Chapter 21
An Overview of the Technological Options for Promoting Communication Skills of Children With Cerebral Palsy

Fabrizio Stasolla
https://orcid.org/0000-0003-1626-9664
University "Giustino Fortunato", Benevento, Italy

Alessandro O. Caffò
Department of Educational Sciences, Psychology, Communication, University of Bari, Italy

Viviana Perilli
Villa Apelusion Medical Care Center, Bari, Italy

Fiora D'Amico
Villa Argento Medical Care Center, Italy

ABSTRACT

This chapter provides the reader with a selective overview of the empirical contributions available in literature on the use of assistive technology-based interventions for promoting communication skills of children with cerebral palsy. Four categories were selected regarding (1) microswitches and computers, (2) aided-alternative and augmentative communication devices, (3) eye tracking, and (4) robots. Overall, 18 studies were retained, and 47 participants were included. Results were largely positive although a few failures occurred. Clinical, psychological, and rehabilitative implications for research and practice were critically discussed.

DOI: 10.4018/978-1-7998-3476-2.ch021

INTRODUCTION

Cerebral Palsy (CP) refers to a group of non permanent postural defects or movement abnormalities as a consequence of fetal problems and/or an immature brain. It is frequently described as one of the basic cause of extensive motor disabilities, closely linked to intellectual delays, sensorial impairments, perception disturbances, and associated with behavioral difficulties, epilepsy, seizures, or muscular alterations (Anaby et al., 2017).

A critical issue for children with CP is represented by their communication inabilities. Thus, due to lack of speech, tracheotomy, and both upper and lower limbs spasticity, children with CP may be unable to adequately and sufficiently communicate their needs to the outside environment (Perrin, Gnanasekaran, & Delahaye, 2012). Accordingly, they might be quite isolated and passive with negative outcomes on their quality of life (Stasolla & Perilli, 2015). To overcome this crucial matter, one may envisage the use of assistive technology-based rehabilitative interventions (AT) (De Pace & Stasolla, 2013).

1. BACKGROUND

AT defines any electronic tool, piece, equipment, or device aimed at promoting self-determination, independence, constructive engagement, and/or positive occupation of an individual with severe to profound multiple disabilities towards the social environment. Consequently, children's isolation and passivity on one side, and caregivers' burden on the other, should be relevantly prevented. Additionally, the quality of life should be improved (Weinstein, Lloyd, Finch, & Laszacs, 2018).

Based upon learning principles (i.e., causal association between behavioral responses and environmental consequences), a child with severe to profound developmental/multiple disabilities, and/or extensive motor impairments should be motivated to an adaptive responding, once exposed to an AT-based intervention, for getting the independent access to positive stimulation contingently to such responding. Thus, the AT-based program should mediate and fill the gap between the behavioral responses and the environmental events (LoPresti, Bodine, & Lewis, 2008). Among populations with developmental and intellectual disabilities, children with CP might greatly benefit of an AT-based strategy.

Microswitches (i.e., electronic tools aimed at providing brief periods of positive stimulation contingently to performing an adaptive responding, through a technological control system), aided-alternative and augmentative communication systems (AAC) (e.g., speech generating devices, computer-based interventions), eye tracking, and robots may be very useful for supporting a child with CP to profitably communicate his/her needs, and/or requesting/choosing desired items. For example, through a combined microswitch/computer-based program, a child with cerebral palsy may be enabled to independently access to preferred environmental events such as beverages, foods, and/or leisure activities. Else, with AAC aided-systems such as PECS (*Picture Exchange Communication System*) and VOCA (*Vocal Output Communication Aid*) a child with CP may choose between two different communication strategies.

Basically, two groups of users may be targeted for the aforementioned programs, namely (a) children with CP who present extensive motor disabilities and are considered within the normal range of the intellectual functioning, and (b) children with CP who have severe to profound intellectual disabilities and motor impairments. Irrespective of the adopted intervention strategy (i.e., see the options listed above), for the former group, one may envisage the access to the literacy process, while for the latter group the rehabilitative program may be aimed at promoting occupational activities and/or constructive engage-