

Videoconferencing in the classroom: Children's attitudes

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Abstract

As the cost of videoconferencing technology decreases, and its availability increases, children have greater opportunities to explore the use of this medium within their own classroom environments. Some of the benefits of videoconferencing within the educational setting include access to classes not offered at their school, to off-site teachers with unique expertise and to resources which would otherwise be unavailable. A recent innovation in the use of classroom videoconferencing is PEBBLES (Providing Education By Bringing Learning Environments to Students), a videoconferencing robot which allows elementary and secondary school students access to regular classroom activities while confined to a hospital. The objectives of this study were to document how the sick child's classmates perceived the PEBBLES experience and how the exposure to videoconferencing influenced their attitude towards their sick classmate. Data were obtained from 26 children, aged 11 to 13 years, classmates of a 12 year old child suffering from acute renal failure. The children were interviewed prior to and following their six week PEBBLES experience and were also asked to make drawings of the unit before and after they had an opportunity to interact with it. The results show that the children adapted with great ease to PEBBLES, and were able to

establish a strong “rapport” with the unit, and with their absent classmate. © CybErg 1999.

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Keywords

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1. Introduction

As the cost of videoconferencing technology decreases, and its availability increases, children have greater opportunities to explore the use of this medium within their own classroom environments. Some of the benefits of videoconferencing within the educational setting include access to classes not offered at their school, to off-site teachers with unique expertise and to resources that would otherwise be unavailable. Moreover, videoconferencing has been shown to heighten student motivation and to help them learn communication and management skills.

When elementary or secondary school students are absent from school for extended periods due to illness, they are provided with a tutor or access to in-hospital classrooms. Although such instructional techniques help sick students keep up with some of the missed classroom work, they do not alleviate all of the stress generated by confinement to a hospital setting. Removal from familiar surroundings (such as the home and school environment) and a lack of control over major, and even many minor decisions concerning themselves, are factors which contribute to this stress (Bossert, 1994, Calculator and Jorgensen, 1994; Ellerton et al., 1994; Katz et al., 1992).

Moreover, traditional instructional techniques do not provide sick children with frequent contact with familiar classmates, a factor that has been reported to be of critical importance for children with cancer (Katz et al., 1992). In addition to academic gains, contact with their peers appears to result in significant non-academic benefits, particularly in social and communication skills and in the development of greater self-confidence and independence (Lipsky, 1995; Thompson, 1994).

Less attention has been given to the stress experienced by students when one of their peers is hospitalized due to a long-term serious illness. There are a number of different scenarios, each of which would be expected to require a different level of support and cause different

levels of disruption to a classroom environment. In one scenario, the sick student does not return to school and classmates must deal with the issues related to their classmate's loss. In another scenario, the sick student completely recovers from the illness and must be reintegrated into the classroom, a process that may be disruptive especially if the absence has been lengthy. In a third scenario, a student may be required to attend school on an extended part-time basis due to medical considerations such as renal dialysis or physiotherapy. Little formal research has examined the impact of these situations on the students in the classroom. In all cases, little attention has been paid to the potential for technology-mediated integration of sick children in their classroom. However, there have been a number of projects where children collaborate with other children using various technologies such as the Internet, faxes and video-conferencing to accomplish academic goals (e.g., Schools of the Future project (Naujokaitis, 1997) and Schools of the Helsinki 2001 (Matikainen, 1998). In these projects, however, little data has been published regarding children's attitudes toward the technology and how it affected their classroom experience.

The PEBBLES project is designed to link sick children with their regular classrooms using technology-mediated communication and presence. The student in the hospital controls a robot-like communication system located in the school. The system incorporates video-conferencing technology so that there is a two-way, real-time audio and video connection between the classroom and the sick child. While there are many aspects of this project to report, this paper will focus on data that reflect the impact of such a system on children in the classroom. Specifically, the objectives of this paper are to document how the sick child's classmates perceived the PEBBLES experience and how the exposure to videoconferencing influenced their attitude towards their sick classmate.

2. Methods

2.1 Subjects

Twenty-six male and female classmates of a 12 year old girl suffering from acute renal failure due to chronic kidney disease participated in this study. The students were 11 to 13 years old and attended grade 7 in a senior public school. The girl, henceforth referred to as the remote student, needed to be hospitalized as a day patient three times weekly (Mondays,

Wednesdays, and Fridays) in order to receive hemodialysis. On alternate days she was permitted to attend school but was often too sick to do so. Due to her chronic kidney disease as well as other systemic disorders, the remote student was small for her age, and had never regularly attended school with these classmates.

2.2 *The Videoconferencing System*

Wayne Gretzky's PEBBLES™ (Providing Education By Bringing Learning Environments to Students) is a video-mediated communication system which has been designed to link a child in the hospital with his/her regular classroom (Fels et al., 1999). In this case, one part of the PEBBLES system was located in the regular school classroom, and the other component was located in the dialysis unit of a major children's hospital. The classroom end of the system, shown in Figure 1, is a child-size, yellow, egg-shaped device which transmitted a live and interactive audio/visual image of the classroom to a computer located in the hospital (i.e., the hospital end of the system). The hospital unit, shown in Figure 2, transmitted a full-sized, live audio/visual image of the remote student's face to the classroom. The remote student used a video game controller to control the classroom unit including turning it left and right, moving the camera up and down, zooming it in and out, and signaling the teacher by activating a mechanical hand. The remote student was able to see and hear all classroom activities and contribute fully. The classmates were able to view the remote student's head and upper body, to hear her, and to see her wave the mechanical hand. They were aware of when she turned the classroom unit to face different directions and also what she was viewing. Although the unit was used in this classroom for eleven weeks, the results reported in this paper are based on usage during the first six weeks of the PEBBLES experience.



Figure 1: Classroom end of PEBBLES



Figure 2: Hospital end of PEBBLES

2.3 Outcome measures

Outcome measures consisted of student drawings and class interviews that were conducted before and after the study. These data were used to assess students' views and attitudes toward use of PEBBLES, hospitals and computers in general.

2.3.1 Drawings of PEBBLES. Each classmate was asked to make a drawing of PEBBLES after the system and its function had been described to them but before it was actually installed in the classroom. They were also asked to draw it at the end of their PEBBLES experience.

2.3.2 Responses to Discussion/Questionnaire. A group discussion was conducted with the classmates prior to and following the PEBBLES experience. Eight questions were asked by a facilitator to the group and the responses were recorded on audiotape. The questions were formulated to provide information about how the children viewed (1) hospitals (e.g., What kind of people work in hospitals? Who has been in a hospital? Did you like it or dislike it? Why or why not?); (2) their sick classmate (e.g., What do you think your classmate will miss while he (or she) is in the hospital? What will (did) you miss about your classmate not being here?); and (3) PEBBLES (e.g., What do you think the system will be able to do? What are the good (bad) things about the system?)

Upon completion of the questionnaire, a paper was handed out to the students on which was typed the following question: "When you think about [remote students name] in the hospital and using PEBBLES to connect to the classroom, how much has it helped you understand what she has gone through while in the hospital?" Each student was asked to mark his or her response on five-point scale where "1" indicated "no help", "2" indicated "little help", "3" indicated "medium help", "4" indicated "large help", and "5" indicated "best possible help".

2.3.3 Drawings of a sick person. The classmates were also asked to make two drawings illustrating their view of sick people in the hospital. One drawing was made immediately prior to the commencement of the PEBBLES experience while the second drawing was made shortly after its completion. The purpose of these drawings was to determine whether PEBBLES had a positive or negative influence on children's perceptions of hospitals and individuals who stay in hospitals. These drawings were reviewed by two members of the research team and rated on four seven-point scales (see Figure 3). The first scale was

“health”, i.e., was the remote student perceived as being very sick (a rating of “1”) all the way to being very healthy (“7”). The second scale was “attitude”, i.e., was the remote student perceived as being very negative (unhappy) (“1”) all the way to being very positive (happy) (“7”). The third scale was “individuality”, i.e., was the remote student perceived as being essentially generic of all sick or hospitalized people (“1”) all the way to being a completely unique individual (“7”). The fourth scale was “vitality”, i.e., was the remote student perceived as being very passive (“1”) all the way to being very active (“7”).

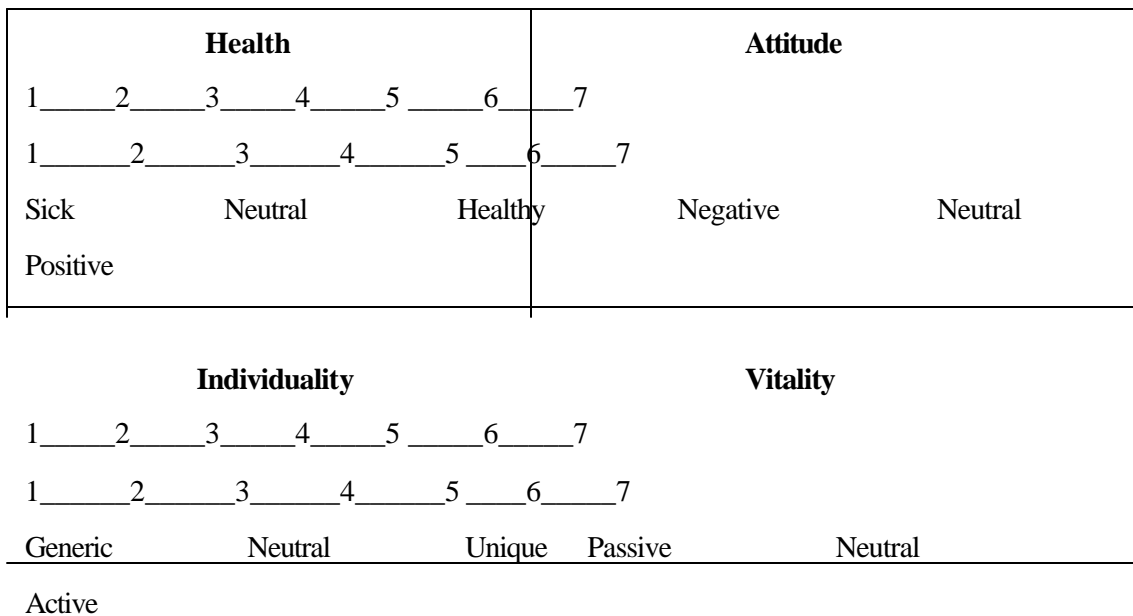


Figure 3: Scales used to rate classmates view of remote student.

2.4 Statistical Analysis

Non-parametric statistics were used to analyze the data. Inter-rater reliability was assessed using the Intraclass correlation coefficient (ICC). The Wilcoxon Signed Ranks test for related samples was then used to determine whether there were significant differences between pre and post PEBBLES experience scores.

3. Results

3.1 Drawings of PEBBLES.

The pre and post drawings of PEBBLES did not provide much insight into class attitudes about PEBBLES. For example, as expected, the shape of the unit varied considerably in the

pre-drawings (from a drawing of a tank to a drawing which had a similar shape to PEBBLES) while the post-drawings all resembled the actual unit in shape and size. Many of the students had seen PEBBLES prior to the study because there had been much media attention as well as many public exhibitions. One interesting observation from these drawings is that the majority (11/18) of pre-study drawings included a face on the drawing whereas the majority (15/18) of post study drawings did not. In previous studies (Fels et al., 1999), we observed the opposite (i.e., the students added personality to the robot unit in the post-study drawings and not the pre-study drawings).

3.2 Responses to Discussion/Questionnaire.

During the group discussion that took place prior to the PEBBLES experience, the students appeared to have a fairly typical view of what takes place in hospital environments. For example, statements such as “I don’t like it [a hospital], but they are good ... it helps people” and “doctors, nurses, surgeons, secretaries, pediatricians work there”. The number and length of responses were sparse. In contrast, the discussion following the six-week PEBBLES experience was much richer in both quantity and quality. The students now included “teachers of little kids” as people who work at a hospital. They also made many more references to the remote student; statements such as “PEBBLES is helping [student’s name] learn at home”, “its kind of cool having a robot sit next to [her]”, “it lets her be with her friends”, and “it allows her to keep up with her school work” were common.

Although the mean score of the students’ response (on the marked scale) to the whether PEBBLES had helped the remote student was higher after six weeks (4.1 ± 0.5) than it had been before they started using the system (3.8 ± 0.6), the difference was not statistically significant.

3.3 Drawings of a sick person

The inter-rater reliability of the four scales used to evaluate the students’ perception of a sick person was generally good with pre scale coefficients for health (ICC=0.61, $p=0.001$), attitude (ICC=0.87, $p=0.000$), individuality (0.75, $p=0.000$), and vitality (ICC=0.54, $p=0.005$). The post scale inter-rater reliability was also good for the attitude (ICC=0.84, $p=.000$) and vitality (ICC=0.72, $p=0.000$) scales, weaker for the individuality scale (ICC=0.55, $p=0.003$) and quite low for the health scale (ICC=0.38, $p=0.04$). The results of

the Wilcoxon signed ranks test for related samples showed that there was a significant difference between the pre- and post attitude scales ($p=0.01$). Although there appeared to be a trend for other three scales, with the post scores being higher than the pre scores in all cases, these results were not significant. These results suggest that interacting with PEBBLES does affect students' impressions of hospitals (and of people's experience in hospitals).

4. Discussion

The benefits of instruction in an integrated classroom setting rather than a segregated individual setting have been well researched and documented (Lipsky, 1995; Stainback and Stainback, 1985). Researchers (Katz, 1992) suggest that maintaining links with school as early as possible is very important for children with cancer. In addition to academic gains, students experience significant non-academic benefits particularly in social and communication skills, developing greater self confidence and independence.

In this study, the PEBBLES interactive videoconferencing system was used as a means of providing the benefits of an integrated classroom even when a child, due to illness or for other reasons, must remain in a remote location. The results demonstrated that the remote student's classmates adapted with great ease to PEBBLES, and were able to establish a strong "rapport" with the unit, and with their absent classmate. Technically, the system worked very well despite occasional difficulties with the quality of the audio pick-up from some students. The remote student was able to participate in the various classroom activities including discussions, presentations, and individual work. She was able to manipulate the classroom unit and camera with great skill so as to direct the camera to the focus of action, be it at the front blackboard, at the teacher or at the various classmates dispersed around the room.

The PEBBLES experience had a very clear and significant effect on the students. Their perception of the remote student's attitude (i.e., whether she was happy or unhappy) became more positive and they were able to articulate clearly the benefits of this type of academic interaction. The remaining scales, while increasing between the pre- and post measurements, were not significant. The use of these scales on additional subjects will help to determine whether the time period was too short to have an impact on factors such as the remote student's health, individuality and vitality or whether issues related to this particular's students personality and familiarity with her classmates played a role. Future studies will be directed at

documenting the effect that factors such as students' age, prior familiarity with the remote student, and length of the videoconferencing period have on the children's attitudes.

In conclusion, it is important to note that the students' understanding of what takes place in hospital environments increased as did their awareness of what technology can do. The remote student recently underwent a kidney transplant and will likely recover in time to rejoin her classmates at school at the start of the next academic year. The students' increased understanding and awareness of what their sick classmate endured as well as the positive interaction with her experienced via PEBBLES will hopefully ease her re-integration into the classroom.

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