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Designing play equipment to develop the social competence of children with cerebral palsy

Research Through Design Case Study

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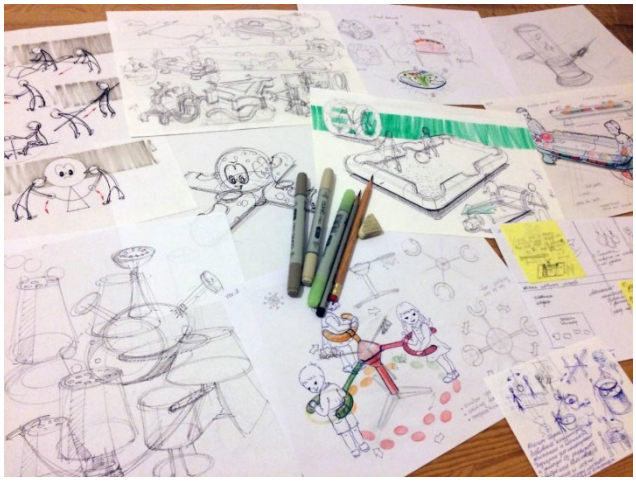
Abstract

This study investigated the design of play equipment for encouraging peer-to-peer social interactions amongst children with cerebral palsy aged from 4 to 6 years, as a means of developing their social competence. The focus was on developing a new conceptual model and criteria for designing this specialist play equipment and, thus, creating a level playing field for children with different manifestations of cerebral palsy.



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According to the statistics of the National Health Service, it is estimated that approximately 1 in 400 children is born with cerebral palsy in the UK (NHS, 2017). It is recognised that these children often have reduced social engagement, yet socialisation plays a fundamental role in development. In spite of this, there are few toys specifically developed for children with cerebral palsy and even fewer which support peer socialisation. Therefore, there is a need to develop relational play equipment for them.

The research presented here is interdisciplinary and informed by a social perspective on disability. It combined theoretical investigation with design practice within an action-research approach. User-centred design was used for the design development and intervention. Observations of children with cerebral palsy and interviews with their parents and conductors were employed for collecting data about the children's social interactions before and during the design intervention in order to determine the effectiveness of the proposed concept. Data collection was carried out at the National Institute of Conductive Education in Birmingham, England.

A conceptual design model of play equipment for enhancing the social competence in children with cerebral palsy was developed. The model focused on designing semiotic content that could trigger cognitive, emotional, social and physical processes to encourage children to participate in relational play and facilitate peer-to-peer social interactions. Based on this model, design criteria were developed, integrating two interrelated sets of indicators. The first set pertained to the design position and comprised child-friendly design criteria. The second pertained to the social purpose, comprising indicators of social competence, such as social skills and self-confidence.

Based on these criteria, a number of design ideas were developed, using ideation, intuitive hand sketching and brainstorming. A final idea of the thematic play environment, "Undersea Friends", which corresponded best to the conceptual model of play equipment and met most of the design criteria and recommendations from parents and conductors, was chosen for the design intervention. "Undersea Friends" consists of the toys intended for practising particular social skills, where each toy in the play space is a creature-friend and a facilitator of children's interactions. These toys are Octopush Olly for practising turn taking, Hexapush Hetty for practising cooperation and Larry Long Legs for sharing. Two prototype toys for this environment were developed and evaluated with children with cerebral palsy for the purposes of this study.

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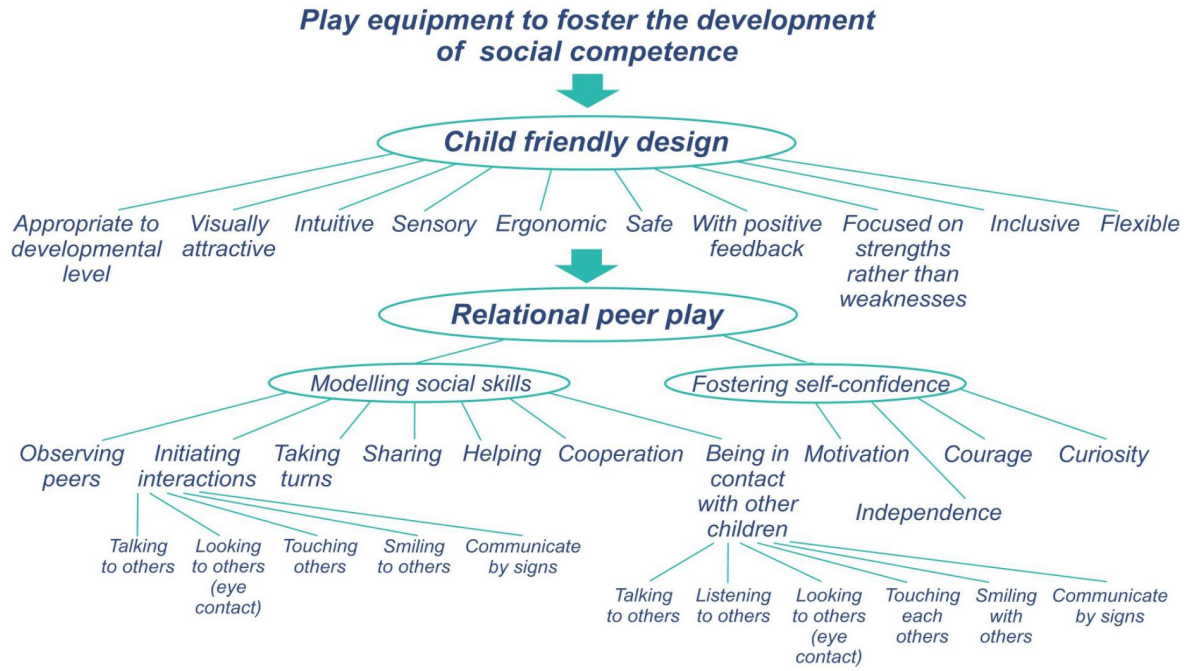
This completed study highlights the difficulties which children with cerebral palsy may experience with peer interactions while playing. It provides a new understanding of the development of social competence through engaging children in relational play,

facilitated by specialist play equipment, as well as the prototype toys of the play environment, "Undersea Friends". This research contributes to understanding of how designers can approach the creation of such play equipment by providing design criteria, design recommendations and suggestions for further investigation.



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Summary of research through design activity

This research made contributions to the field of design for health and well-being, specifically to educational toy design for children with cerebral palsy and to inclusive design and inter-sensory design in this context. It also contributed to the fields of educational practice, specifically to the development of social competence in children with cerebral palsy. The outputs took the form of design solutions as well as design criteria and recommendation for designers, design teams, educators, children with cerebral palsy and their parents.

In doing so, a new conceptual design model of play equipment was developed which contributed to toy design for children with cerebral palsy and to inclusive design. This model defines the relationship between children with cerebral palsy, their social competence, play equipment and relational play as follows: play equipment encourages social interactions amongst children through relational play, which in turn helps them to practise social skills and thus to develop their social competence. The

study found that the model is useful in designing children's educational tools in the context of conductive education.

To design this specialist play equipment, design criteria were developed. These criteria allow other designers to create play equipment for children with cerebral palsy in order to address the social development of these children. The design criteria were supplemented by more specific design recommendations.

In regard to educational toy design for children with cerebral palsy, this study offered two practical examples of relational play equipment. These examples are the prototypes of Olly the Octopush for practising turn-taking and Hetty the Hexapush for practising cooperation.

Collaboration with non-academic institution (the National Institute of Conductive Education, Birmingham) allowed the work to make a real-world impact by improving education practice and providing tangible benefits for children with cerebral palsy, their parents, and practitioners who are working with them.

Underpinning research, context and summary of methodology

Research projects on the development of children with cerebral palsy have to date mainly concentrated on physical and cognitive areas or on social development, pursued through special educational programmes and training (Elliot and Gresham, 1993). This study, in contrast, investigated how to foster the development of social competence through enabling these children to participate in relational peer play with a new model of play equipment. This specialist equipment was not only a tool for fun, learning and development but more importantly an intrinsic centrepiece for attaining social competence.

This study sought to address and to answer the following research question: How can we design play equipment to develop peer-related social competence in children from 4 to 6 years of age with cerebral palsy? It explored how play equipment could contribute to the development of social skills through encouraging relational play and thus peer social interactions between children.

To answer the main research question, this study combined theoretical investigation with design practice (Creswell & Plano Clark, 2011). The research strategy was modelled on an action-research approach (O'Brien, 2001). The dual position of both researcher and designer taken during this study allowed for the gaining of insights into design practice and to use of design perspective as a means of looking for creative and child-friendly solutions, which were explored and demonstrated through the practice.

The concept of developing social competence through play served as a theoretical framework for the investigation, and from this a new conceptual design model of play equipment was created. The design model was primarily informed by the academic literature and observations of children with cerebral palsy. Data collection was carried out at the National Institute of Conductive Education in Birmingham, England. Initial observations and interviews were conducted to define the level and quality of the social interactions of these children before the design intervention. Based on the obtained data, design ideas of play equipment were then developed through task analysis and ideation through hand sketching. During the development of design ideas, the conductors and parents played the roles of advisers and co-designers. Thus, the ideas were refined in an iterative design process, and two prototypes of the play equipment were created.

Observations were carried out with the intervention in place, in order to determine any changes in the children's peer-to-peer interactions and consequently the effectiveness of the designed play equipment. The main focus of this stage was to evaluate how children used the play equipment provided, their level of engagement with the toys and the level of interactions between children while playing with this equipment. In order to evaluate these aspects, two types of indicators were defined: indicators of engagement and indicators of peer-related social competence. Insights from the observations together with focus-group discussion demonstrated effectiveness of the design criteria and the conceptual design model.

The play equipment designed in this study was intended to be used in special schools and nurseries for children with disabilities, in inclusive schools and nurseries and in centres of conductive education.

References produced by researcher from/during doctoral research

Borzenkova, G., Niedderer, K., Rozsahegyi, T., (2018) Designing play equipment for children with cerebral palsy: the context and design guidelines. DRS2018 conference proceedings: Design Research Society, the University of Limerick, Ireland, Volume 5, pp 1953- 1969. Available from: http://www.drs2018limerick.org/track/inclusive-design-inclusive-sig

Presentations of research work have been made at the conferences:

The 3th International GamiFIN 2019 Conference, Levi, Finland. Poster. Best poster award. Available from: https://www.researchgate.net/publication/329138833_Toys_for_children_with_cerebral_palsy

The 8th International Toy Research Association Conference "Toys and Material Culture: Hybridisation, Design and Consumption", Paris, France (2018). Paper “Designing toys for children with cerebral palsy”. The ITRA-BTHA (the International Toy Research Association and the British Toy and Hobby Association) Prize for Outstanding Toy Research (£1000). Abstract available from: https://www.researchgate.net/publication/326450508_DESIGNING_TOYS_FOR_CHILDREN_WITH_CEREBRAL_PALSY_ITRA_2018_ANNA_BORZENKOVA

Annual Research Conference ARC 2017, University of Wolverhampton, UK. Poster. Winner at the Annual Research Poster Competition at the University of Wolverhampton. Available from: https://www.researchgate.net/publication/329138824_Designing_play_equipment_for_children_with_cerebral_palsy

Physical toys prototypes of Octopush Olly for practising turn taking and Hexapush Hetty for practising cooperation (2018)

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