New Technologies for Writing and Drawing Evaluation

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ABSTRACT

Movement analysis is generally considered the analysis of walking, with the first workshops not by chance being called Gait Analysis Laboratories. Improvement of the technical specifications of these tools and the simplification of user interfaces have allowed these tools to be applied to other motor actions apart from walking. Simple or complex movements of the upper or lower limbs have become the object of movement analysis. The areas of interest range from sports to the clinical. This possibility to refer to several motor actions as well as different areas has meant that these laboratories are now known as Movement Analysis Laboratories. Is it possible to consider the use of these systems in the evaluation of the writing skills of the child. The specific research is part of the screening of special needs education, highlighting important information that is subject to the planning and production of the drawing. The project starts from the desire to investigate the possible integration of the traditional rating scales with digital systems, for this reason, and in order to be a predictive tool of the writing skills of children, the VMI test has been adopted as a working basis. In particular, attention has been given to the first page of the test.

Keywords: Drawing Evaluation, Movement Analysis, Special Needs Education, VMI Test, Writing Evaluation

The application of new technologies to the analysis of human movement is a support to the traditional evaluation systems that deal with the study of motor control.

Computers, software and, in general, digital systems have become an integral part of the culture of our century. It is well known that the potential of software is closely linked to the hardware specifications of the computer upon which it is installed.

The close connection between software and hardware is the basis for the success of the tasks that are required of the computer and the particular program. If the software has bugs or the hardware is defective or broken, the relationship is either interrupted or limited. Man like a
computer responds on a daily basis to programs that are modulated with respect to the characteristics of the human body. Walking, grasping, sneezing, moving an object or simply drawing represent the final stage of integrating several devices managed by one or more programs. The implementation of the voluntary or involuntary movement depends on both the perfect synergy and efficiency of the two systems.

Human movement can, therefore, be considered as the output of the interaction between different systems and apparatuses (Divieti, 1997). The nervous system, the muscles and skeleton as well as the sensory and perception systems cooperate each with their own prerogatives in the realization of movement. The alteration or blocking of one of these elements determines the effectiveness or success of the required movement. A specific pathological situation can cause motor and postural alteration, consequently leading to a limitation in the performance of certain daily actions. The study of functional limitations can be a useful tool in understanding the dynamics that lie behind the creation of movement.

The need to make use of increasingly accurate measuring instruments allows the clinician to provide quantitative elements of support to traditional assessment scales (Baratto, et al., 2003). Performance tests are often evaluative scales through which it is possible to have a measurement on the functional status of the patient. One of the most famous is the Functional Independence Measure (FIM), which measures the autonomy of a subject, with the examiner assigning a score from 1 to 5, depending on the skill of the subject in some carrying out several daily activities. The measurement tool should complement and enrich the existing assessment tests without the ambition of replacing them, but merely giving additional information.

The integration of quantitative data is a requirement that also applies to other disciplines that need to take advantage of information that can be obtained using new technology systems. Teaching when assessing has to deal with these new dynamics. This new trend requires a necessary hybridization of approaches and research models relating to the domain of the hard and soft sciences (Frith, 2007) in full awareness of the risks of an outright application of the simple explanation of the interpretation of educational phenomena (Rivoltella, 2012).

Recognition of the interdependence between that part of the research that deals with the educational process and the one that is sensitive to the functional characteristics that allow for the execution of actions, guarantees that there is a research methodology that functionally integrates everything in a common conceptual framework (Sibilio, 2011).

The first attempts to assess the quality of handwriting date back to the beginning of the second century, with the qualitative result of the manual writing process being connected to the readability of the text. The scoring was determined by comparing the text with examples of handwriting sorted by the degree of readability. This type of scale was called global-holistic (Freeman, 1959).

This type of assessment requires very long times to compare the correspondences between the reference manual and the text to be evaluated. In addition, the subjectivity of interpretation of the operator in the scales of the holistic approach plays a vital role, making the tool weak when compared to the same assessment between different operators. An analytical approach, recently introduced, adopts predetermined and well-defined parameters, with the quality of the handwriting being evaluated. The size of the handwriting as well as the spacing between the letters is also considered.

Among the most successful analytical tests, it is worth mentioning “The concise assessment method for children handwriting” (Hamstra-Bletz, et al., 1987). Although independent of the subjective nature of the evaluation of the operator, the analytical scales are not only unsuitable in assessing the quality of the handwriting, but they also do not provide a total assessment of its quality.

In both evaluation systems, it is not possible to carry out a real time survey of the handwriting process and even less so of the kinetic components related to it.
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