Best Practices & Case Studies

Partner Name: OŠ Podmurvice, Rijeka, Croatia **Date:** 1/6/2025

Best Practice / Case Study #1

- **Title:** Use of Virtual Reality in School-Aged Children with Developmental Coordination Disorder: A Novel Approach

  Author(s) / Organization: Giulia Purpura, Valentina Di Giusto, Carla Fulvia Zorzi, Giusi Figliano, Mattia Randazzo, Valentina Volpicelli, Rosanna Blonda, Elena Brazzoli, Tarjn Reina, Silvia Rezzonico, Roberta Sala, Anna Cavallini
  Affiliations: University of Milano Bicocca, School of Medicine and Surgery, Monza, Italy; IRCCS Fondazione Don Carlo Gnocchi, Milan, Italy; Università Cattolica del Sacro Cuore, Department of Psychology, Milan, Italy

- **Year:** 2024

Description:

This study implemented a virtual reality rehabilitation program targeting visual attention, inhibition, planning, and visual-motor coordination in children diagnosed with developmental coordination disorder. Conducted over 11 weeks in the Computer Assisted Rehabilitation Lab, the program utilized the VITAMIN platform, integrating sensors like Microsoft Kinect V2 and Wii Balance Board to run exergames. Rehabilitation sessions were individualized, offering games with varying complexity levels to match each child's functional profile.

Evidence of Effectiveness:

Preliminary results indicated significant improvements in visual attention and in visual-motor coordination, with increased accuracy in hitting target bonuses and decreased errors in avoiding distractor targets.

Application to Project:

This case study offers valuable insights for designing VR-based rehabilitation programs for children with developmental coordination disorder. Key elements to consider are: individualized rehabilitation – customizing games to align with each child's functional profile enhances engagement and effectiveness; integration of technology - utilizing sensors and interactive platforms can provide real-time feedback and track progress; focus on executive functions - targeting cognitive domains such as attention and inhibition can lead to significant improvements in motor skills and gamification - incorporating game-like elements can increase motivation and adherence to the rehabilitation program.

Best Practices & Case Studies

Partner Name: OŠ Podmurvice, Rijeka, Croatia **Date:** 1/6/2025

Best Practice / Case Study #2

- **Title:** HSVRS: A Virtual Reality System of the Hide-and-Seek Game to Enhance Gaze Fixation Ability for Autistic Children

- **Author(s) / Organization:** Chengyan Yu, Shihuan Wang, Dong Zhang, Yingying Zhang, Chaoqun Cen, Zhixiang You, Xiaobing Zou, Hongzhu Deng, Ming Li; Third Affiliated Hospital of Sun Yat-sen University, China

- **Year:** 2023

Description:

The Hide-and-Seek Virtual Reality System is a VR-based intervention designed to improve gaze fixation abilities in children with autism spectrum disorder. The system engages children in a hide-and-seek game with a virtual avatar, utilizing face and voice manipulation technologies to personalize the avatar's appearance and voice, making it resemble someone familiar to the child, such as a parent. This personalization aims to enhance the child's engagement and motivation.

Evidence of Effectiveness:

A pilot study was conducted to evaluate the feasibility of Hide-and-Seek Virtual Reality System. The study involved 24 children with autism spectrum disorder. The study utilized subjective questionnaires completed by the participants' parents and objective data. Results indicated that children in the VR-assisted intervention group demonstrated better performance in gaze fixation compared to those in the control group. Also the use of personalized avatars through face and voice manipulation techniques was found to enhance the efficiency and effectiveness of the system.

Application to Project:

This case study provides valuable insights for designing VR-based interventions aimed at improving social communication skills in children with ASD. Important elements to consider are: personalization by incorporating familiar faces and voices can increase engagement and effectiveness and interactive gameplay by utilizing game-based scenarios like hide-and-seek. This can make interventions more appealing to children.

Best Practices & Case Studies

Partner Name: OŠ Podmurvice, Rijeka, Croatia **Date:** 1/6/2025

Best Practice / Case Study #3

- **Title:** Development of a Wheelchair Simulator for Children with Multiple Disabilities
- **Author(s) / Organization:** Nancy Rodriguez; Institute of Research in Computer Science and Random Systems (IRISA), France
- **Year:** 2015

Description:

This study presents the development of a virtual reality wheelchair simulator aimed to assist children with multiple disabilities in familiarizing themselves with wheelchair use. The simulator provides a safe and controlled environment where users can practice wheelchair navigation without real-world risks. By simulating various scenarios, the VR system allows children to develop necessary skills and confidence before transitioning to actual wheelchair use.

Evidence of Effectiveness:

The study focuses on the development and implementation of the simulator and it highlights the potential benefits of VR in rehabilitation and therapy. The ability to repeat actions and progress at one's own pace in a risk-free environment is emphasized as a significant advantage, particularly for children with multiple disabilities.

Application to Project:

This case study underscores the value of VR in providing safe, customizable and engaging training environments for children with disabilities. The important elements are the safe learning environment, because VR scenarios allow children to practice and develop skills without real-world risks and customization because VR experiences are tailored to individual needs and abilities.

Best Practices & Case Studies

Partner Name: OŠ Podmurvice, Rijeka, Croatia **Date:** 1/6/2025

Best Practice / Case Study #4

- **Title:** Task-Based Role-Playing VR Game for Supporting Intellectual Disability Therapies
- **Author(s) / Organization:** Wen-Chun Chen, Santiago Berrezueta-Guzman, Stefan Wagner
- **Year:** 2024

Description:

This study introduces a task-based role-playing virtual reality game developed to support therapy for children with intellectual disabilities. The game integrates everyday life scenarios into an immersive VR environment to enhance skill acquisition and transfer. By simulating real-life tasks within a controlled virtual setting, the game aims to improve the adaptive behaviors and daily functioning of children with intellectual disabilities.

Evidence of Effectiveness:

Functional tests and preliminary experiments demonstrated the system's stability, usability, and adaptability. 70–80% of participants showed successful skill transfer to new challenges, indicating the game's potential effectiveness in real-world applications. Some challenges were identified, like VR discomfort and task complexity, highlighting areas for improvement in the future.

Application to Project:

This case study offers valuable insights for designing VR-based interventions aimed at enhancing daily life skills in children with intellectual disabilities. Key elements are the real-life scenarios that are incorporating everyday tasks into VR. They can facilitate skill acquisition and transfer. Also, tailoring task complexity to individual user needs can enhance engagement and learning outcomes.

Best Practices & Case Studies

Partner Name: OŠ Podmurvice, Rijeka, Croatia **Date:** 1/6/2025

Best Practice / Case Study #5

- **Title:** Virtual Reality Opportunities to Integrate Social Skills
- **Author(s) / Organization:** Sean Smith (Principal Investigator), Amber Rowland (Co-Investigator), Bruce Frey; University of Kansas, Life Span Institute
- **Year:** 2021

Description:

The Virtual Reality Opportunities to Integrate Social Skills (VOISS) project is a virtual reality application developed to assist children with autism spectrum disorder in practicing and enhancing their social skills. The system simulates various real-life social interactions, such as conversing in a school hallway or purchasing items at a store, providing a safe and controlled environment for repeated practice.

Evidence of Effectiveness:

The Virtual Reality Opportunities to Integrate Social Skills (VOISS) project has been implemented in 17 schools, allowing students to engage in repeated exposure to social scenarios, which is crucial for long-term development. The VOISS Advisor platform offers educators resources such as video demonstrations and lesson plans to facilitate the transfer of skills from the virtual environment to real-world situations.

Application to Project:

This case study highlights the potential of VR applications in supporting social skills development for students with autism spectrum disorder because they offer realistic scenario simulation incorporating everyday social interactions to provide practical and relevant practice opportunities. The application can function across various devices, ensuring broader accessibility.

Best Practices & Case Studies

Partner Name: OŠ Podmurvice, Rijeka, Croatia **Date:** 1/6/2025

Best Practice / Case Study #6

- **Title:** Feasibility of a Virtual Reality-Based Exercise Intervention and Low-Cost Motion Tracking Method for Estimation of Motor Proficiency in Youth with Autism Spectrum Disorder

- **Author(s) / Organization:** Darren R. Hocking, Adel Ardalan, Hisham M. Abu-Rayya, Hassan Farhat, Anna Andoni, Rhoshel Lenroot, Stan Kachnowski; Columbia University and University of New South Wales

- **Year:** 2022

Description:

This study explores the feasibility and acceptability of a custom-designed Virtual Reality game-based intervention, GaitWayXR, aimed at improving gross motor skills in youth with autism spectrum disorder. The intervention involved ten participants aged 10–17 years who completed six 20-minute VR-based motor training sessions over two weeks. Whole-body movement was tracked using a low-cost motion capture system, and the data were analyzed to assess movement efficiency, synchrony, and symmetry.

Evidence of Effectiveness:

The VR intervention was found to be safe, with no adverse events reported. While there was limited evidence of improvements in gross motor skills, the study identified positive correlations between standardized measures of motor skills and the motion tracking metrics. Parents expressed interest in using the VR game at home, but were concerned about cost and space.

Application to Project:

This case study offers valuable insights for the development of VR-based interventions aimed at improving motor skills in children with autism spectrum disorder. Key considerations for the project include the use of affordable motion capture technology to assess movement quality and monitor progress, the implementation of short and engaging sessions to boost participation and adherence and the active involvement of parents to support and sustain the intervention at home. Additionally, designing cost-effective and adaptable solutions can significantly enhance accessibility across diverse educational and therapeutic settings.