

Supporting Children's Emotional Expression and Exploration in Online Environments

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ABSTRACT

Children are routinely exposed to adult-oriented news and current events. Outside of their families, they rarely have forums in which they can explore and express their reactions to and feelings about these events. This paper introduces OutBurst (<http://archived.cbc4kids.cbc3.com/>), a networked, participatory activity where children can express and explore their intimate feelings about news and current events. Outlined in this paper are the child-centric requirements, design and evaluation practices used to create OutBurst; a discussion of questions that were raised in the design process; findings culled from a summative evaluation of the entire CBC4Kids pilot; and a description of the subsequent content analysis of child-generated submissions. Our investigations show evidence of children expressing and exploring their emotional reactions to adult-oriented news stories. However, many of our original questions about the utility of an online environment to support these aims remain outstanding and require further exploration.

Keywords

Child-centered design, user experience evaluation, emotion, affect, expression, exploration, children, news.

INTRODUCTION

Children are routinely exposed to adult-oriented news broadcasts. During breakfast, the television vividly broadcasts the latest car accident, natural disaster or political strife. In the car driving to school, the radio announces the latest murder, followed by details of the upcoming environmental forum. In Canada, television coverage of 911 broke into CBC's morning CBC4Kids programming which is aimed at preschoolers and 6-10 year olds. In contrast, most educational current events material aimed at children is censored to ensure it is "age appropriate." For example, large maps of the world are

marked with bright red arrows that point to areas of strife. However, images and words of killing, pillage and the resulting desolation are largely absent. This discrepancy often results in dissonance between what children are passively exposed to and what they are actively taught. What are children to think? How do they feel? How are children to resolve the internal dissonance between adult and child-friendly versions of the news?

Networked, interactive media may provide a framework in which children can explore their feelings. OutBurst, a news-based activity for children, was created as part of a pilot at the Canadian Broadcasting Corporation (CBC) [1].

We began by conducting a series of requirements gathering and design exercises with children [2]. Through this process we quickly realized that children were routinely exposed to adult-oriented news broadcasts. We found that children wanted a place where they could explore and express their intimate feelings about adult-oriented news. The result was the CBC4Kids's OutBurst activity. The primary objective was to create an online environment that would help children identify, express, explore and perhaps resolve some of their complex feelings about the news they were exposed to.

OutBurst has a number of unique design features that we hoped would make it a supportive environment for children to use to react to emotionally-charged issues. Three of these features include: a visual, comix-style interface; the distinction between public and private expression; and the use of virtual guides. We wanted to create a form and function that children were familiar with and therefore felt comfortable with. We hoped to provide a forum to solicit both private and public opinions. We also hoped that by providing examples of both real and virtual opinions, children would feel supported in their explorations.

To determine if OutBurst met its goal of helping children express and explore their intimate feelings about the news we examined three complementary yet distinct aspects of user experience: the usability of the environment, the appeal and utility of three specific design features, and the content generated by children. Our first priority was to ensure that OutBurst was usable by children. We present a

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IDC 2004, June 1-3, 2004, College Park, Maryland, USA
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brief overview of the usability methods employed as part of our design approach. The usability results are not included as they do not contribute significantly to the topic of this paper. Once we knew that OutBurst was usable, we focused our efforts on understanding if our three specific design features appealed to children and supported them to express and explore their emotional responses to news and current events. Many questions were raised during design. A summative evaluation of both usability and user experience factors provided only limited answers. Ultimately, the success of OutBurst can be judged by the frequency and form of user-generated content or “opinions” that children created using OutBurst. This paper concludes by describing the content analysis which was conducted to look for evidence of emotional expression and exploration.

DESIGNING TO SUPPORT CHILDREN’S NEEDS

The development of OutBurst was part of a larger project. The project involved the creation of a child-oriented brand for CBC4kids.ca and its instantiation through three networked activities and a personalized homesite that linked all the activities together. OutBurst was one of the activities. The initial goal for the OutBurst activity was to allow children to explore the local, national and international events that influence their lives. After requirements gathering we refined this goal.

Child-Centric Development Process

Due to time constraints our project followed a linear waterfall model of software development that included research, requirements, design, implementation and evaluation phases. However, during both requirements and design, we cycled through several iterations based on formative child-centered practices. At the beginning of the project, I exposed the newly formed team to a wide variety of sources of information about children using a series of “Team Immersion” exercises. Once the team had had a preliminary exposure to their audience, I introduced the overall goals for the CBC4Kids brand as well as ideas for several activities: one of which was the news and current events online activity that became OutBurst. With this activity (and others) in mind the team began a requirements gathering phase, followed by an iterative series of design exercises both with and without children.

At the beginning of the requirements phase we visited children in their homes and schools. We interacted with them formally (e.g., interview questions) and informally (e.g., show and tell). After we had familiarized ourselves with our audience, we created two tools which we found invaluable in determining our user requirements and later evaluating our designs. First, we created a set of values we wanted the CBC4Kids.ca brand to support. The values were based on our understanding of children’s needs to do, shape, know, belong, connect and dream in the world. Second, we created a series of child-based personas (later refined to two key ones) which we continually referred to

throughout the iterative requirements, design and evaluation process. The user experience goals and resulting design strategies for OutBurst evolved through this process.

Team Immersion

The goal of “Team Immersion” is to immerse the design team in children’s lives throughout the project. Techniques for immersion change as the project progresses. As the new team came together I wanted to immediately build an environment that motivated constant discussion about children’s lives, experiences, preferences, needs and goals. I also wanted to encourage feelings of camaraderie and cohesion in the group and educate them about their target audience. Learning can be often enhanced by first helping people identify what they don’t know. I conducted several exercises to help the group identify misconceptions they may have had about children or designing for children (e.g., *Kids you thought you knew* quiz).

During the requirements gathering phase, the team reviewed both CBC internal and published research reports on children (e.g., Markle Foundation study [4]). Assigned readings from “Designing for Children” [5] and “The Design of Children’s Technology” [7] were also an invaluable tool for bringing developers up to speed on 8 to 12 year olds. The team did a series of “homework” assignments that explored children’s toys, TV programs and online sites. We created a seven part user profile document (demographic, psychographic, TV-o-graphic etc.) and a “day-in-the-life” timeline. We went on guided reconnaissance trips to a Science Center, Aquarium and suburban shopping mall.

The team quickly realized that children were shorter and smarter than they had imagined! In public spaces (e.g., shopping malls), they saw that children were not separated from the adult world and struggled to understand it. This formed the foundational requirement for our design. We also realized that children’s media has a look and feel all its own that uniquely identifies it to both adults and children, as child-targeted. We later used this notion in our development of a comix-style interface.

With Children: In Homes and Schools

Part of our requirements gathering and early brainstorming involved visiting children in their homes and schools. We conducted five sessions in children’s homes and two in classrooms following established guidelines [8]. Prior to each session we collected (by phone) demographic information from their caregivers (e.g., age, gender, grade, native language, etc). We also recorded details on the child’s computer experience, interests, family, living arrangements, daily schedules and activities.

We interviewed the children and asked them how they felt about current news and its impact on them. From this it became very clear that children were routinely exposed to adult oriented news. Some of them had the opportunity to discuss this with their families. In the classroom, they felt

that current events coverage was “dumbed down” and they found this disturbing in ways they struggled to articulate. Many children felt that they had few opportunities to express or explore the complex feelings that arose almost on a daily basis as they struggled to understand their world. We also noticed that in groups, children were often hesitant to express themselves publicly, while at the same time, they didn’t hesitate to carry on whispered conversations privately with their peers. This realization led us to consider providing avenues for both public and private expression in OutBurst.

Without Children: Child-Based Personas

During the design and development of CBC4Kids.ca we conducted weekly informant-based (and later usability-based) sessions with children (see Antle [1] for further details). Due to policy issues we could not bring children into our design studios at the CBC. In order to help the team constantly think *about* and think *like* children, we decided to develop a series of child-based personas. One of the primary purposes of developing the personas was to prevent us from talking about children in non-specific ways.

We created personas after our brainstorming session that later produced our brand values. Based on the teams’ detailed literature review, immersion exercises, child user profiles, day-in-the-life timeline, home visits and interviews we created fifteen personas. We followed guidelines based on (but not limited to) Kim Goodwin’s suggestions in the article “Perfecting Your Personas” [9].

In order to reduce our fifteen personas to a usable number, we searched for the minimal set of personas which, if our design satisfied all the personas in that set, we satisfied our audience. To reduce the number of personas we combined them, eliminating those we could while still preserving the comprehensiveness of the set. At the end, we had two personas, named Rachel and Dodge. We moved them into our office by posting their photos and profiles, imagined quotes and artifacts. I instilled a practice of thinking and talking about Rachel and Dodge in all our discussions. I encouraged team members to say things like “I don’t think that Rachel would understand what that meant.”

Not only did our personas influence our decision to go with a comix-style interface, but the process of creating them and showing them to children in our informant-based sessions led us to develop six virtual guides for our main web site, and to use three guides in OutBurst.

Design Strategies

From our work with and without children we recognized one main goal:

- Children are searching for ways to explore and express their thoughts and feelings about adult-oriented news coverage of current events.

and three supporting needs:

- Children need (and want) a familiar, comfortable and kid-only space to do this.
- Children need (and want) to express themselves privately, semi-privately (to their friends) and publicly.
- Children need (and want) to see evidence of other children’s expressions, both real and virtual.

In order to address this goal and these needs we developed the three design strategies which are subsequently discussed in this paper:

- Create form and function that children are familiar with and therefore feel comfortable with.
- Provide a forum to solicit private, semi-private and public opinions.
- Provide examples of both real and virtual opinions, in order to help children feel supported in their exploration and expression.

Ultimately, we hoped that through expressing their own feelings and viewing others’ opinions, children would be able to resolve some of their internal dissonance about the adult-oriented news they were passively exposed to.

Usability Testing

In order to ensure that children could use OutBurst we conducted ongoing usability testing using various methods. During the design phase, children were used as testers on early, interactive prototypes in order to determine if they could successfully complete critical tasks (e.g., find story, read story, review virtual guides’ opinions, write opinions, submit, save and email opinions, read others’ posted opinions). Prior to beta release, we conducted cognitive walkthroughs (by adults) of the same key tasks. We also involved children in our beta usability test of the full site. In the three months that followed the project launch we conducted a summative evaluation of the entire pilot project which included retesting of key usability items. Ongoing usability findings support improved usability and the elimination of critical usability issues.

OUTBURST

OutBurst has two modes of interaction: active and passive. In the active mode, children can explore a current news story and add their opinion (Figure 1). In the passive mode, children can view archived news stories and see other children’s opinions about those stories.

Each week during the pilot a current news story that impacts children’s lives was chosen from adult coverage (provided on CBC.ca). Children could read the overview, view an image and/or delve deeper into the full story. They could then add their own “opinion”. An opinion is represented as an avatar with speech and thought bubbles and a story title bar. To promote varying levels of expression, opinions could be submitted to CBC for posting (public), emailed to a friend (semi-private) or saved

to a child's personal folder in CBC4Kids' KidSpace (private).



Figure 1. OutBurst main interface

In the active mode, the interface includes the current story, three cartoon-style CBC4Kids virtual guide characters who give their opinions about the current story (Figure 2), and icons for submission to CBC, emailing to a friend or saving to KidSpace (private folder).

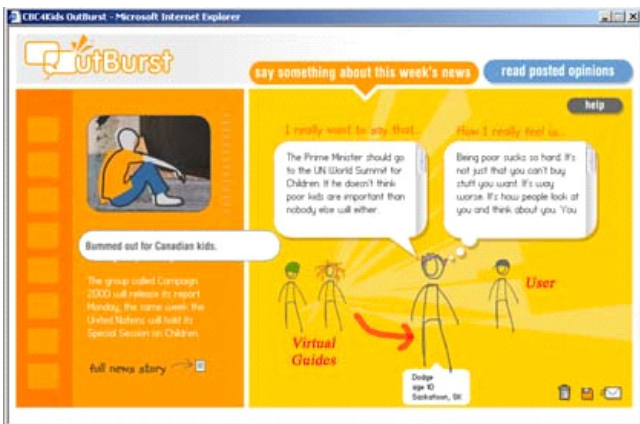


Figure 2. Virtual guide Dodge expresses his opinion



Figure 3. Posted opinion of past user

In the passive mode, a visual, expandable list shows archived stories. The interface includes a window for the selected story, the three virtual guides and an expandable

section for selecting and viewing other children's opinions (Figure 3).

Three design features are unique to OutBurst: a comix-style personal representation; multiple forms for private and public expression; and the use of virtual guides. All three were developed in response to our interactions with children, their feedback and our user experience goals. These features form the basis of the discussion points in the following section.

OUTBURST DESIGN

Little is known about how interactive media affect children's social, emotional and intellectual development [16]. The following question remains largely unanswered.

Can a "cold" medium be used effectively to help children understand their intimate feelings about the world?

The discussion points I present below rest within, and make assumptions about, this more general question.

Comix-Style Personal Representation

Based on our research and interactions with children, we decided to adopt a comix-style interface for the OutBurst activity (see Figure 1) [11]. A comix-style interface is well suited to networked, interactive environments for 8 to 12 years olds for several reasons [1]. First, the conventions used in comics are well known to most children. Second, a comix-style environment is an age and gender appropriate tool for 8 to 12 year olds. Third, a comix-style environment allows for the flexibility to express objective and subjective feelings and thoughts [3]. Speech bubbles are used to represent subjective public thoughts and feelings, thought bubbles are used to represent private thoughts and feelings and a title box represents (in comic-conventions), the narrator's objective voice.

While this approach is similar to McMahon's Bubble Dialogue technique [12, 10], it differs in that the user is represented by a single character (avatar) rather than multiple characters. In addition, the speech and thought bubbles only represent the user (not third parties).

The following discussion point was raised in our design sessions:

Does using comix-style characters and bubbles embedded in interactive media enhance children's ability to explore their intimate feelings and thoughts?

Public and Private Expression

The distinction between what people say and think often reveals internal dissonance. OutBurst acknowledges this distinction in several ways. As described above, children can express themselves (in written form) using their character's speech or thought bubbles (Figure 1). They can also re-label the story using the title box. Children can then choose to submit their opinion to CBC for public posting, email it to a friend (semi-public) or save it to their personal folder (private) on CBC4Kids.ca (KidSpace).

Discussions points:

Can children in this age range actively distinguish between what they think and feel? Can children distinguish between what they want to say publicly and what they feel or think privately? Is there, and are they aware of, dissonance between the two?

Can children adequately translate their intimate thoughts and feelings into typed words? Would other forms of expression be more appropriate?

Virtual Guides

The CBC4Kids.ca site uses virtual guides (Figure 2) to help establish an intimate and warm child-to-child relationship with its audience. The virtual guides were developed based on adapted persona theory. You can meet the guides online at (http://archived.cbc4kids.cbcr3.com/gds_meet.cfm). Each guide represents a vertex in a six-dimensional space that defines the range of children CBC4Kids is targeted to. Only three guides were used in OutBurst. Each of the three guides gives their opinion on each story. Together the guides demonstrate a wide range of thoughts and feelings about each story.

Rachel, age 12, lives in Toronto. She reads Lemony Snicket books the way other kids eat potato chips. Rachel secretly wants to be a dancer. Her opinions tend to be precocious but conservative. Dodge, age 10, lives in rural Saskatchewan. He can watch the colors in the sky change for hours and not get bored. He eats spaghetti-Os one at a time. He holds the record for taco'd bike wheels. His opinions reveal his sensitivity juxtaposed with his attempts to deal with issues of poverty and isolation (see Figure 2). A third guide, Sebastian, age 11, lives in Montreal. He can color-match all 97 Crayola crayons using only three colors of paint. He was caught drawing giant caricatures of his teachers. Some teachers wanted him suspended; others wanted copies of his drawings. His opinions are often humorous and alternative in their orientation.

The opinions of the guides are written to give a wide range of expression and encourage children to do the same.

Discussion points:

Do the virtual guides lack realism and thus discredit the activity or do children relate to them as both real and fictional, much like characters in a story?

Can virtual guides be used to set up a framework containing a wide range of expressions which encourage children to delve more deeply into their feelings than they might otherwise do?

SUMMATIVE EVALUATION

Unfortunately, we did not have the opportunity to investigate all of the questions raised during design. However, a summative evaluation was conducted as part of the pilot phase of the project. The main purpose of the evaluation was to examine the entire project (i.e., not just OutBurst) and answer these questions: Did we get kids? What worked, what didn't, and why? I took this

opportunity to summarily examine OutBurst to see how children related to the three design strategies: comix-style representation, public and private forms of expression and virtual guides.

Methods Overview

The summative evaluation included 45 one-on-one sessions with children, expert reviews, an online popup survey and statistical analysis of site usage data. Children not previously involved in the design of CBC4Kids.ca were recruited for the final summative evaluation. The data collected was both qualitative and quantitative. For further details on methods, see [1].

Results Overview

Overall, the evaluation showed that OutBurst was a unique and engaging approach to news coverage for children. In the month of May alone, 250 kids submitted opinions through OutBurst. In the one-on-one sessions, children used words like "new", "different" and "unexpected" to describe OutBurst. They came to OutBurst expecting a game and found something they had never seen before on the Internet. Eighty-five percent said they would come back. Usage data showed a high repeat visit rate (likely related to the weekly updates cycle).

Children giggled at the jumping guides, were immediately attracted to the opinion bubbles, and were quiet reading the news story. Most read the first paragraph of the story (without opening it), scanned the virtual guides' comments and then started typing their own opinions. Some did this easily; others struggled. After creating their opinions, kids went back to the story and opened it. Perhaps they were interested to learn more or just realized there was more to the story. Some kids read every word of the story; others just scanned it.

Here is some of what children had to say about OutBurst.

"It's kinda fun. If you're mad about something you can type it in and get it out there."

"It's new, different. I hadn't really seen anything like that on the Internet before."

"You can share with lots of people and they can help you and write back."

However, children were unsure whether posting their opinion would make a difference (to themselves or the world). Their responses are more focused on product than process.

"It might make a difference but I'm not sure how."

"With so many people giving opinions one opinion might not make a big difference."

Comix-Style Personal Representation

Overall children liked the comix-style representation. They immediately identified it as targeted towards themselves despite their associations with CBC as an adult brand. Many children wanted to see branded characters in the

representations (e.g., Spiderman, Arthur, Dora the Explorer, Kim Possible). They also liked the idea of designing their own comix-style characters. Several older children found the stick-like drawing too young for them and wanted something more sophisticated.

Despite personal and age-related taste, the use of a comix-style representation achieved its objectives. Children were comfortable with the interface and immediately new what the thought and speech bubbles represented.

While we didn't determine if using a comix-style design enhanced children's emotional explorations, we do know that children connected with it. By presenting adult-oriented news in a child-specific environment, the content, its presentation, and their initial thoughts and feelings about that content are brought to the forefront of their attention, which is an excellent first step.

Public and Private Expression

The evaluation sessions showed that older children (aged 10+) did understand the difference between what they wanted to say and how they felt. This is in alignment with previous work with Bubble Dialogues [10, 12]. We found that some children had trouble knowing what to write. Having an opinion or typing one's own opinion (rather than clicking to select a pre-written one) appeared to be a new experience. For some children this was good, for others confusing.

"I think it's cool that you can share what you think and feel."

"Read stories and get to write opinions. Once you figure it out, it's cool."

We have yet to determine if there was dissonance between what children wrote in the speech and thought bubbles. Preliminary exploration done in the content analysis suggests no dissonance but does show differences in content between the two bubble types.

Virtual Guides

The evaluation showed that some children had trouble distinguishing between the virtual guides and the posted opinions of other children. Many children read the guide's opinions but it is unclear what affect this had. While the guide's opinions provided tangible examples of what OutBurst was about, most children still wanted more help in forming their own opinions. Several children thought that OutBurst would be better if they could design their own characters (perhaps as an alternate form of expression). Much more work, informed by Dehn and van Mulkern's review of empirical studies on impact of animated interface agents [6], needs to be done here before we can draw any conclusions.

CHILD-GENERATED SUBMISSIONS

The summative evaluation was informative but in some ways it raised more questions that it answered. It did show us that we were pointed in the right direction. We knew that OutBurst was usable and that children related well to

the key design features. In this, we had satisfied some prerequisite and necessary conditions in answering our research question. In order to better determine the impact of OutBurst, I conducted an analysis of the affect content of child-generated submissions.

Content Analysis Methods

The content analysis of user-generated submissions took three forms. First, I analyzed the number and frequency of child-generated submissions in order to look for patterns and irregularities. Second, I created and applied a content analysis scheme to a random sample of 12 submissions taken from three stories. I only had access to postings submitted to CBC, so I focused my analysis on submissions intended for public viewing. The scheme was designed to look for evidence in children's writing of emotional and/or personal expression and/or exploration. Third, I compared the average word count for thought versus speech bubbles for the three stories.

There are few detail oriented (versus holistic) methods for assessing the emotional content of children's written work. I created a new "affective" content assessment scheme that could be quickly applied in an exploratory way. My scheme was influenced by the work of Wilkinson on assessing the affective maturity in children's written work [17,18], Pennebaker's work on using language as a psychological diagnostic tool [13] and Robertson's work on developing a writing assessment scheme [14]. My assessment framework contained five categories:

1. Emotional expression (e.g., I hate it when ...)
2. Personal expression (e.g., I don't think that's right ...)
3. Self-reflection or exploration of the impact of the event on self (e.g., I would never do something like that.)
4. Empathy or exploration of the impact of the event on others (e.g., I understand how the girl feels.)
5. Questions (e.g., Why did that happen?)

Categories 1 and 2 were intended to indicate emotional expression, and categories 3, 4 and 5 were intended to indicate evidence of exploration. Unlike traditional analysis of children's writing, I focused on affective content not techniques (e.g., characterization) or surface features (e.g., spelling).

My method for applying this scheme involved examining each submission and coding by category on a phrase-by-phrase basis. I assessed the quantity of instances of each category as described by Wilkinson [17]. I have not yet assessed *variety* or *complexity* of instances. Where appropriate, I included individual words not contained in a phrase if they fit with category (e.g., Sad!).

I applied this categorization scheme to 12 submissions taken randomly from three news stories. Stories were taken from current adult-oriented news posted on CBC.ca. It was recognized that the posted stories may or may not overlap with news stories that impact Canadian children on a daily

basis. However, the utility of OutBurst as a forum for emotional expression and exploration can still be assessed.

I picked the stories for the variation in theme. The first was our launch story about two Ottawa (Ontario, Canada) high school boys who planned to pull a suicide-bomber prank on a Jewish girl. The theme was bullying. The second story was about an orphaned orca whale living near Seattle (Washington, USA) and the debate over whether to return her to her pod off the British Columbia coast (Canada). The theme was humane treatment of animals. The third story was about the catholic Pope’s appearance at World Youth Day in Toronto. The theme was religion and the role of religious figures in children’s lives.

I completed two passes of analysis (several days apart) in order to evaluate the reliability of my technique. The two passes were within 10% variation of each other. I did not assess inter-rater reliability. Future analysis will require additional rigor in the development of the categorization scheme and criteria as well as triangulation (by using a second analyst) in the application. For exploratory purposes this method was sufficient and provided positive feedback which will motivate and inform future experiments.

Content Analysis Results

Throughout the first three months of the pilot we collected 468 user submissions covering 14 news stories. Our usage statistics are highest between April 30 and June 25 when most public schools are still in session. During this time, children submitted an average of 6.1 opinions per day and an average of 50 opinions per story. In our slower traffic time, between June 26 and August 15, children submitted an average of 2.5 opinions per day and an average of 16 opinions per story. The number of opinions that were posted varied from about 50 to 75%. Opinions were not posted if they contained “bad” words, were blank or duplicate, or if the number of postings was greater than could be handled by the editorial team.

Affective content analysis revealed encouraging results. For the 12 submissions from each of three stories (i.e., 36 submissions in all) I found the following numbers of instances in the five categories outlined above:

Story	1. Emot.	2. Pers.	3. Self	4. Empat.	5. Q?
Suicide - Bomber	21	39	14	20	4
Orca	12	22	4	15	2
Pope	13	19	9	6	8
Totals	46	80	27	41	14

Table 1: Affective content analysis results

Children’s opinions for the Suicide-Bomber story contained the most affective content, both expressive and exploratory. They had a lot to say and their empathy with

the victim was high in all cases but one. The Orca story elicited less direct emotional content but children showed much empathy for the plight of the whale. Seventy-five percent of the submissions for the Pope story contained questions, which is another form of exploration.

Together, the results from these stories show that submissions did contain a high degree of affective content. Although I did not evaluate the variety or complexity of instances, my impression was that neither of these would be particularly high. Many of the submissions echoed each other. However, in the larger sample, there were both extreme and unusual submissions.

Preliminary word count analysis of the three stories showed that children wrote on average 21 words in thought bubbles and 31 words in speech bubbles. The lowest word count was one and the highest was 56 (the text was cut off). I did not count words in the title field. Children were most prolific in their opinions of the Suicide-Bomber story generating an average of 25 words for thought bubbles and 40 words for speech bubbles. They wrote the least about the Orca story. Speech bubbles contained a higher word count than thought bubbles across all three stories.

Overall, content from thought bubbles contained more instances of emotional expression and exploration of the impact on self. Content from speech bubbles was more prolific and tended to contain personal opinions, empathetic explorations and questions.

CAN WE SUPPORT CHILDREN’S EMOTIONAL EXPRESSION AND EXPLORATION IN ONLINE ENVIRONMENTS?

Despite worries about a cold medium, the results from this study imply that we can, at some level, support children to express and, possibly to a lesser degree, explore their emotional reactions to news and current events. Certainly, a large number of children submitted opinions to CBC. We do not know how many children created opinions which they emailed to friends or saved to their private KidSpaces.

The comix-style representation and the distinction between thought and speech bubbles seemed to help children connect with the environment and provide a forum for their feelings, thoughts and opinions about the stories.

The virtual guides may not have inspired children to deeply explore their feelings but they did serve as exemplars for format if not content.

Even though children expressed difficulty knowing what to write in the one-on-one sessions, the quantity of affective content and average length of submissions showed they did manage to put their feelings and thoughts into words.

At this stage, this is as far as we can go in answering our original research question. Since we were not able to analyze the email-to-a-friend content, we do not know if children actively and collaboratively discussed their thoughts and feelings with others. In order to fully assess the utility of OutBurst as online environment, we would

need to record and analyze this content and children's subsequent collaborative interactions.

CONCLUSIONS

OutBurst represents an initial foray into designing an online environment that can support children to express and explore their intimate feelings. The best thing about this project is that the goal of OutBurst corresponds to children's real, articulated needs. The discussion points raised in the design process need to be further addressed in order to better understand children's emotional needs and ways of meeting them. Evaluations to date have been limited in scope and depth but provide guidance for moving forward.

Future research and development will require modifications to existing child-centered requirements gathering, design and evaluation practices if they are to better explore ways of supporting children to deal with their intimate and often unarticulated thoughts, feelings and needs around issues of news and current events. One idea is to adapt Liz Sander's "Do, Say, Make" techniques [15] to children in order to provide insights into how children can be helped to respond to emotionally charged current events and news. A comparative analysis of OutBurst with other forms of expression (e.g., verbal, written, graphical) would help determine if an online environment such as OutBurst can support children to explore their feelings in more depth than they might elsewhere. Examination of the collaborative features of OutBurst and children's subsequent behaviors is also required. Together with other efforts, these investigations can help us determine the best ways that we can use a cold medium such as the Internet to support children's emotional development.

ACKNOWLEDGMENTS

I wish to thank Robert Ouimet, Krista Harris and a fantastic design team at CBC. Special thanks to Louise Allen who coordinated the summative evaluation and all the kids at St. Frances de Sales, Choice and Lord Strathcona Schools and Vancouver's Science World who made this project come to life. The IDC reviewers' feedback was much appreciated. And thanks to Jenny for her editorial eye.

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