A Virtual Interactive Community Platform Supporting Education for Long-Term Sick Children

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Abstract. Analysis of existing ICT-based solutions for the education of long-term ill children reveal several weaknesses with respect to social and cooperative involvement, cost of development, and mobility issues. We present a scalable and affordable solution that supports both the social needs and learning process of these children. An educational platform was created based on the concepts of 3D networked virtual environments and Virtual Interactive Communities. In this work we describe the system architecture, network setup and protocols, and how we implemented the educational support. Our solution incorporates innovative hardware, software and connectivity features, set in a user friendly user interface based on networking and 3D technologies. It helps to establish high quality involvement of the long-term sick children in a communication based scenario between the place where the child stays/has been moved and their original classroom learning setting.

Keywords: Cooperative Learning Environment, Edutainment, E-Health, E-Learning, Virtual Interactive Communities, Social Networks.

1 Introduction and Motivation

Health care is becoming less hospital-centric; the hospitalization periods are much briefer and treatments are increasingly carried out at home. This shift has mediated medical, social and economic reasons and consequences. Furthermore, in the case of long-term and chronically ill children, this shift has a major impact on their education. The responsibility to provide education, is transfered from the hospital to the school which the children attended before their absence. Regular schools, however, are hardly able to set up high quality instruction for

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their home-based pupils. As a result, the socialization opportunities offered by schools are no longer available for them and friendships between the ill child and fellow pupils become more and more disintegrated [1,2].

In this work, we present a cooperative, community-based, E-Learning platform that aims at re-establishing the communication link between the place where the child is staying and the original school setting in view of supporting high-quality instructional scenarios. Analysis of existing ICT-based solutions, for educating long-term sick children ([3,4,5,6]), reveal weaknesses including the absence of social involvement, high development costs and mobility issues. Furthermore, although scientific publications have been written about several ICT-solutions, most of them focus on the results rather then giving a clear insight into the development process or the technical details.

The solution we propose, is based on the concepts of 3D networked virtual environments (NVEs) and Virtual Interactive Communities (VICs). It has to be stressed that we do not aim on the development of a new electronic learning environment (ELE) such as there are: Blackboard, WebCT, Anywize, etc. or a content management system (CMS). In contrast, we concentrate on a solution that can be linked to or used in cooperation with existing ELEs and CMS applications. The platform we present, does not focus on developing content, is based on concrete user needs, is educationally sound and relevant, and offers a scalable and affordable solution. The communication provisions build on audio and video (A/V) links, using standardized protocols, and help to support educational scenarios that support learning processes. Regarding the entire process, five interactive steps were undertaken: (i) analysis of user needs, user characteristics and context factors, (ii) design, (iii) development, (iv) evaluation, and (v) delivery. The focus of this work is on the more technical aspects of the design and development processes. More specifically we will give an insight on system architecture, network setup and protocols, consistency maintenance and visualization.

In the following section we elaborate on related research in the fields of E-learning solutions and VICs. Thereafter, we will give a brief overview of the required functionality. Section 4 discusses the details of how this functionality was implemented. In the fifth section, we will give some preliminary results. Finally, we give some concluding remarks and future research directions.

2 Related Work

2.1 ICT Solutions for E-Learning

To date, several ICT-based solutions have been proposed in order to support education for children with health impairments. The most remarkable probably is the PEBBLES project (Providing Education By Bringing Learning Environments to Students). It comprises an advanced prototype solution developed in the USA and Canada [3,6]. It was launched as the worlds first fully functional telepresence application: a social and technological solution that virtually places a child within the classroom by putting a robot which replaces the sick child