which they take place assumes a key position since, in potentially educational contexts, even the learning of the movement and / or the learning through the movement can be regarded not as a mere interiorization of external, often even implicit, executive schemes but as the result of a reorganization of existing schemes.

This view makes us consider the teaching of motor activities as an "*embodied*" and "*situated*" practice and the results it produces through the teaching activity as the final product of a complex interaction with the context and the specific physical characteristics of the subject, which is difficult to explain in a clear way.

Studies on situated knowledge (Lave & Wenger, 1991; Chaiklin & Lave, 1993) help to broaden the field of inquiry to psycho-emotional, material, social and cultural elements, that also affect the teaching of the movement since the motor teaching and learning, as well as the consequent education, seem to be strongly influenced by material and relational circumstances.

The teaching of the movement seems to be particularly sensitive to this co-determination,

since it will be ineffective if it provides explicit plans of action, in a view of knowledge borrowed from today's cognitive sciences that help to emphasize the close link among knowledge, action and context (Clancey, 1997) and to consider the interaction among intentions, actions and feedback as the basis for learning.

Evidences in the *Embodied Cognitive Science* are not less important from a cognitive point of view; they acknowledge the main role of the sensory-motor system in structuring concepts we use to think (Lakoff, 1999).

In this perspective that highlights the increasing complexity of the object of study, it is therefore useful to identify research methods which give up reductionist attitudes in favor of a greater and even ecological validity of the teaching research in the motor field. It will help, without disregarding its value, the experimental research on the movement, which aims at analyzing it through the intentional and controlled manipulation of the variables.

In fact, it is widely recognized the mutual relationship among the research questions, the subject of study and the choice of the method to properly carry out the research (Krane et al. 1997; Patton, 1990). Hence, with regard to the educational research on the motor activities, the traditional distinction between quality and quantity translates both in questions that can be placed and subsequently investigated in real contexts and questions that are different from the complex network to which they belong. Therefore, in choosing the research method, there should be done a further distinction between researches dealing with persons and actions and researches dealing with parts of such elements (muscles, fibers, etc.) (Mac Fee, 2009).

For these reasons it would be desirable, in terms of methodology, to put quality models beside the quantitative researches that are aimed at identifying the general laws or the invariances underlying the determinants of the movement. Those qualitative models, if on an epistemological level may be opposite, may nevertheless be consistent on an application level. If the quantity techniques allow the analysis of elements of the movement which may be functional to the teaching-learning dynamics, the qualitative research allows the understanding of features and meanings of the teaching-motor experience as well as of the learning-contextual and procedural elements, without sacrificing the rigor of the research. The integration of the two approaches would produce a final result that highlights the most significant contributions of both methodologies in the educational motor research (Nau, 1995), legitimizing the scientific nature of qualitative research not just as a preliminary exploratory phase from which the regularities to be tested and interpreted come out through a collection of facts and of measurable variables expressed in quantitative way.

The difficulty of controlling all the variables, which take part in the teaching through the movement, makes it difficult to apply the experimental method in all its phases, even if it seems necessary in the analysis of some components of the movement that has traditionally used quantitative approaches and experimental and technical solutions in the measurements of kinetic and kinematic components of the movement, often performed in laboratory settings.

At least three kinds of difficulties raise in the research on the teaching through the movement that make it impossible to respect the principles of repeatability and generalizability which are the basis of the experimental research. They are the following ones:

- the procedural and contextual factors that guide the choice of the agent are not repeatable;
- the educational relationship among the teacher, the student and the class group is not repeatable;
- the small number and unhomogeneity of the sample, which often makes it difficult to generalize the results.

On the other hand, the repetition makes no sense: all the features of the situation and the relationship cannot be replicated since there is no complete list of this features nor the ability to determine which of them can be considered relevant (Mac Fee, 2009). Moreover,

the generalizability, and so, the possibility to extend the results obtained with the sample to the reference population, would be undermined by the difficulty of identifying a number of characteristics of the sample that can be considered similar to those of a general reference population (Sparkes, 1998).

Furthermore, there is the same kind of difficulty even when we try to fix common features among experimental and control groups in laboratory tests; in this case we try to identify the most significant variables to answer the research questions through the process chosen or, better, we might consider that there is no neutral way to a theory to solve this issue.

In fact, the greatest mistake which can occur in the research on the teaching through the movement is to not recognize that, when there are complex relationships (teacher / learner agent and context) there are events, situations, relationships, perspectives and characteristics that could be considered finished entities (McFee, 2009).

Anyway, this does not imply a complete renunciation of research projects that start from the formulation of hypotheses, to then define the procedures for collecting and processing data in a theoretical framework that represents the *rationale* of the investigation procedure. It is indeed to put beside them “*much less rigorous methodological approaches but more flexible and elastic approaches that can still provide some form of knowledge empirically found...*” (Lumbelli, 1994).

On the heuristic level, an integrated approach that meets the requirements to ensure a high quality to the teaching through the movement in educational settings (Penney et al, 2009) should take into account:

- the complexity and exclusivity that characterizes the teaching-learning path;
- the possible availability of many theoretical frameworks;
- the possibility to use different strategies for the research;
- the possible detection of a background that, under special conditions, is able to create trends and to guide the results of the teaching-learning processes according to the responses, the behaviors and the attitudes produced;
- the interaction between subjective dimensions and contextual aspects;
- the influence of the researcher's cognitive schemes, that inevitably guide the assignment of meaning to the evidences gathered;
- the quantitative elements that characterize the movement in the choice of the objectives to be pursued.

This integration is also needed because research on teaching through the movement seeks to answer some questions that traditional investigating procedures of the sciences of motion are not able to provide answers and therefore require the contribution of traditions to a more strictly educational research.

In fact, the scientific fields of biomedical, biomechanics and bio-engineering areas, to which we mainly refer in the study of the movement, even investigating the causes that produce the movement, the effects of motor activity and its possible variables and the multifactorial assessment of attitudes, skills, abilities and psychophysical potentials of the person, do not have scientific traditions to answer the following questions:

- how to teach and learn through the movement;
- how to teach and learn the movement in its many forms;
- how didactically correct the movements wrongly learned and learn new movements which are functional to the education-training processes;
- how to shape teaching according to the psychophysical features and the subject's motivations;
- how to shape the teaching of the movement according to the context where it occurs (Aiello & Sibilio, 2010).

These questions are an integral part of the tradition of the educational research that, in the

last two decades of the last century, after having experimentally investigated for a long time on teaching and learning, leaving out all those aspects that cannot be empirically and experimentally tested, has recognized the need for complementary approaches while investigating complex events whose fragmentation could lead to a loss of meaning (Laeng, 1992).

Specifically, it would not be a matter of assuming prescriptive attitudes and providing models to practice through the theorization emerging from the collection of information and their subsequent elaboration and explanation, but of examining and analyzing the current practices by plunging in contexts in which they perform and by using heuristic strategies that should also recognize in the forms of imperfect rationality an epistemic attitude needed to study the educational processes (Sorzio, 2005) as well as the teaching of the movement.

Today's scientific debate on these issues has led to a permanent opening to the research methodologies more appropriate to the complexity of the educational phenomenon that, inspired by a constructivist systemic approach, appears to answer more to the needs of educational research in the motor field.

The reaction to the scientist objectivism of empiricism and the acknowledgement, mainly in the social sciences, that the knowledge produced by the scientific research is also the result of the relationship between the real object of study and teaching reality of the researcher, leads us to consider it as the product of a process of meaning influenced by perception and by the cultural and explanatory patterns of the researcher, as member aimed at registering and giving meaning to the phenomenon under investigation (Sorzio, 2005).

Particularly, in the field of the teaching of the movement, it is built on the researcher's ability to grasp the complexity of the interaction that takes place in the educational context where the teaching of movement is practiced, using logical models to understand the psycho-emotional, cognitive and relational implications also of the proposed activities. It is also built on the researcher's ability to interpret contextual elements that provide feedback to a possible restructuring of the learner's and teacher's patterns of action that are involved in the learning process of, in the movement and through the movement, and of the teacher.

This link between the researcher and those involved in the teaching-learning activity is a possible channel of access to evidences which can contribute to the discovery of the reasons that have led to or contributed to the choice of a teaching action by those who teach and that have favored or fixed effective, ineffective, foreseeable or unforeseeable responses of the learners, asking the researcher to interpret the possible relationships between factors that may have determined the conditions that made possible the effectiveness of a particular teaching situation.

It is a passage which substantially contributes to the investigation on the favorable conditions that make effective the proposed teaching and that can be integrated with the experimental research in the analysis of the movement which, being the result of an intelligent motor action of a person, is easy to analyze in its objective transparency, promoting the process of critical reflection on the effectiveness of educational choices and behaviors (Bellagamba, 2001).

The analysis of fragmentation of the movement allows to know the components whose connection or joining allows to find the whole in its integrity. But not everything can be traced to the sum of the parts; in fact something may miss the analysis especially when it is the human reality (Laneve, 2009).

This approach could lead to the definition and study of all those elements that are detectable on an empirical level and that, under certain conditions, can find expression and recurrence in similar situations and can be traced back to a principle of recurrence by integrating with an epistemic attitude oriented to capture the authenticity and complexity of the experiences during the teaching and learning, opening new heuristics perspectives in the educational research of the motor field.

Conclusions

The recognized educational value of motor activities requires a reflection on the way in which it is possible to acquire knowledge in the field of didactics *of, through* and *in* body and its movement. This leads to a selection of research methods that, although each with specific characteristics and purposes, highlight a possible complementarity when the aim is to investigate on the potentialities offered by the body and the movement to foster the educational development in potentially educational contexts.

Therefore, the object of the scientific reflection of this work has been proposed as a preliminary stage of investigation on the characteristics of research methodologies most suitable to the complexity of the object of the study. Without any pretense at completeness, the study aims to stimulate a multidimensional scientific approach that allows to capture the potentialities of the body and movement in the construction of didactics methods aimed not only to the education *of* movement but also *in* and *through* the movement.

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