Using an ICT tool as a solution for the educational and social needs of long-term sick adolescents

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This research investigates the role of an ICT tool for meeting the educational and social needs of long-term sick adolescents. Both surveys and interviews were conducted in this study. The participants of this study were sick school students between 12–19 years old. The interviewed participants had used the ICT-supporting tool for three months to three years. The results indicate that the ICT learning tool had a positive impact on meeting the educational and social needs of long-term sick adolescents. The respondents reported that using the ICT tool helped them to keep up to date with their schoolwork and maintain social contact with classmates and teachers. More importantly, the ICT tool helped them to reduce their social isolation and to feel more confident about their reintegration into school and about their future.

Keywords: ICT tool; educational needs; social needs; long-term sick adolescents

1. Introduction

Technological and scientific progress has made it possible for children with a long-term health condition to overcome their physical difficulties (Bruil, 1999, in Gültekin & Baran, 2007; Tielen, 2003). Keeping contact with school seems to be an important prerequisite to reduce the side-effects of an illness for sick children (Bessell, 2001; Shiu, 2001). Long-term sick adolescents are at increased risk of educational difficulties which eventually will undermine their academic motivation and self-esteem (Maslow, Haydon, McRee, Ford, & Halpern, 2011; Suris, Michaud, & Viner, 2004; Porter, 2008; Servitzoglou, Papadatou, Tsiantis, & Vasilatou-Kosmidis, 2008). Adolescents who are cut off from social contact can develop psychosocial problems, feelings of being different or fears of being rejected (Bessell, 2001; Davis, 1989; van Wageningen, 2004). Porter (2008) and Wallander, Eggert, and Gilbert (2003) stressed the importance of maintaining the connection between home and school for ensuring a smooth reintegration and for the adolescent’s academic, social and emotional development.

Researchers argued that the continuity of education for long-term sick adolescents is an important way of avoiding social isolation, psychosocial problems or the accumulation of learning difficulties (Harter, 1999). Previous studies suggested that ICT could be an effective tool in reducing risks arising from long-term absence by providing social and educational continuity for sick children (Fowler, Penn, &

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1.1. The educational and social needs of adolescents with a long-term sickness

Formulating a universal definition for long-term sickness is difficult because it is used as an ‘umbrella term’ for many different diagnoses. The definition of Baldew and Baldew-Visser (1985) is applied in this research. Their definition includes both physical illnesses and psychological disorders and it mentions the consequences of illness on other domains besides health (Baldew & Baldew-Visser, 1985). Secondary school students aged from 12 to 19 were the focus of this study. Adolescence is known as a transition period from childhood to adulthood characterised by emotional, cognitive and physical growth and consisting of several developmental tasks (Whyte & Smith, 1997). Therefore, we consider that studying the educational and social needs of long-term sick adolescents has special significance for the cognitive, social and emotional growth of this group of youngsters.

In this study, we focus on two aspects of the needs of long-term sick adolescents: educational and social needs. Educational needs refer to the needs to catch up with schoolwork, follow the lessons and participate in school tasks in order to keep up with the progress of education and achieve its successful continuation. The social needs refer to the needs of the long-term sick students to keep in contact with friends, classmates, teachers and so on. These two types of needs are intertwined as both are related to the connection of the long-term sick students with their school.

The meaning of school for students obliged to stay at home owing to an illness should not be underestimated. From the moment school isn’t part of their daily life any more, it becomes a place away from home or the hospital where the sick adolescent can experience lost feelings (Davis, 1989; Tielen, 2003; van Wageningen, 2004). Long-term sick adolescents are at increased risk of educational difficulties which eventually will undermine their academic motivation and self-esteem (Maslow et al., 2011; Porter, 2008; Servitzoglou et al., 2008). According to previous research, students sick at home reported missing group-based instruction the most and they found it important to be included in groupwork (Asbjornslett & Hemmingsson, 2008; Lombaert et al., 2006). Previous research also found that adolescents with a long-term illness were at higher risk of poorer educational outcomes than non-sick students (Maslow et al., 2011; Suris et al., 2004). According to the study by Thies (1999), 45% of students with a long-term illness reported falling behind with schoolwork; 35% failed to pass their school year and 36% were worried about not being able to get a job in the future.

Previous research in this domain indicates that keeping contact with peers is a very important issue for long-term sick children (Bessell, 2001; Davis, 1989; Lombaert et al., 2006; Tielen, 2003). For adolescents in particular, it is vital to feel accepted by peers (Porter, 2008; van Wageningen, 2004). Long-term sick children and adolescents may have an increased risk of feeling anxious that their changed appearance or the fact that they are sick could lead to rejection or exclusion as they are considered ‘different’ (Lightfoot, Wright, & Sloper, 1999). Perceived peer support is an important factor for the social and psychological adjustment of a long-term sick adolescent (Harter, 1999; Lightfoot et al., 1999; Wallander & Varni, 1989). Long-term sick students absent from school are vulnerable if they are isolated.
from the school and from their school and social contacts. Researchers have found that it is important for sick students to be included in groupwork so they can also benefit from the social aspect of it (Lombaert et al., 2006). Both learning and social involvement is crucial in guaranteeing smooth reintegration into the class and the development of positive well-being (Bessell, 2001; Porter, 2008; Lombaert et al., 2006; Sexson & Madan-Swain, 1995). Fulfilling the educational and social needs of sick children makes it possible for these children to feel that they can still live a normal life (Lombaert et al., 2006).

1.2. The use of ICT learning tools to support children with a long-term illness

According to Lombaert et al. (2006) and Tielen (2003), ICT plays an important role in assuring the continuity of education. Sick adolescents reported that home schooling was the least favourable option for the continuation of education because of the lack of social contact with peers (Fels & Weiss, 2001; Searle et al., 2003). Researchers referred to ICT as a suitable medium for learning groups with special needs (Devos, 2007; Leask & Meadows, 2000; Tielen, 2003). For example, it can enable sick students to follow classes live at home using educational software and interactive learning platforms (Beauchamp & Kennewell, 2010; Hsia et al., 2010).

Previous research also highlights that going back to school was often accompanied by a fear of rejection by peers because of physical changes or social isolation (Davis, 1989). According to Tielen’s study (2003), 5–10% of long-term sick children used ICT to keep in contact with friends and to keep up with schoolwork. ICT tools have the advantage of eliminating alienation from friends and facilitating school reintegration (Anderson & Rourke, 2005). Using ICT-supported learning tools can reduce feelings of loneliness and isolation and help sick children to be less socially withdrawn (Battles & Wiener, 2002; Nicholas et al., 2007). Thus the continuation of education and contact with peers is very important for preventing maladjustment or emotional problems, and ICT can play an important role here (Asbjørnslett & Hemmingsson, 2008; Bessell, 2001; Davis, 1989; Madan-Swain, Katz, & LaGory, 2004). However, in the available literature, there is still a lack of empirical studies to unravel whether and to what extent ICT tools can help meet the educational and social needs of long-term sick adolescents.

1.3. The Flemish context and the ICT learning tool

In Flanders (Belgium), the decree Besluit van de Vlaamse Regering gives four possible solutions to provide education for sick children. Firstly, hospitalised children can follow lessons in the hospital. Secondly, ‘K-diensten’ organises education for children in a psychiatric setting. Finally, there are two forms of home schooling, POAH (permanent education at home) and TOAH (temporary education at home) (Govaerts, 2010; Vlaamse Regering, 2007). In this context, an organisation (Bednet vzw) was established to provide educational support for sick children through ICT learning tools. The Bednet ICT-supported learning can be part of home schooling or hospital schooling. Students and parents who choose to follow Bednet ICT-supported learning receive the installation of the hardware and software from Bednet.

The Bednet tool is a two-way, real-time audio and video connection over the World Wide Web to offer absent long-term sick students the opportunity to study and follow school from home or the hospital by using ICT learning tools. It is a
realisation of the ASCIT project (Again at my School by fostering Communication through Interactive Technologies for long-term sick children), a cooperation among IBBT (Interdisciplinair Instituut voor Breedband Technologie), the Flemish government and Mobistar. The objectives of Bednet are to minimise the negative effects of long-term illness for students and provide educational support through the ICT tools. The users of the ICT tool are children aged between 6 and 19 years who are absent from school for at least two months because of an illness or rehabilitation. The installation of the Bednet tools is based on user application. In the preparatory period, the Bednet staff sit down with all the actors involved in the project in order to set out the plan. When the request is approved, Belgacom installs an Internet connection at the sick student’s home and in the classroom. After that, the Bednet tools (hardware and software) are installed both at home (in some cases the hospital) and in the classroom. The hardware and software of the Bednet tools are free for the users (both at the school and at the hospital or home). The interaction between the absent sick student and the school takes place within a secure virtual classroom. The student and teacher have their own username and password. Through the ICT-supported virtual classroom, the student can follow the lesson, raise or answer questions, draw the teacher’s attention, take pictures of the blackboard and so on, synchronously with their class, from home or hospital (Janssens, 2010). Figure 1 shows the interface of the Bednet tool for the users.

1. Frame of the webcam/camera
2. Pictures of the blackboard
3. Draw attention: the computer in the classroom makes a noise
4. Virtual bookshelf: the student, teachers and classmates are able to post pictures and documents
5. Live scanning and sending of documents
6. Class agenda: list of tasks and map with homework

Figure 1. The design of Bednet on the computer (Bednet vzw, 2009, p. 26).

Perceived usefulness/satisfaction of the ICT tool

Long-term sick adolescents

Educational needs
- Contact with peers
- Contact with teachers

Social needs

Figure 2. The conceptual model of this research.
2. Research questions

This research is part of a larger study investigating the impact of ICT tools on the continuation of education and well-being of long-term sick students. The objective of this research is to investigate the impact of the ICT tool in meeting the educational and social needs of long-term sick children. The conceptual model of this research is presented in Figure 2. The research questions of this study include:

(1) Is the Bednet ICT learning tool satisfactory for long-term sick adolescents?
(2) Can the Bednet ICT learning tool meet the educational needs of long-term sick adolescents?
(3) Can the Bednet ICT learning tool meet the social needs of long-term sick adolescents?

3. Research method

3.1. Sample

The participants of this study were selected based on the following criteria: i) school students (12–19 years); ii) absent from school because of a chronic illness, rehabilitation, long-term medical condition or psychological disorder; iii) who at the time of the research were using the Bednet ICT learning tool or who had recently used it.

During the academic year of this study (2011–2012), there were a total of 96 secondary students in Flanders using this special learning tool. Owing to privacy reasons, the survey could only be distributed to the users via the Bednet Administration, which provides this tool in Flanders. During the first research phase, an online survey was distributed to all 96 users by the Bednet Administration. As all the users of the ICT learning tools have access to computers and the Internet, we opted for administering an online survey to reach the entire target population. Explicit informed consent was asked from the sick students’ parents or guardians before they responded to the survey. The informed consent mentioned clearly that anonymity of the data would be ensured and that the participants had the right to withdraw their data at any time. Reminders were sent to the users owing to the difficulty of obtaining feedback. After several reminders, we received 56 responses from the online survey. The response rate reached 58% of the population. Given the difficult health situations and the privacy issues of these sick children, this was considered a significant achievement. The survey was conducted in October–December 2011.

3.2. Survey questionnaire

The online survey included four parts. The first part asked about participants’ demographic data, the period they had been out of school and how long they had been using the ICT learning tool. The second part (11 items) was about their satisfaction with the technological functioning of the Bednet ICT tool. The third part (14 items) asked whether and to what extent their educational needs were met. The fourth part (8 items) asked whether and to what extent their social needs were met. The participants were asked to rate the extent to which they agreed or disagreed with a certain statement on a 5-point Likert scale. One example question for educational needs was ‘I can finish my school tasks in time with the support of the ICT learning tool.’
At the end of the online survey the students were asked whether they were willing to participate in an interview. Those who were interested in participating were asked to provide their email addresses or telephone numbers for a follow-up interview.

3.3. Interviews

Interviews were conducted with those respondents who agreed to participate. The interviews took place individually at the home of these sick students. The interview with the parent was conducted immediately after the interview with each sick adolescent. In total, eight students and seven parents were interviewed including one grandparent. The interviews were conducted in February–April 2012.

The interview questions were semi-structured in order to adapt to the actual situation of each respondent. Before the interview, several contacts were made with the parents of these children in order to ensure the interview ran smoothly and privacy and sensitivity issues were protected. Some example interview questions are: Do you have any difficulty with the technical use of the tools? Can the ICT tool meet your educational needs? What needs are not met? Do you feel that the use of the ICT tool made it possible to keep up with school/peers? A brief interview was held with one of the parents to better understand the situation and the possible effects of ICT-supported learning from another angle. It also served a purpose of triangulating the data to determine, for example, whether the adolescent had given socially desirable answers. Furthermore, the parents were able to provide us with additional information about the academic and/or social impact of the ICT use on their children.

3.4. Data analysis

The collected data from the survey was analysed with SPSS 19. Descriptive analysis, t-tests and ANOVA were conducted in order to examine the differences between specific groups and the relationship between individual characteristics and their satisfaction of educational and social needs. The reliability of the scales was analysed. The Cronbach’s alphas for the scales ‘satisfaction with the technological functioning of the ICT tool’, ‘satisfaction with educational needs’ and ‘satisfaction with social needs’ were .85, .88, and .82 respectively.

The interview data were coded using Atlas.ti. Thematic and category coding were used to analyse the educational and social needs of the long-term sick students and their experiences, satisfaction and problems with using the ICT tool, and its impact on their learning and social needs. Open thematic coding was used to identify themes that represent the central ideas of the long-term sick students. Axial category coding was used to categorise the concepts and themes.

4. Results

4.1. Demographic variables of the respondents and their use of the ICT tool

The demographic variables and the use of the ICT tool of the participants in the survey are presented in Table 1. Among the respondents, 36 were female and 20 were male. The age of the respondents was between 12 and 19. Half of the respondents were in the age range 14 to 16 years old; 12 respondents were between 17–19; and 16 were between 12–13 years old. With regard to the reasons for being
Table 1. Demographic variables and the use of the ICT learning tool by the survey respondents.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age</th>
<th>Reason of absence</th>
<th>Study level</th>
<th>Time using the ICT learning tool (months)</th>
<th>Hours of using the ICT learning tool per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12–13</td>
<td>14–16</td>
<td>17–19</td>
<td>2–5</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Male</td>
<td>20</td>
<td>16</td>
<td>28</td>
<td>64%</td>
<td>16</td>
</tr>
<tr>
<td>Female</td>
<td>36</td>
<td>29%</td>
<td>50%</td>
<td>82%</td>
<td>33%</td>
</tr>
<tr>
<td></td>
<td>50%</td>
<td>21%</td>
<td>18%</td>
<td>61%</td>
<td>64%</td>
</tr>
<tr>
<td></td>
<td>18%</td>
<td>7%</td>
<td>6%</td>
<td>32%</td>
<td>7%</td>
</tr>
<tr>
<td></td>
<td>4%</td>
<td>7%</td>
<td>11%</td>
<td>7%</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>2%</td>
<td>18%</td>
<td>33%</td>
<td>58%</td>
<td>9%</td>
</tr>
</tbody>
</table>

ASO = General Secondary Education; TSO = Technical Secondary Education; BSO = Vocational Secondary Education.
absent from school, 82% were absent from school because of illness; only 18% were absent from school owing to a rehabilitation.

In the current Flemish educational system, secondary education has four learning tracks: General Secondary Education (ASO), Technical Secondary Education (TSO), Vocational Secondary Education (BSO) and Artistic Secondary Education (KSO). Seventeen were following ASO, nine were following TSO and two were following BSO. So the majority of them were in ASO, which is the learning track with more theoretical courses (such as science and mathematics) than the other learning tracks.

With regard to the use of the ICT learning tool, the majority of the respondents (36) had been using it for 2–5 months. Four of the respondents had been using the tool for 11–20 months and 10 had been using it for more than 20 months. Regarding the hours spent using the tool, 16 students used it for 1–10 hours per week; 28 used it for 10–20 hours per week and four students used the tool for more than 20 hours per week. This result shows that the ICT learning tool was quite frequently used by the sick students.

The demographic variables of the interviewed respondents and their use of the ICT tool are presented in Table 2. Of the eight interviewed participants, six were female. The age of the participants was from 14 to 17 years old. The participants had a wide range of medical conditions. Five of them had a chronic medical condition, one had a curable form of Hodgkin’s disease, one respondent was recovering from surgery and one respondent was hospitalised owing to fears and symptoms of depression. Six participants were students from the ASO learning track and two were from TSO.

With regard to the hours spent using the ICT learning tool, four respondents used the tool for more than 10 hours a week. Three students used the tool for between 5–10 hours a week. Only one respondent used the ICT learning tool for less than five hours a week. Five of the eight respondents were combining learning with the ICT tool from school with home education through TOAH. One student combined the use of the ICT tool with education at the hospital school and a few hours at home school through TOAH. Another respondent used the ICT tool in addition to her part-time education at school. One respondent was only using the ICT tool to follow her education from school.

Table 2. Demographic variables and information from the interviewed respondents.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Gender</th>
<th>Age</th>
<th>Primary condition</th>
<th>Time using the ICT tool</th>
<th>Study level</th>
<th>Interview parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>17</td>
<td>Fibromyalgia</td>
<td>3 years</td>
<td>6 TSO</td>
<td>Mother</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>14</td>
<td>CVS</td>
<td>6 months</td>
<td>2 ASO</td>
<td>Mother</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>15</td>
<td>CRPS</td>
<td>7 months</td>
<td>3 ASO</td>
<td>Mother</td>
</tr>
<tr>
<td>4</td>
<td>F</td>
<td>17</td>
<td>Vascular problems</td>
<td>3 years</td>
<td>6 ASO</td>
<td>/</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td>15</td>
<td>Hodgkin’s disease</td>
<td>3 months</td>
<td>4 ASO</td>
<td>Mother</td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>15</td>
<td>Operation leg extension</td>
<td>7 months</td>
<td>3 ASO</td>
<td>Mother</td>
</tr>
<tr>
<td>7</td>
<td>F</td>
<td>14</td>
<td>Depressive symptoms</td>
<td>4 months</td>
<td>2 ASO</td>
<td>Mother</td>
</tr>
<tr>
<td>8</td>
<td>M</td>
<td>16</td>
<td>Auto-immune disease</td>
<td>7 months</td>
<td>4 TSO</td>
<td>Grandmother</td>
</tr>
</tbody>
</table>

ASO = General Secondary Education; TSO = Technical Secondary Education; BSO = Vocational Secondary Education.
4.2. Satisfaction with the technical use of the ICT tool

The use of technical functions and the satisfaction levels reported by the respondents are presented in Table 3. The survey respondents reported that they were satisfied with the technical functioning of the tool ($M = 4.41$). Both the survey and interview results showed that all respondents used the webcam and were satisfied with its functioning ($M = 4.41$). The function ‘asking attention’ was used by almost all users and the satisfaction level was high ($M = 4.0$). Scanning, sending documents and printing were frequently used and the satisfaction level was also high ($M = 4.33, 4.46, 4.30$ respectively). The bookshelf function and agenda were less frequently used by the students. However, those who used the bookshelf function (57%) reported that it was quite handy to use.

<table>
<thead>
<tr>
<th>Function</th>
<th>Mean</th>
<th>Not used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Webcam</td>
<td>4.41</td>
<td>0</td>
</tr>
<tr>
<td>Taking pictures</td>
<td>4.0</td>
<td>36%</td>
</tr>
<tr>
<td>Asking attention</td>
<td>4.0</td>
<td>7%</td>
</tr>
<tr>
<td>Bookshelf</td>
<td>4.36</td>
<td>43%</td>
</tr>
<tr>
<td>Scan documents</td>
<td>4.33</td>
<td>0</td>
</tr>
<tr>
<td>Send documents</td>
<td>4.46</td>
<td>4%</td>
</tr>
<tr>
<td>Print</td>
<td>4.30</td>
<td>0</td>
</tr>
<tr>
<td>Agenda</td>
<td>4.09</td>
<td>54%</td>
</tr>
</tbody>
</table>

4.3. The educational needs of the sick students and the role of the ICT tool

During the interviews, the respondents said that maintaining their connection with school was very important for them. They mentioned that it was important for them to continue their education in order to obtain their diploma successfully. Four of the eight respondents expressed explicitly that they hoped to be able to catch up with school and finish their study year without too many difficulties. Five of the respondents said that it was important for them to maintain social contact with classmates and teachers. Three respondents said that it was important for them to have a daily routine to follow lessons even they were at home.

As one respondent said, ‘I am sick, but I am not stupid, eh.’ Most of the respondents said that keeping up to date with school was their most prominent need while being sick and absent from school. Some respondents said that they especially missed their teachers at school. Two respondents reported that they were not able to follow the courses from school before they used the ICT tool.

The respondents reported that the use of the ICT tool was very helpful for them to keep up to date with their school. The survey results show that students were satisfied with the tool keeping them up to date with school ($M = 4.38$). During the interview, all participants and three mothers stressed that the ICT tool was an important support in catching up with schoolwork.

All respondents reported that they could obtain specific explanations from their teachers via the use of the tool, which was very useful for them. Two mothers also said that using the tool helped their daughters to have less stress when catching up with school. One mother was extremely satisfied as her daughter could pass several exams because she obtained explanations from the teachers through the use of the tool. The respondents were very satisfied with the help they could receive from teachers during a lesson ($M = 4.12$). However, the respondents from BSO received less help from their teachers ($M = 3.00$). All respondents except two said that the lessons were fairly easy to follow. Most teachers tried to explain as clearly as
possible and asked questions regularly to the students at home. The majority of the students (100% of the male students and 69% of the female students) were satisfied with the way their teachers worked with the ICT tool. They were also satisfied that the teachers gave them detailed answers when a question was raised. In addition, the participants were also satisfied that they could ask questions via the tool \( (M = 4.00) \). The participant who had used the tool for three years said that he had no problem in asking for attention or in asking or answering questions. However, four participants who had used the tool for a shorter period were less used to asking or answering questions while using the ICT tool. In addition, the majority of the respondents also used tests via the ICT tool and were very satisfied \( (M = 4.68) \). Four of the interviewed respondents participated in groupwork via the ICT tool. The participants in the survey rated the use of the groupwork with a mean of 3.63. The results indicate that the long-term sick female students were more satisfied with the ICT tool for meeting their educational needs than long-term sick male students \( (t = 4.11, p < .05) \).

One of the interview respondents said that her computer skills had improved since using the ICT learning tool. In addition, the survey results showed that the male and older students reported they could work more independently since using the ICT learning tool; 63% of the male students agreed that they could learn independently, while 44% of the female students reported so; 83% of the respondents aged 17–19 agreed that they could learn independently with the support of the ICT tool, while only 42% of the students aged 12–16 reported this.

With regard to the support of the ICT tool for education, four of the eight interviewed participants said that following the lessons via the ICT tool was not that different from actually being in the class. However, three participants said that it was a bit more difficult to concentrate either because of the distraction of using the tool, other distracting factors at home or their physical pain.

Regarding their motivation to learn, the survey results show that 92% of the respondents could keep themselves motivated for the courses through the ICT tool. One respondent said that with the help of the ICT tool, he missed fewer lessons compared with when he did not use the tool. Two respondents said that they were motivated to work as the teachers and classmates could see how much they worked (for example on the tasks). Three mothers also confirmed that this was an important motivating factor. In addition, two respondents said that they were motivated to study because it was an excellent escape from the downsides of their health problems.

### 4.4. The social needs of the sick students and the role of the ICT tool

Most of the respondents reported that they missed their classmates and lacked daily social contact while being sick at home. Three interviewed respondents stressed that they would prefer to be part of their class and to have more contact with their classmates. One respondent said that she was very eager to hear from her friends in the class. Two of the mothers also said that they implemented the ICT tool in order to help their children break out of social isolation.

As one respondent said, ‘With the use of the ICT tool, I could see my classmates and my life became more normal.’ Most respondents said that between the lessons, they could have informal talks with the students or teachers via the ICT tool, which was quite useful to the students to feel that they were part of the class. The survey
results show that the respondents were satisfied with their informal contact with classmates via the ICT tool \((M = 4.46)\); their satisfaction with the informal contact with teachers was relatively lower \((M = 3.38)\). The results show that the students from ASO were more satisfied with the ICT tool for meeting their social needs than students from TSO and BSO \((F = 4.25, p < .05)\). The students who used the Bednet tool for a shorter period (2–5 months) were more satisfied with the ICT tool for meeting their social needs than students who used the Bednet tool for a longer period (11 months to 3 years).

Two interviewed respondents said that they were happy that they could get to know new classmates via the ICT tool. Both the students and their mothers commented that this was very helpful and the students felt less stressed about returning to school as they were familiar with and in touch with the classmates. This was also confirmed by several mothers. Five respondents also said that they felt confident about returning to school as they were in touch with the teachers. The survey participants reported that they were satisfied that the ICT learning tool could help them maintain relationships with their classmates \((M = 4.38)\). As one respondent said, ‘previously I was considered like a “tourist” in the class as I often could not attend the class … now my classmates saw me much more often, they trusted me more as they saw I was working hard … I feel I am part of the class because I am present for the class, although not physically sitting in the class’; ‘I am happy that I can show to the class and the teachers that I am motivated to study well.’

Six out of the eight interviewed students said that they felt connected with the class with the help of the ICT tool. One respondent (14 years old) even said that this was the first time she felt part of her class for her secondary school. Two mothers reported that their daughters received a lot of support and involvement from their classmates because of the daily contact with the class through the ICT tool. This finding was supported by the survey results in which the participants reported that they felt connected with their class with the help of the ICT tool \((M = 4.42)\).

In addition, one respondent said that she received invitations from her classmates on Facebook. One respondent mentioned that she experienced fewer prejudices from her classmates and could have a normal relationship with her classmates due to the contact she was able to maintain through the ICT tool. Four respondents reported that having more routine around schoolwork was a useful distraction for them in their daily life. Two respondents said that the use of the ICT tool, in combination with counselling, helped them to reduce social fears. Most mothers confirmed that using the ICT tool reduced the fear and stress of going back to school.

5. Discussion

This research investigated the effect of a special ICT tool for the educational and social needs of long-term sick students. Both surveys and interviews were conducted to understand the views and feelings of the sick children using this tool. The results of this research gave us important insights about how the use of an ICT tool could help long-term sick students with their educational and social needs. The results show that the longer the students used the ICT tool, the more they were engaged in class activities via the tool. The participants reported that using the ICT tool was effective in keeping up to date with the school. The use of the ICT tool also made it easier for the long-term sick students to return to school.
The technical functioning of this ICT tool seemed satisfactory for most respondents. The findings of several international studies of similar ICT tools (e.g., P.E.B.B.L.E.S., HomeLearn) also indicate that ICT tools are effective in building a bridge between home/hospital and school (Anderson & Rourke, 2005; Battles & Wiener, 2002; Fels, Williams, Smith, Treviranus, & Eagleson, 1999; Fowler et al., 1999; Nicholas et al., 2007).

The results show that the ICT tool played an important role in meeting the educational needs of the long-term sick students. The most important impact is that the sick students could keep up to date with schoolwork. Many respondents reported that the use of the tool prevented them from falling behind at school. They felt like a part of the class and felt supported by classmates and teachers. Receiving specific explanations from the teachers was considered a big benefit for the students. Most respondents also said that the use of the ICT tool helped them to pass their study year without extra difficulties. This was in line with previous studies in which the ICT tool was complementary to, and supported, regular education (Abdous & Yoshimura, 2010; Beauchamp & Kennewell, 2010; Bottino, 2004; Gombeir, 2007, Lou, Bernard, & Abrami, 2006; Lombaert et al., 2006). Previous studies also found that maintaining contact with peers was considered the most important social need for sick children (Bessell, 2001; Davis, 1989; Lombaert et al. 2006; van Wageningen, 2004). In addition, unlike in home schooling, the sick students could participate in group-based instruction (Lightfoot et al., 1999). As found by Asbjornselett and Hemmingsson (2008), most respondents preferred to participate in groupwork with their classmates instead of having an alternative task. The results of this study supported previous arguments that receiving group-based instruction and maintaining contact with the class were essential for long-term sick children to have a positive reintegration in the school (Anderson & Rourke, 2005; Fels et al., 1999; Harter, 1999; Porter, 2008; Sexson & Madan-Swain, 1995).

The ICT tool also played an important role in reducing social isolation for the long-term sick students. The respondents reported that the use of the ICT tool helped them to maintain daily social contact and be part of their class. Most parents also confirmed that following the lessons via the ICT tool played a critical role for their children to be able to continue their schoolwork, as well as increasing their social contacts. The majority of the participants reported that the most significant role the ICT tool played was to act as a bridge between the school and themselves (at home or in the hospital). More importantly, for some participants, the ICT tool played a role in reducing social prejudices as the classmates could see that the sick students worked just as hard as other students on their schoolwork. It also had a large impact on reducing the stress of sick children concerning the reintegration in school. These results support previous arguments that ICT learning tools can be helpful in preventing the social isolation of long-term sick children (Bessell, 2001; Lombaert et al., 2006; Nicholas et al., 2007; Tielen, 2003; van Wageningen, 2004). Our study also found that the long-term sick children supported by the ICT tool felt positively about their own competencies in schoolwork and social contacts.

In summary, the current research showed that the ICT support tool was an effective way to ensure the continuation of education and the maintenance of social contacts for long-term sick children. This research has both important theoretical and practical implications. Theoretically, the study supports the role of ICT for meeting the educational and social needs of sick children. It provides empirical evidence that
ICT can play an active role for this special group of users and more provision of ICT tools for sick children from home or hospitals can be beneficial for them both socially and academically. On a practical level, this study is also very useful for organisations who offer special ICT learning tools for sick children. The findings of this study can offer insights for the organisation to provide better services to long-term sick children. For example, further support should be provided, such as better optimisation of the technical functions of the ICT tool, and more guidance for users. Attracting more long-term sick children to use this tool will also be beneficial for this special group of youngsters, as the current rate of implementation is still low.

The results of this research need to be interpreted with a few limitations. As the subjects of the study are specific users of the Bednet tool, the samples are selected from this specific population. Due to privacy and the physical conditions of the target group, involvement of the participants was not easy and the number of participants was relatively small. In addition, fewer boys participated in the research, which might indicate that the opinions and situations of the boys could be underrepresented. There was also fewer participants from TSO, BSO and KSO, which may not reflect the complete situation of all the ICT tool users. In addition, we are aware that the answers of the adolescents to the survey could be self-defensive, for example they might have the tendency to deny the conflictual aspects of their emotional lives by using denial or other psychological defence mechanisms typical for this phase of life (Nardi et al., 2008; Servitzoglou et al., 2008). In this study, we tried to use the interview data to triangulate the data, especially the interviews with the parents. Among our interviewees, the views of the parents largely confirmed the findings about the children. Teachers also play a very important role in this process. In future research, teachers can be included to understand their views, beliefs and practices in supporting long-term sick children for their educational and social needs through the use of ICT tools.

Despite the above-mentioned limitations, this research made a significant contribution to the research domain of the role of ICT for the educational and social needs of long-term sick children. In addition, as the user groups of ICT tools for long-term sick students are growing each year, more extensive studies can be conducted based on the findings of this research. The insights of this study are very beneficial for educators, educational designers and ICT developers, as well as policy-makers in education, especially education for groups of learners with special needs. With the development of ICT, it is our common goal that more and more instruction and learning support can be provided to learners. This is not only important for them to develop academically about learning and knowledge, but also to develop socially and build a healthy mindset and psychological well-being for their personal lives and futures.

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References


Anderson, T., & Rourke, L. (2005). *Videoconferencing in kindergarten-to-grade 12 settings: A review of the literature*. Athabasca: Canadian Association of Distance Education Research, Centre for Distance Education.


