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A Virtual Rehabilitation System for Wobble Board Balance Training with Children

Diarmaid Fitzgerald, Nanthana Trakarnratanakul, Luke Conroy, Paddy Nixon and Brian Caulfield

Abstract—Virtual reality-based computer games may be a useful way to develop motor skills and increase activity levels in children. We have developed an interactive computer platform where users must tilt a wobble board to complete on-screen computer game tasks. We have conducted a pilot study with 81 school children who played the game and used a questionnaire to gather information on children’s enjoyment levels and perceptions of the system. Findings showed a high level of enjoyment with the game and provided useful information for future research and development.

I. INTRODUCTION

METHODS to challenge motor skills and promote increased physical activity are essential for children as part of a healthy lifestyle. The practice of motor skills is required during childhood development and challenging these skills may improve overall function in both children with physical deficits, e.g. developmental coordination disorder, and healthy groups. Research has demonstrated the worldwide increase in pediatric obesity and methods to encourage physical activity are required [1].

We have developed a virtual reality-based balance training platform, known as wobbleball, by attaching a motion tracking sensor to the upper surface of wobble board. This renders the wobble board the input controller for an on-screen computer game. Neverball, an open source computer game [2], was utilised for the on-screen environment where users must tilt the wobble board to roll a ball along an on-screen platform to collect coins and avoid obstacles (Fig 1). The aim of this pilot study was to measure enjoyment and collect feedback from school children following game play.

II. METHODS

Eighty-one school children (34 girls and 47 boys) volunteered to participate in this study. Age ranged from 5 to 13 years with an average (SD) of 8.9 (2.4) years of age. Written consent was completed by each child’s parent/guardian prior to the study. Following a brief demonstration each child played the balance game in the school gymnasium and completed the custom designed questionnaire which used a Likert scale design with smiley faces as shown in Table I. The following questions were included:

1) Is Wobbleball a good game?
2) Is Wobbleball fun to play?
3) Would you like to play Wobbleball again?
4) Do you have anything else to say about Wobbleball?

Fig. 1. (a) A child playing the Wobbleball game under supervision. (b) The on-screen environment in the game.

TABLE I

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III. RESULTS

This pilot study has provided an initial trial investigating the possibility of using the Wobbleball system with children to promote exercise and train motor skills. The findings suggest children have a high level of enjoyment while exercising with the system as indicated by the positive responses to all three questions.

The fourth question collected some feedback from children and while most provided positive comments a small number of children (n=13) mentioned that the wobble board was “difficult to control” or “hard to use”. We must therefore investigate some easier methods to control the game as an option for some children. Future research is needed to investigate the benefits of the system as an exercise intervention for children and to examine how training using Wobbleball could be integrated into the existing physical education curriculum in schools.

REFERENCES