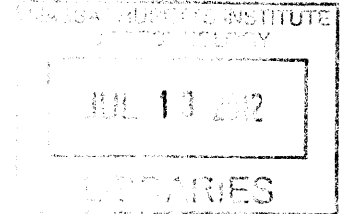


Reflective Interfaces:
Assisting Teens with Stressful Situations Online

by

Birago Jones

ARCHIVES



Submitted to the
Program in Media Arts and Sciences, School of Architecture and Planning,
in partial fulfillment of the requirements of the degree of
Master of Science
In
Media Arts & Sciences
at the Massachusetts Institute of Technology

June 2012

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Abstract

This thesis presents the concept of *Reflective Interfaces*, a novel approach to user experience design that promotes positive behavioral norms. Traditional interface design methodologies such as User Centered Design are oriented towards efficient satisfaction of short-term interface goals, but may not serve the best interests of the user in the long term. Reflective Interfaces encourage the user to think about the space of possible choices they can make, reasons for making those choices, and consequences of their interactions for themselves and others.

The problem of Cyberbullying is a serious problem, threatening the viability of social networks for youth today, as spam once threatened email in the early days of the Internet. We explore the design of several Reflective Interfaces for helping teens in distress over social network interactions.

First, we implemented a fictitious, but fully functional social network, *Fakebook*, that provides just-in-time and just-in-place help when potentially bullying interactions are detected. Laboratory tests of the Fakebook interface showed encouraging results. Second, we collaborated with MTV on their site, *A Thin Line*, which finds stories analogous to a users' particular situation and helps reduce feelings of isolation. We are also working on *TimeOut*, a dashboard for social network providers that alerts them to situations where outbreaks of bullying might escalate in a community.

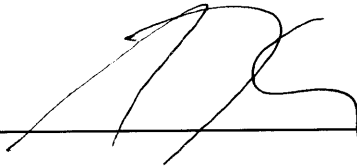
By putting users in a reflective state, Reflective Interfaces can help them self-correct toward an implicit goal of the community, the interface, the application, or reaffirm the user's own stated goals. These principles can be applied across a wide variety of interfaces for social interaction and other domains.

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Reflective Interface:
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Birago Jones

The following people served as readers for this thesis:

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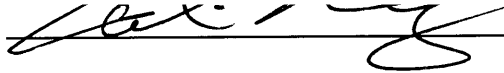


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Reflective Interface:
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Colin Raney
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1 Introduction

1.1 Motivation

The tragic story of Phoebe Prince exemplifies some of the more negative consequences of social network systems. Phoebe moved to a small town in Massachusetts from Ireland in 2009. Within a short period of time, she became the target of a group of girls from her school. Her peers used Facebook and SMS texting to launch an assault of taunts, name calling, and character smearing that eventually drove Phoebe to commit suicide. The district attorney, Elizabeth Scheibel, assigned to her criminal case stated, "The investigation revealed relentless activity directed toward Phoebe, designed to humiliate her and to make it impossible for her to remain at school," Scheibel said. "The bullying, for her, became intolerable." (ABC, 2009)

Cyberbullying on social networks is a significant societal problem whose effects range from manageable social and emotional issues, to unwieldy and destructive behavior. Recent surveys found that almost 43% of teens in the United States were subjected to some form of cyberbullying. (Ybarra, 2010) While some researchers argue that the number of instances of cyberbullying is exacerbated by the fear mongering of hypersensitive media, the negative social and psychological effects of cyberbullying are real. (Vandebosch & Nocentini, 2009)

Current social networks are not equipped for adequate supervision or user-centric mitigation strategies. Social networks usually provide unspecific, generalized advice on coping with bullying. Their advice usually appears only on a static Web page, independent of any social interaction. The White House

Conference on Bullying Prevention (White House, 2011) and the government's site <http://www.stopbullying.gov> provide a representative sample of such materials, including videos. Apart from links to materials, and tools for reporting complaints to already-overwhelmed moderators and network providers, there have been no significant attempts to design social network software explicitly to cope with bullying situations.

The first step in any attempt to head off or cope with bullying is to detect possible cases where it might be occurring. Innovation is necessary in bullying detection, because simple approaches like looking for curse words or insult words in the text are insufficient. Dinakar (2012) shows that simple approaches such as those used for spam detection are not acceptable. While spam is sent identically to millions of users, and usually declares its topic explicitly, bullying is personal and implicit. Dinakar introduces novel techniques based on Commonsense reasoning and mixed-initiative Latent Dirichlet Analysis (LDA). These techniques include algorithms that enable the detection of problematic, hidden and overt patterns found in user text input, and matching of text-based stories.

1.2 Contribution

True solutions reside in teaching youth healthy online discourse. This work, together with the companion thesis by Karthik Dinakar (2012), represent the first major attempt to design social network software to help prevent, and mitigate the consequences of, online bullying.

What do you do after you have detected possible instances of bullying? That is the topic of this thesis. Traditional approaches are heavy-handed, such as censoring an offending post or accusing or banning the perpetrator. While these might be appropriate in severe cases, they treat the immediate symptom rather

than the root problem. We prefer instead, to use the “teaching moment” of potential bullying, to encourage reflection that may lead to a user voluntarily adopting more positive choices.

We introduce the methodology of Reflective Interfaces, interfaces designed to encourage the user to reflect on his or her behavior. Reflective Interfaces contrast with more traditional UI/UX methodologies such as User Centered Design (UPA, 2012), that is more oriented toward efficiently accomplishing short-term goals in the user interface, like online purchases. Reflective Interfaces support people in times of distress, enable digital conflict resolution, give constructive feedback, and promote introspective self-learning.

There are several dimensions to Reflective Interfaces, which include: strategic, psychological, social, and analytic. They are discussed in detail in Chapter 3 of the thesis. This thesis also outlines three major implementations of Reflective Interfaces, in the area of addressing teen digital distress.

We present a fictional, but fully functional social network called *Fakebook*, which superficially mirrors the interface of Facebook. Fakebook deploys a Reflective Interface that utilizes notifications, action delays, displaying hidden consequences, system-suggested flagging, and interactive help and education. These provide an array of possible features and interventions that social network implementers can use as a resource. Two lab studies show that Fakebook’s reflective capabilities are found useful in defusing potentially bullying situations.

MTV’s *A Thin Line* (MTV, 2012) website encourages youth to share their stories of bullying, sexting, drug abuse, teen pregnancy, and other social issues. The website also has a vast array of online and real-world help services for their users.

We present a redesign of the “Over the Line” (OTL) section of their website to implement a Reflective Interface to encourage users to not only share and read stories, but to see how their stories match other peers’ experiences. The Reflective Interface also provides the content of the existing help section to be accessible to the user at the point of interaction. The MTV Over the Line redesign serves as a paradigm for similar websites, which provide distressed users with targeted assistance.

MTV has agreed to implement the Reflective features on their site, and we have designed an experiment to provide data to validate our hypothesis that reflective features will enhance emotional support provided by the site, compared to a more conventional and static version. The experiment is described in the thesis, but as the public deployment of this experiment is beyond our control, we do not have the data at press time. Results will be the subject of a future article.

Finally, we present a dashboard interface for social network moderators that helps monitor the social health of their community, and provides alerts to possible viral-like outbreaks and escalations of dangerous situations. TimeOut is an example of aggregating the algorithmic detection data to support the decisions moderators must make on behalf of their communities.

1.3 Outline

The thesis is structured as follows:

Chapter 2: Provides a high level overview of our Cyberbullying detection capabilities, and how they support Reflective Interfaces. The natural language processing aspect of this work is the subject of Dinakar’s thesis (Dinakar, 2012),

and appears in our joint publications (Dinakar & Jones, 2012). The essentials are presented here in order to make the thesis document self-contained.

Chapter 3: Discusses the high-level concepts of Reflective Interfaces.

Chapter 4: Discusses Fakebook, which illustrates just-in-time help, and just-in-place contextual help.

Chapter 5: Provides a detailed description and process of the MTV Over the Line redesign using Reflective Interfaces to help teens in distress.

Chapter 6: Presents TimeOut, the social network moderator dashboard, which helps people who manage online communities, to reflect on the health of their constituents.

Chapter 7: Offers a selection of related work and background research.

Chapter 8: Closes the thesis with the conclusion and recommendations for future exploration.

2 Detecting Potentially Bullying

2.1 Detection

Detecting bullying is a much harder problem than detecting spam. Spam is sent identically to large numbers of people, whereas bullying is personalized and contextual. But we have done an analysis that reveals that most bullying occurs around a small number of topics: racial and ethnic slurs, sexuality, physical appearance, intelligence, social acceptance and rejection. If we can understand whether a message is about those topics, and whether its tone is positive or negative, we can identify many candidates for possibly bullying messages.

2.1 Understanding Language

Computers still can't fully understand English. But progress in natural language processing has helped in partially understanding some aspects of a text. Some active areas of research are topic detection, a mainstay of search and database engines; and affect analysis, whether a message conveys a positive or negative emotion.

We are using statistical techniques such as machine learning classifiers. They are trained on a set of messages identified by people as bullying, and analyzed for their statistical regularities. Such methods have been shown to be effective for many topic detection problems.

Unique to our algorithmic methodologies is a Commonsense knowledge base and Commonsense reasoning techniques. We have a collection of about a million sentences describing everyday life that can provide background knowledge that can get Artificial Intelligence (AI) programs beyond simple word matching and word counting. We simulate the kind of vague, informal reasoning that people do, rather than reasoning with mathematical precision.

The Commonsense knowledge contains the kind of statements that help decide whether a sentence might be referring to stereotypical male or female concepts; for example, “lipstick is a kind of makeup” or “women wear dresses.” If a comment said, “You must have eaten six hamburgers for dinner tonight.” Commonsense knowledge about what people typically eat might indicate that the intent of the comment was to insult someone for being overweight.

We would like to avoid directly accusing an individual of being a bully in any situation, or identifying them as a victim, or a third party bystander. Our goal is not to have 100% certainty in the detection of cyberbullying, merely to note the possibility. If a pattern is repeated over time, seems to be escalating, or has consistently negative tone, our confidence in estimation might increase.

Current strategies by popular social networking websites involve key-word spotting to automatically flag threads that smack of cyberbullying and providing affordances to report inappropriate content. Yet, having millions of users on their networks means that even the flagged instances typically run into the thousands everyday, thereby making the problem of prioritizing serious instances extremely difficult. In the next section, we discuss our algorithmic approach of identifying themes and using them to match online discourse with similar stories.

2.2 MTV Corpus

The popular youth culture network MTV's website, athinline.org allows distressed adolescents and young adults in distress to share their stories anonymously with the notion of getting crowd-sourced feedback and advice. When a teenager posts a story on their website, anyone can read it and vote on its severity in three ways – over the line (severe), on the line (moderate to mild) and under the line (not very serious). The age of those posting stories on the site ranges from 12-24, although more than half of it comes from teenagers. The range of topics in the stories that teenager talk about on the site have a broader scope of teen distress, from issues with dating, digital harassment such as sexting, social network bullying, and physical abuse.

2.3 Story Theme Distributions

We analyzed a completely anonymized corpus of 5500 personal stories from the MTV website, with data on the votes that each story received. Based on the algorithmic (LDA) output, the stories were reduced to 30 separate topic themes. Upon examination of the corpus, most stories contained a set of themes. The most prevalent theme present in the corpus was 'uploading of naked or nude pictures by boyfriend / girlfriend', with advice sought on 'duration of relationships' followed by 'bullying on social media' and bullying connected with appearance'. This is well documented in the social science literature investigating the problem of bullying, especially the fact that most bullying with regard to physical appearance tends to emanate from girls bullying girls. (Mishna, et al, 2009).

| # | Theme | % of stories | # | Theme | % of stories |
|----|---|--------------|----|--|--------------|
| 1 | Using naked pictures of girlfriend or boyfriend | 7.6% | 14 | Hookups | 3.8% |
| 2 | Duration of a relationship/dating | 5.0% | 16 | Shorthand notations (not a theme) | 3.8% |
| 3 | Bullying on social media | 4.9% | 17 | Age & dating | 3.7% |
| 4 | Bullying connected with appearance | 4.9% | 18 | One-sided relationships | 3.5% |
| 5 | High school & college drama | 4.7% | 19 | Communication gaps & misunderstandings | 3.4% |
| 6 | Bullying on email & cell-phone | 4.6% | 20 | Hanging out with friends | 3.3% |
| 7 | Involving parents, siblings or spouses | 4.4% | 21 | Jealousy | 3.2% |
| 8 | Feeling scared, threatened or worried | 4.3% | 22 | Talking negatively behind one's back | 3.2% |
| 9 | Sexual acts, pregnancy | 4.1% | 23 | Anguish & depression | 3.1% |
| 10 | Inability to express how you feel | 4.0% | 24 | Ending a relationship | 3.1% |
| 11 | First dates & emotions | 3.9% | 25 | Long-term relationships under duress | 3.0% |
| 12 | Falling in love | 3.8% | 26 | Post-breakup issues | 2.9% |
| 13 | Cheating & trust issues | 3.8% | | | |

Table 1. Table showing the distribution of themes (theme that gets the most probability mass in a story is the most dominant theme for that story) for the 5500 stories in the MTV corpus.

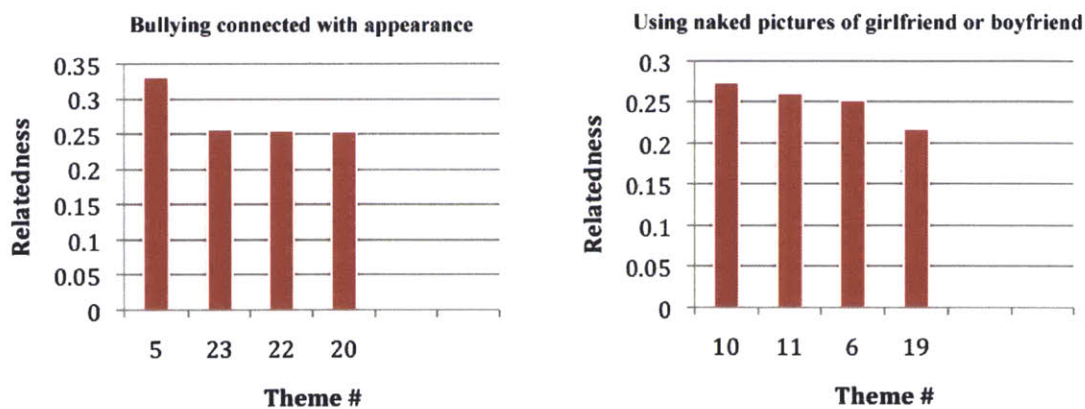


Figure 1 - Top 4 themes that are most related with a given theme. The relatedness is calculated by how many times another theme co-occurred with the current theme amongst the top 3 themes for all stories. That count was divided by the total number of times the given theme occurred in the top 3 themes for all stories.

2.4 Co-occurring Themes

It becomes important to understand a story from a multiple thematic perspective. We investigated the top 3 themes that each story gets, to see what other themes co-occur with it. By investigating the co-occurrence of a theme in a story, a moderator or the Reflective Interface could use it for targeted help. For example, most stories with the co-occurring themes 'Breakups, anguish and depression' and 'Feeling scared, threatened and worried' are by girls. By connecting the meta-data about the individual's gender with the co-occurrence of themes, moderators can point the individual for advice specifically tailored for girls dealing with depression connected with breakups, which might be better than generalized advice on depression.

Research from adolescent psychiatry suggests that distressed teenagers can be helped with targeted, in-context and specific advice about their situation (Menesini & Nocentini, 2009). When a distressed teenager comes to a help site with his or her story, it would be apt to show the individual a similar story encountered by another teenager with the same experiences. What this calls for is story matching based on a distribution of themes rather than by singular labels such as 'positive' or 'negative'. By matching stories based on themes, it can induce a level of reflection on the part of the distressed individual that can cause both self-awareness and a feeling that one is not alone in their plight. Knowing that there are other teenagers who have experienced similar ordeals can go a long way in helping the individual deal with distress.

2.5 Evaluation

We designed an evaluation protocol to test the two crucial aspects of this work – a) the effectiveness of our algorithmic approach of story matching in relation to a conventional technique's baseline, and b) the effectiveness of showing the

matched stories to help reflective thinking in distressed teenagers to feel that they're not alone in their plight. We also provided a qualitative evaluation of the usefulness of identifying the distribution of themes by two community moderators of two popular teenage community websites respectively.

Participant selection: We selected a total of 12 participants of which 8 were female. 5 of them were teenagers at the time of the study. 2 of the participants were teachers at a local public school, while 3 were graduate students working with young children. 2 of the participants were graduate students researching machine learning and human-computer interaction respectively.

User-study protocol: The participants were each subjected to an online user-study as follows. First, each participant was asked to view the MTV A Thin Line website to familiarize themselves with a) the kind of stories and b) the type of linguistic styles employed by teenagers on the site. Second, each participant was asked to enter a new story using a 250 word limit (as in the case of the Over the Line) on any relevant themes as they deemed appropriate. 5 matched stories of which 3 were retrieved using our algorithmic approach and 2 using the control approach were shown to the participant after each new story.

Each matched story was evaluated with respect to two questions Q1: if the retrieved stories matched the story entered by participants in having similar themes and Q2: if they could imagine a distressed teenager feeling a little better if they were shown the matched stories – that they were not alone in their plight. Each participant was asked to write a minimum of 3 new stories, thereby evaluating a total of 15 matches. A total of 38 new stories were entered, with a total 190 matches.

2.6 Results & Discussion

Results show strong results for story matching using our mixed algorithmic (LDA and KL-divergence) approach of extracting themes and matching new stories to old ones. Our approach fared better for both Q1 and Q2 against a simple cosine similarity using tf-idf vectors for the story matching.

An error analysis showed that new stories for which the matches were rated as 'Strongly Agree' had very clear themes with linguistic styles very similar to the stories in the corpus. Those new stories for which the matched stories that received a 'Strongly disagree' or 'Disagree' vote did not have clear themes or used a vocabulary that wasn't common in the corpus. For example, consider the following new story:

'I wanted to be in the school dance team, but I was not accepted. I think its cause the captains don't like my bf.'

The above story is an example of a story that didn't have a clear theme relative to those extracted from the corpus. This best match for this story was "a guy at my school let me flirt with him and he knew i liked him and know he wont even talk to me at all cuz we have no classes together is he over the line or not." Though the algorithm did produce a coarse level match with respect to school and liking a male, the story still received a 'Strongly disagree' vote. This calls for a deeper level of reasoning for fine-grain story matching.

3 Reflective Interfaces

3.1 Overview

Reflective Interfaces are a novel approach to encouraging positive behavioral norms in an interface. We define a Reflective Interface as a type of Intelligent User Interface, which applies Artificial Intelligence and knowledge-based techniques to the issues of human-computer interaction. (Lieberman, et al, 2004) Specifically, Reflective Interfaces are designed to encourage the user to think about why they made the choices they did; and what the consequences are for themselves and others, rather than just the content of the interface choice or the communication taking place.

Reflective Interface design borrows its framework from principles espoused by Donald Schön on Reflective Design (Schön, 1983). Schön developed the theory of the Reflective Practitioner as a paradigm for professional learning. His work had a significant impact on training and education programs for teachers, organizations, and networks. Schön's concepts supported professionals in meeting the challenges of their work with a kind of improvisational learning.

Goel (2010) best summarizes Schön's ideas,

Schön stated three notions of the reflective practitioner, "reflection in action," "reflection on action," and "ladders of reflections." One would reflect on behavior as it happens, so as to optimize the immediately following action. One reflects after the event, to review, analyze, and evaluate the situation, so as to gain insight for improved practice in the future. And one's action, and reflection on action makes a ladder. Every action is followed by reflection and every reflection is followed by action in a recursive manner. In this

ladder, the products of reflections also become the objects for further reflections.

Other researchers such as Sengers (2005), Hallnäs and Redström (2001) also offered helpful insights in considering how to apply reflection to design. Many influential researchers all promote better user-focused interfaces, but they do not address reflection of the user's behavior to support user self-correction.

Reflective Interfaces include notifications, action delays, displaying hidden consequences, system suggested flagging, interactive education, and the visualization of aggregated data, addressing the challenges faced by both end-users and social network moderators. Through the interface, the end-user is encouraged (not forced) to think about the meaning of a given situation, and offered an opportunity to consider their options for reacting to it in a positive way. Reflection Interfaces resist the urge to implement heavy-handed responses, such as direct censorship. Instead, the end-user is offered options to assist them to self-adjust or seek external help.

3.2 Dimensions of Reflective Interfaces

There are several dimensions to Reflective Interfaces, which include: strategic, psychological, social, and analytic.

3.2.1 Strategic Dimension

Traditional feedback mechanisms such as notifications are aimed at letting user know that the computer accepted their command and performed the requested operation. Reflective feedback mechanisms are aimed at feeding back the likely

consequences of the user action, for themselves and others. This leads the user to reflect whether the consequences are consistent with their intentions.

Reflective Interfaces support long-term user goals. By slowing down the speed of interaction between the user and system, the Reflective Interface gives the user time to reflect on their behavior. Many traditional interfaces are speedy and extremely efficient with user interactions. Example paradigms include the “two clicks to the shopping cart” (as ecommerce shopping carts like Amazon), and “one form field registration” (like Pinterest, the social sharing site). These interfaces feature game-like reactions for quick decision-making (Yap, 2010). For the ecommerce merchant, traditional interfaces provide the same impulse buy behaviors that users can experience in real world retail establishments. For the end-user, this compulsive behavior is not always helpful in supporting their needs.

3.2.2 Psychological Dimension

Reflective Interfaces helps the user to maintain their attention on their goals. The interface focuses the user on a few primary tasks. Fewer distractions prove supportive in helping the user decide what they should or could be doing. “White space or the absence of text and graphics plays a role in determining the hierarchical significance of various sections of content on a particular page. In many ways, white spaces direct how and upon what terms we “read” a particular design artifact. They dictate (and thus direct) the visual flow and coherency of a visual composition (Inspiredm, 2012). We attempt to label all interface objects with contextual real world nomenclature, similar to consumer personal computer operating systems using real world picon interface objects (the waste bin for trash, file folders for directories, etc.). For example, for text forms, we use “Share” rather than “Submit”, and “I don’t want to say that!” instead of “Cancel.” Careful consideration is also taken regarding the interface ‘tone’ when

communicating with the end-user. The “voice” of the interface is passive, submissive, polite, and appreciative.

3.2.3 Social Dimension

Especially in social networks, the goal of the interaction is to have positive social relations, and to feel connected to others. This is especially problematic for teens that have limited capacity to understand what are normal or healthy patterns of interaction. Learning of others’ experiences, and connecting with people who can offer support or advice at the right moment can be extremely valuable. Software should be designed to encourage this support.

Individual actions have consequences not only for a single user, but, if the user is acting in an online community, for the overall health of the community as well. Tools need to be designed to explicitly support people who take responsibility for maintaining the social health of a community, as well as to help each person be a good citizen. Problems in a community often start out small and escalate if not properly handled.

3.2.4 Analytics Dimension

Reflective Interfaces provide behavioral analytics to application developers. Often website analytics report on user click-through, and time spent on a particular section of the website. (Google 2012). By increasing the number of interactions user must make with the system, the number of recordable data points is also increased. Moreover, Reflective interactions ask users to qualify their behavior. These types of interactions offer developers a new cache of data to help design their software to meet the needs of their users.

3.3 Reflective Interfaces for End-Users in Distress

In situations where according the user freedom of choice carries the risk that the user will make unwise choices, or choices that damage the community, conventional interfaces are often designed to restrict the user. In the case of Cyberbullying, some social networks detect curse words or other indications, and censor or ban the perpetrator. Such actions also do little to help the recipient of such messages.

Being preemptive, but supportive, Reflective Interfaces are a less heavy-handed engagement. By reflecting consequences back to the initiator, they give the opportunity for the situation to be resolved without infringing on someone's perceived freedom. For the affected parties, reflective devices such as sharing stories of others in the same situation give them the ability to reflect on their options for coping strategies and provide emotional support.

Rather than present educational material that might affect user behavior in school assemblies or other offline contexts, we bring the material to the time and online place where a problematic situation may be occurring. This hits the user just at the moment when they might be negatively affected emotionally, and at a time where they are in a position to do something about it.

Reflective Interfaces can help third parties such as the social circle of the people directly interacting, and moderators or social network providers. It attempts to support the social network provider, who may find that human supervision may not scale to modern social networks.

By designing an interface that encourages the user to reflect about the meaning of their given situation, we believe that it gives users the opportunity to consider their options for reacting to given situation in a more positive manner.

To illustrate these dimensions of Reflective Interfaces, we will now discuss Fakebook, the MTV Over the Line Remix, and TimeOut.

4 Chapter 4: Fakebook

Cyberbullying is a daunting problem, and has rightfully garnered the attention of concerned parents, school officials, the media, and other interested parties. Support and help for persons dealing with the issues are available, but it's in school assemblies, brochures, pamphlets, other paper-based products, and static webpages. Help is not in the place of interaction – the social network software itself. When a teen gets a hurtful message, they might respond within minutes. This is the real opportunity for making a difference; afterwards it's too late. A Reflective Interface empowers the user interface with end-user support. The job of the Reflective Interface is to figure out when is the right time to present the user help. And to present the help within the interface where the user is going to ignore it. In addressing cyberbullying, a Reflective Interface supports just-in-time, just-in-place help.

Fakebook is a fictitious social network website which is an exact copy of the popular website Facebook. It was built as a test bed to deploy our intervention techniques of both algorithmic text detection and a Reflective Interface for the end-user. After construction and testing, a small user study was conducted to test our hypothesis that software intervention using algorithm detection and Reflective Interfaces would be helpful in stemming the distress of negative user interaction.

4.1 Monitoring and User Privacy

Privacy advocates may object to having a detection algorithm scanning messages and text conversations, as this is a potential violation of the user's

privacy. Many common computing situations today involve the monitoring of user input. Users of the Google search engine and Gmail mail systems, for example, grant Google permission to analyze their mail or search terms in order to deliver targeted search results or targeted advertising. According to the Electronic Privacy Information Center (2011), while many users are concerned about their privacy others feel less concerned with having their input monitored by a program. In such cases it is the user's responsibility to use the "opt-out" option, which may address their privacy concerns.

Minors, which have different privacy issues, are heavily engaged in the issues of cyberbullying (NCPC, 2010). Many parents insist on monitoring their children's social interactions, and some establish behavioral rules for the use of social networks that are extremely restrictive. For younger children, some parents resort to social networks like "Scuttle Pad" (2011) and "What's What?" (2011) which are promoted as "safe networks." Similar websites prohibit any unmoderated commentary, any use of profanity, any social interaction with strangers, any reference to unapproved web sites, etc. New strategies in software-based intervention will hopefully contribute to an increased feeling of safety among parents and children, while still permitting considerable freedom of expression on the children's part.

4.2 Roles in the Bullying Process

There are many roles in the cyberbullying process, which include the perpetrator, the victim and third party bystanders, such as friends, adults, moderators, and network providers. Each of these roles might elicit different kinds of reflective interfaces appropriate to their role. These roles are not mutually exclusive. Determining who is the victim and who is the perpetrator may not be an easy task. Victims may be tempted to cope with the situation by retaliating, which then thrusts them into the role of perpetrator (Stop Cyberbullying, 2011). In our

collaboration with the social network provider Formspring (2011), we learned that some negative interactions seem to start in one social network site, then spill onto another. Sometimes bullies in the digital realm may be victims in the physical world. Such complexity provides a source for misinterpretation of roles and behavior. Thus directly identifying an individual of being a perpetrator or a victim may not be constructive in diminishing negative behavior. True bullies may never be stymied by any intervention, real or digital. However providing tools to support healthy digital conversations is needed.

4.3 End-User Strategies

In providing tools to facilitate user discourse, users, moderators, and social network providers are encouraged to take an active part in determining and enforcing their own norms of healthy digital social behavior. These methods are not prescriptive, but rather options for social network providers to implement and test.

4.3.1 Notifications

One class of interventions is notifications. Notification is drawing attention to a particular situation in order to encourage reflection. Oftentimes, people need only very subtle cues to help them understand how their behavior affects others. In face-to-face conversations in the real physical world, one has facial cues, body language etc. to help show how one's input is being accepted. On phone calls, one can hear a person's intonation, pitch, and volume. Based on these physical responses one can quickly adapt to curb or change their behavior. In the digital realm this is not the same, especially when conversations are not in real time. Changes in the user interface could make up some of these differences. (Walther, et al, 2005)

4.3.2 Interactive Education

Another class of interventions is interactive education. Current anti-cyberbullying efforts in schools and in youth-oriented media centers focus on educating participants about the process. (Banks, 2012) Most education efforts consist of general guidelines such as warning potential perpetrators about the negative consequences to their victims and the potential damage to their own reputations. They counsel potential victims to share their experiences with friends, family, and responsible adults. They counsel potential bystanders to recognize such situations in their social circle and to take steps to defuse the situation and to provide emotional support to the participants.

While these education efforts are positive contributions, they can be ineffective because they are disconnected from the particulars of the actual situation, both in relevance, and in time and space. Guidelines are often vague and they do not address the particular details of an actual situation. Advice is usually so general that it is not directly actionable. The venue for bullying education is often school assemblies or classes, far from where bullying actually takes place.

The fact that cyberbullying occurs online gives an opportunity for intervention in real time. When a potential perpetrator is about to send a problematic message, there may be some time to encourage that person to reconsider, or to give them an opportunity to rescind their message. When a potential victim is about to receive a message, there may be a few minutes to counsel them on the appropriate response, or influence their immediate feelings about receiving such a message. Rather than give completely general advice, tailored advice may be offered addressing that particular kind of bullying. Such advice can be immediately actionable, and can have a dramatic effect on the outcome of the situation.

4.3.3 Introducing Action Delays

A number of possible intervention techniques are aimed, not at interrupting the process, but at introducing small delays to the process in the hopes that the delay will encourage reflection. Such delays may not prevent severe cases of bullying, however major cyberbullying problems are often characterized by rapid spread in a particular community. Slowing down the spread of negativity might in some circumstances be enough to avert a major disaster. (Walther, et al, 2005) The aim is to slow the spread below the “chain reaction” rate.

Alerting the end-user that their input might be hurtful and making them wait some time before actually submitting could also be helpful. The end-user could decide to rephrase their comment or cancel it outright. This enforces a time for Schön’s “reflection in action.” In some ways, Reflective Interfaces are similar to the “spell-check” function in word processing software. Generally user interface design has been focused on helping the end-user get or submit information as quickly as possible. However there are cases where offering the user time to reconsider and confirm that the information they are providing is truthful is warranted, as in credit card purchases, applications, etc. Such enforced reflection is also common on commercial sites, which provide free services to a user. Web sites such as RapidShare (2011), the file-sharing site enforce a delay so that the user has time to consider the worth of the service, and the value of purchasing enhanced services or delay-free usage.

As seen in Figure 2, the submit button is changed to “Wait 50 seconds to post” and next to it, a button to cancel the interaction states “I don’t want to say that.” Both the labels on the buttons correctly represent the action the user is taking, rather than simply stating “submit” and “cancel.” Nielsen (2011) states that the notion of labeling user interface objects by their functionality is important to help the user understand their actions. Labels in this instance are important to the user for helping them to correctly negotiate their options as presented by the

system. Here the user has typed content deemed by the system as being something that might be perceived as being negative. Both buttons are styled in the same fashion as the origin Facebook style to not draw too much user attention to the change.

Even after making the decision to send the message, it is also helpful to provide a delay before the message is actually delivered to the recipient, giving the user the opportunity to undo the action and take the message back before it is seen by the recipient. Often the act of sending makes the consequences of sending seem more real to the user, and triggers a “sender’s remorse” response.

[View more comments](#)

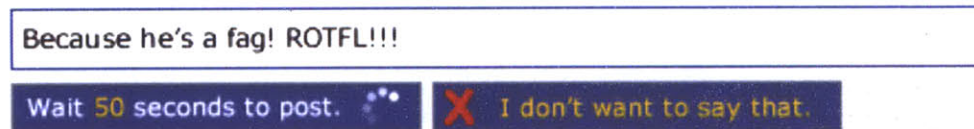


Figure 2 – Mock-up of delay and undo operations given to the sender for a chance to reconsider message.

4.3.4 Informing the user of hidden consequences

Oftentimes the end-user does not realize that they are responding to the group’s entire social graph, not just to the owner of the page they are commenting on. Whether or not a single comment, or the overall tone of thread, is deemed negative by the detection algorithm, an interface change to the text label on the submit button may reflect the number of people they are communicating with.

[View more comments](#)



Figure 3 Mock-up of informing the sender of the consequences of sending to a large social network.

For example, if Romeo, who has 350 friends, is posting a comment on Juliet's page, who has 420 friends, then the submit button for Romeo would reflect, "Send to 770 people."

In another example, if Tybalt's comment on Juliet's page is negative, after successfully submitting, the system might respond with an alert box, "That's sounds harsh! Are you sure you want to send that?" If Tybalt changes his mind, an "undo" button could be made available, as his comment has yet to be sent.

4.3.5 Suggesting Educational Material

For Juliet, the receiver of negative comments, the interface could provide interactive educational support. Using Google Gmail ad-like text messages next to the negative comments offering the user support. "Whoa! Need help with this? Click here for help." The small text message links to external websites related to supporting victims of bullying. This also provides an easy conduit for external support agencies to connect their materials to the individuals for whom they work. Social network providers could partner with outside social agencies to craft appropriate material to link to, and utilize this method of helping their end-users.



Figure 4 – Mock-up of a small text message offering educational material to users, after detection of a problematic message.

We agree that there is no guarantee that bullies will opt-in to clicking on educational material, nor that such educational material would have a significant effect on stopping bullying behavior. But there is evidence that some kinds of educational material are indeed effective against bullying. The opt-in would at

least give such material an opportunity to reach its intended target in a situation close to the time and place where effective action is possible. The results of our user study provide some evidence that enough participants found the links useful that make it plausible that the links would be clicked on, though this would remain to be verified in field tests.

We do cite evidence on the effectiveness of anti-bullying education programs (Ttofi, et al, 2008) that include educational material in the form of videos, school assembly presentations, and readings on the subject. It states, "Our meta-analysis showed that, overall, school-based anti-bullying programs are effective in reducing bullying and victimization. The results indicated that bullying and victimization were reduced by about 17–23% in experimental schools compared with control schools..." "The most important program elements that were associated with a decrease in victimization (i.e. being bullied) were videos..."

Educational materials created to support victims of bullying are often too general. And the actual support provided to victims usually happens long after the bullying event. Even more ambitious than a link to external content, we are building an interface strategy to provide short targeted video suggestions of what to do next, or how to respond. The detection algorithm could analyze the user's comments and situation, and then align it to preselected stories or educational materials representing similar issues.

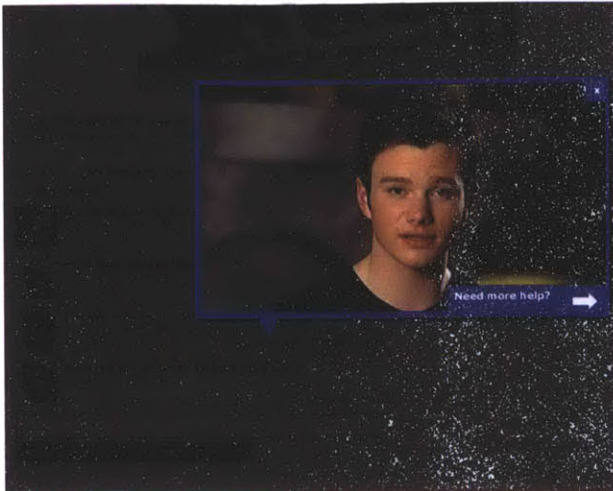


Figure 5 - Mock-up of an anti-bullying video from <http://www.itgestbetter.org> is presented, after the user clicks on a help message link.

The small text link is the first point of entry for the user. The interface is developed to include functionality similar to an expert help system (Ignizio, 1991) Designing an intelligent help system to best serve the end-user is complex and difficult, as discussed by Molich and Nielsen (1990). The text link initiates the end-user “reflection on action.” After the educational material is presented, the interface could ask the user whether or not the story provided was in fact a good match and if it was useful. If the user requests more help, suggested solutions and materials are provided in a tiered method. The help support system would record the user interactions, so that if the user requests more help in the future, the system knows it has provided assistance before, and would not treat the interaction as a new occurrence. By allowing the user to opt in or out at any stage of engagement, the support would become contextual, prescriptive, and desired, rather than overbearing and obstructive.

4.4 Fakebook Reflective Interface 1 Evaluation

The Reflective User Interface strategy of suggesting educational material, as discussed earlier in this chapter, was evaluated in a small user study, testing the

differences between dynamic in-context targeted advice in the user interface, targeted static advice in the user interface, and the typical “help” link user interaction found on most social networks. The study included five participants, consistent with the findings Nielsen (2000) suggests when conducting a user test. A fully functioning hypothetical social network, called Fakebook, was built as platform for testing both detection algorithms and user interface strategies. Fakebook was graphically styled and patterned after the popular social network Facebook, so that users would feel familiar with its interface.

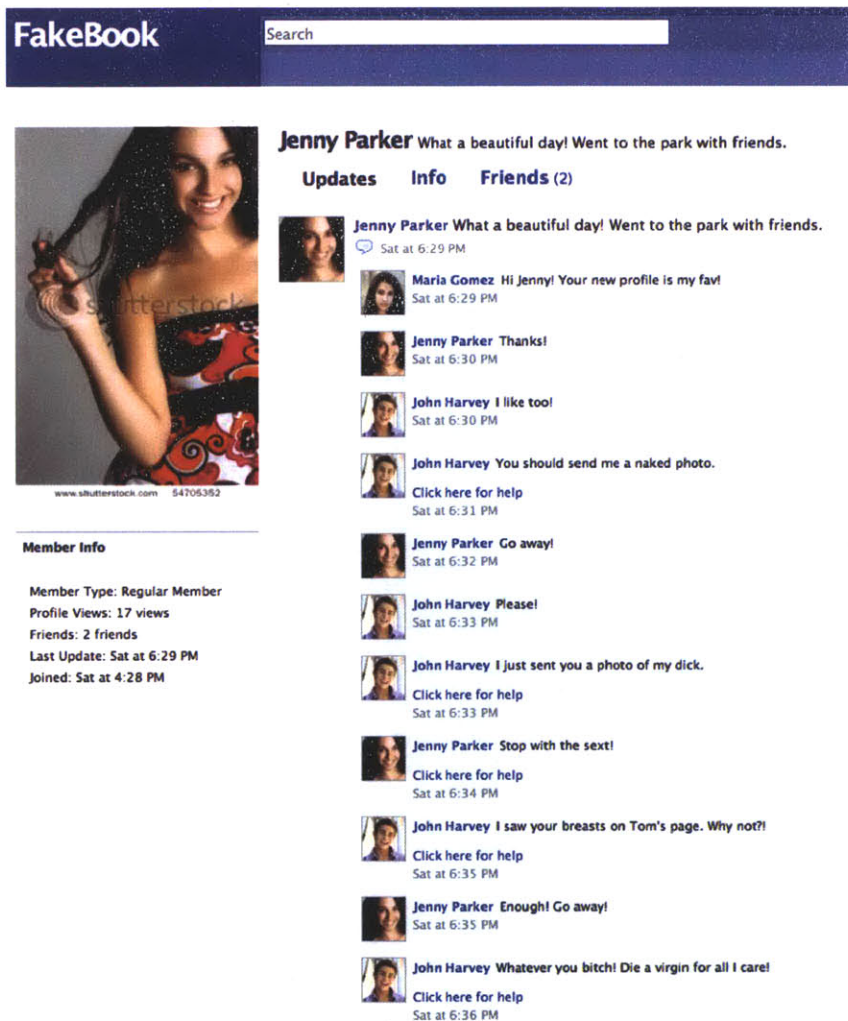


Figure 6 – Fakebook, the fully functioning social network built as a testing platform. The “Wall” interface is shown with in-context links to targeted help.

Prior to the user study, a mock conversation between three imaginary persons was staged to present a bullying interaction. While the dialogue was fictional, it modeled real messages found from research data provided by MTV's A Thin Line website. Using the detection classifier, each message was scanned for being a possible case of bullying.

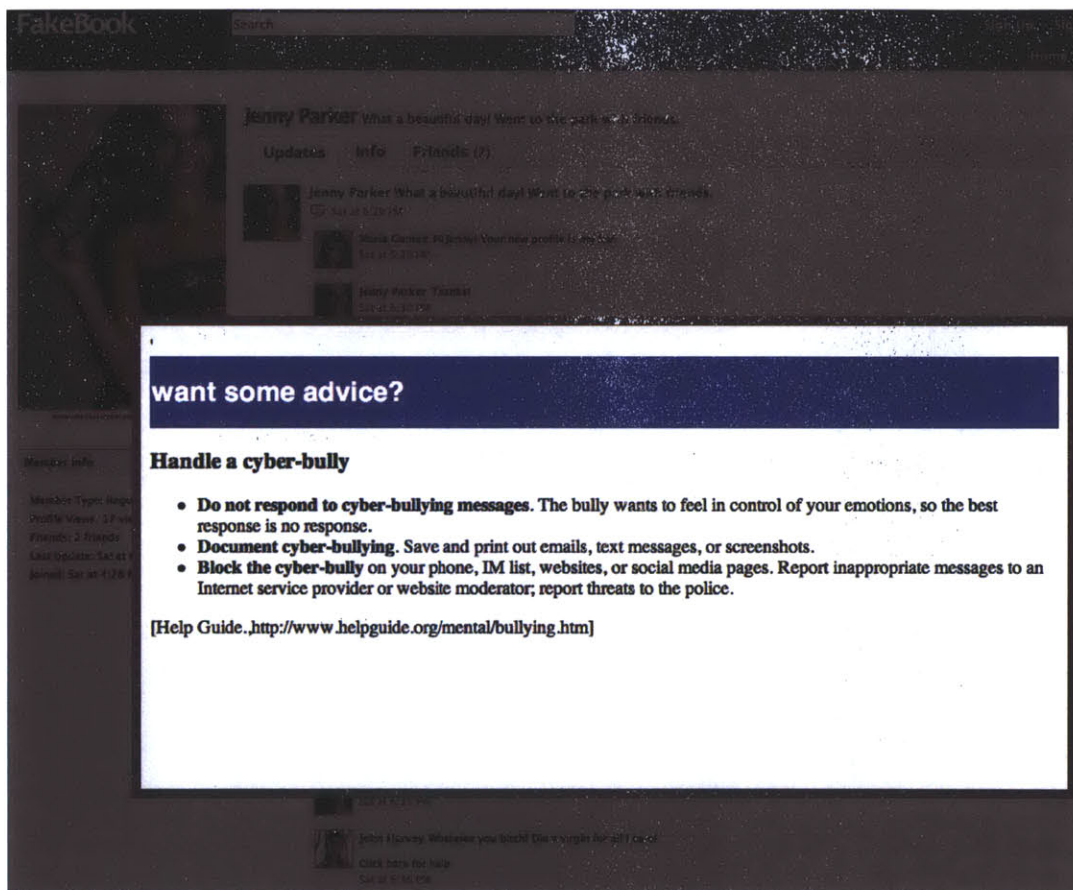


Figure 7 – After the end-user clicks on a link for more help, the Fakebook modal window displays in-context targeted help.

Three different versions of a “wall” (an interface that allows users to send and receive messages) (Facebook, 2011) conversation were created, each varying the type of advice offered by the user interface. In the first version, a small text link stating, “Click here for help,” was placed next to the messages positively identified by the classifier as being a candidate for bullying. Once clicked, the link

would bring up a modal window (pop-up window) containing a short paragraph of advice for coping with bullying situations. While the advice was hand-curated from a website (Kids Help, 2011) specializing in cyberbullying coping advice for both children and parents, it is dynamic displayed based on the detection algorithm's analysis of the bullying message. Jakob Nielsen's Ten Usability Heuristics (2011) provides a relevant guide for the modal window interface design decision. "Recognition rather than recall" suggests that, "the user should not have to remember information from one part of the dialogue to another." The interface presents the help advice in the same viewing area as the potentially negative interaction.

The second version of the interface looked exactly as the first, but the content of the "Click here for help" modal window consisted of a single web link to a website (Stop Cyber-bullying, 2011). The suggested website represents many similar websites that are listed in the help sections of many social networks. These links, while helpful, are often hard for end-users to find. And they are located on webpages separate from the user interaction space. The third version of the interface contained no targeted advice links. In every version, the standard "help" link was present. Clicking this link brought users to a page mirroring the current Facebook (2011) help page.

Basics

Trouble Using Facebook

Report Abuse or Policy Violations

Ads and Business Solutions

Safety Center

Community Forum

Report Abuse or Policy Violations

Report Abuse or Policy Violations

English (US) ⌵

Expand All · Share

Tools for Addressing Abuse

- Tools for addressing abuse
- How to report abuse
- Privacy settings
- Tools for reporters without accounts

Report Abuse or Policy Violations

- Impostor accounts
- Bullying
- Intellectual property infringements
- Unauthorized payments
- Advertising violations
- Pornography
- Scams, phishing and spam
- Violent, graphic or gory content
- Hate speech
- Promotion of "cutting," eating disorders or drug use

Secure a Compromised Account

- Hacked, scammed or phished accounts
- Best practices for account security

Surface Safety and Privacy Concerns

- Memorializing accounts of deceased friends or family
- Reporting underage accounts
- Helping someone who posts suicidal content
- Reporting convicted sex offenders

Get Help and Give Feedback

- Family Safety Center
- Post and answer questions in the Help Forum
- Report a bug if something isn't working

Figure 8 – Facebook’s help page.

For the user study, participants used the Fakebook social network, to take a survey. They were shown the three versions of the wall of Jenny, a fictional character, and her conversation with two persons, John and Maria. Participants were asked to read through the conversational thread imagining themselves as each of one of the characters, and then asked questions. The five participants were asked to click on each “*Click here for help*” link while reading through the conversation. Participants were told that Jenny was the victim, John was the bully, and Maria was a third-party bystander.

The survey used Likert scale questions, answering with Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, or Strongly Agree. Participants were asked the same three questions for each version of the wall interface. The first question was, “Imagine you are Jenny. Assuming Jenny is the victim, when I

clicked on the advice links I considered the advice helpful in the situation.” The second question, “Imagine you are John. Assuming John is the bully, when I clicked on the help links, I felt reflective about my behavior and how it might have affected Jenny.” And the third question, “Imagine you are Maria. Assuming the Maria is a bystander, when I clicked on the links, I reflected on how the messages might have affected Jenny.”

| | Interface 1: In-Context Dynamic Help | Interface 2: (Control) Static Help | Interface 3: No Interface Change |
|---------------|---|---|--|
| Motivations | Targeted help is more appropriate to the situation of the end-user. By providing the help in the same interface as the bullying interaction, the advice becomes actionable. | Static help provided to the end-user in the same interface as the bullying interaction, would have more perceived value to the end-user than no in-interface assistance at all. | This represents the standard social network interface. |
| User Protocol | Participants were asked to click help links. | Participants were asked to click help links. | Participants were asked to click the standard 'help' link. |

Table 2 – Table describing study protocol.

| Interface 1: In-Context Dynamic Targeted Help | | | | | |
|---|-------------------|----------|----------------------------|------------|----------------|
| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
| Imagine you are Jenny. Assuming Jenny is the victim, when I clicked on the advice links I considered the advice helpful in the situation. | 0% | 0% | 0% | 20% | 80% |
| Imagine you are John. Assuming John is the bully, when I clicked on the help links, I felt reflective about my | 0% | 20% | 0% | 40% | 40% |

| | | | | | |
|---|----|----|----|-----|------------|
| behavior and how it might have affected Jenny. | | | | | |
| Imagine you are Maria. Assuming the Maria is a bystander, when I clicked on the links, I reflected on how the messages might have affected Jenny. | 0% | 0% | 0% | 20% | 80% |

Table 3 – Table showing results for interface 1 using in-context, targeted dynamic help.

| Interface 2: (Control) Static Help | | | | | |
|---|-------------------|------------|----------------------------|-------|----------------|
| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
| Imagine you are Jenny. Assuming Jenny is the victim, when I clicked on the advice links I considered the advice helpful in the situation. | 0% | 40% | 40% | 20% | 0% |
| Imagine you are John. Assuming John is the bully, when I clicked on the help links, I felt reflective about my behavior and how it might have affected Jenny. | 20% | 60% | 20% | 0% | 0% |
| Imagine you are Maria. Assuming the Maria is a bystander, when I clicked on the links, I reflected on how the messages might have affected Jenny. | 0% | 80% | 20% | 0% | 0% |

Table 4 – Table showing results for interface 2 using static help.

| Interface 3: No Interface Changes | | | | | |
|--|-------------------|----------|----------------------------|-------|----------------|
| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
| Imagine you are Jenny. Assuming Jenny is the victim, when I clicked on the | 100% | 0% | 0% | 0% | 0% |

| | | | | | |
|---|------|----|----|----|----|
| advice links I considered the advice helpful in the situation. | | | | | |
| Imagine you are John. Assuming John is the bully, when I clicked on the help links, I felt reflective about my behavior and how it might have affected Jenny. | 100% | 0% | 0% | 0% | 0% |
| Imagine you are Maria. Assuming the Maria is a bystander, when I clicked on the links, I reflected on how the messages might have affected Jenny. | 100% | 0% | 0% | 0% | 0% |

Table 5 – Table showing results for interface 3, which contained no interface changes.

We were encouraged that participants overwhelmingly preferred the interface with targeted in-context advice, which concurs with our assertion that targeted help within the user interface at the point of the bullying interaction would be more helpful to the end-user, than the typical “help” link support provided by social networks. There are few, if any, social networks providing in-context dynamic support for cyberbullying. As a result there are few intervention models to employ in the manner we propose. An alternative Reflective Interface model providing static help within the user interaction, could serve as intermediate step towards providing end-users with support.

4.5 Fakebook Reflective Interface 2

An effective way of providing in-context education is through the sharing of stories. But for the stories to have a significant effect, the user must be able to identify with the character that plays their role in the story. A second reflective interface was implemented in the Fakebook context to retrieve stories relevant to the user’s experience, based on our analysis of the MTV story corpus. First, we describe the Fakebook implementation, which emphasizes retrieval of the stories indexed by the Fakebook post. Later, we report a redesign of the MTV site itself,

which uses a newly-entered story as an index for the story matching, together with features for qualifying the story and providing feedback to the matching.

4.6 Using Crowd-sourced Empathy

MTV's A Thin Line website is one of the best sites we encountered to address the cyberbullying problem. The web site encourages youth to share their stories of bullying, sexting, drug abuse, teen pregnancy, and other social issues. From the website,

"MTV's A Thin Line campaign was developed to empower you to identify, respond to, and stop the spread of digital abuse in your life and amongst your peers. The campaign is built on the understanding that there's a "thin line" between what may begin as a harmless joke and something that could end up having a serious impact on you or someone else." (MTV 2011)

Web site users have the ability to offer their opinions and thoughts on each story, and to rate whether they thought the story "Over the Line" of acceptability. With over 9,000 stories, the MTV's "crowd-sourced ethics" approach is great repository of teen opinions, values, and perspectives on many troubling social issues. Leveraging the power of our detection system, we have incorporated MTV's database into our interface design. A detailed discussion of the story-matching algorithm is provided in a companion paper (Dinakar & Jones, 2012).

"Recognition rather than recall" suggests that, "the user should not have to remember information from one part of the dialogue to another." The interface presents the original conversation and the matched story in two separate columns side by side on the screen.

You're not alone. Your drama sounds a lot like...

Romeo Pitt We're too cute! I love hanging out with you guys! :)
35 minutes ago - delete - like

Snookie DeVito Why are you hanging out with those sluts?
31 minutes ago - delete - like

Tybalt Sanchez Because he's a fagi it looks like an ad for "Always with Wings" ROTFLUJ!!!
4 minutes ago - delete - like

Juliet Roberts Fuck you! He's NOT gay! He's my date for prom!
2 minutes ago - delete - like

Anonymous // Male, 14

One of my friends posted a close-up picture of me backstage at a school play and someone decided to post a nasty comment calling me "gay" and "a fag". Most of my friends stood up for me, but in truth that didn't help. Telling me made it worse.

OTHERS RATE IT:

| | |
|-------|-----|
| OVER | 80% |
| ON | 13% |
| UNDER | 7% |

Is this story similar? YES NO

Read the next story. →

Figure 9. Screen shot of Reflective User Interface Showing Story-Matched Content

In Don Norman's (2011) commentary on the differences between Human Centered Design (HCD) and Activity Centered Design (ACD) he makes a case for designing informational messages to "offer alternative ways of proceeding from the message itself." In the design of the Reflective Interface, presenting a story in the same physical screen space as their text conversation, offers the user an opportunity for comparison and reflection, as seen in Figure 12. The user may see that they are not alone in being a victim. Conversely, a user might also observe how their behavior might be perceived as being "bully-like."

Teens are often highly influenced by their peer group. While not every person will adhere to such behavior, it is believed that the peer pressure generated by interface change will support situations that could be influenced. The hope is that users will "self-adjust" and act in ways that are exemplary of healthy discourse. In some scenarios, it is hoped that users might take the matched story as a call to action, and intervene or defuse the negative situation. The MTV-AP 2011 Research Study (2011) found that "With enhanced media attention and education focused on cyberbullying the last year, young adults are increasingly likely to intervene in digital abuse. The study shows they are more likely to intervene if they see someone being mean online than they were in 2009 (56% in 2011 versus 47% in 2009) and a majority say they would intervene if they saw someone using discriminatory language on social networking sites (51%)."

Each MTV stories has a percentage rating as being over, on, or below general peer acceptability. The user may introspectively associate their situation with the same rating. The stories also have peer-related comments and suggestions for coping with these kinds of situations, which may also be applicable to the user's situation.

After viewing the matched story, users are presented choices as to what they can do next. These include: do nothing, block problem users, get tips on how to respond, flag the thread or message to the network provider, and get more help. If the user decides to flag the message, the analogous story is tagged for the network provider to view. Flagging in this way allows the user to express themselves more creatively by stating that their situation is similar to the story. For the network provider or moderator, extra context will greatly help making a decision on how to respond, or prioritize. This feature is described in more detail later in this thesis in Chapter 6: TimeOut.

Molich and Nielsen (1990) discussed the difficulty of designing intelligent help systems, and the complexity of simple human-computer dialogue, which Reflective Interfaces attempts to address. The small text link is placed next the problem message and serves as a trigger for initiating the story reflection. The matched story is displayed in an eye-catching talk bubble, which serves as its own self-contained interface object. As an object, this makes the interaction space modular, and ready for reuse in other parts of the application. Also, the user interacts with the system in a confined space with the hope to encourage Schön's double loop learning, a mental separation of interaction and learning by the end-user.

After the story is presented, the system asks the user is asked whether or not the story provided was in fact a good match and if it was useful. If the user requests more help, suggested solutions and materials are provided in a tiered method. The support system will record the user interactions, so that if the user requests

more help in the future, the system knows it has provided assistance before, and would not treat the interaction as a new occurrence. By allowing the user to opt in or out at any stage of engagement, the support can become contextual, prescriptive, and desired, rather than overbearing and obstructive.

The story-matching algorithm also provides a way to index curated support especially tailored for the given situation. When the user requests additional help, theme specific educational materials are presented. Since the stories already have been grouped into themes, educational materials and advice based on these themes are easily accessible at the time of interaction. Third-party intervention would be both in-context and at the place of interaction.

4.7 Fakebook Reflective Interface 2 with Story Matching Evaluation

To evaluate the effectiveness of the Reflective User Interface using story matching, a brief user study was conducted. Subjects were asked individually to imagine that they felt that they had been bullied or abused when engaging in a text-based conversation on a social network. They were first presented with an image that represented their fictitious conversation on a social network. The next image displayed represented a screen shot of the typical Facebook Help page. The next image displayed was a screen shot of the original text conversation and a story from the MTV database matching the conversation. After viewing the image, subjects clicked the image to advance to the final screen, a set of two questions.

The first question was, "Which of the two interfaces do you feel would most likely encourage you to reflect on your situation?" 100% of respondents answered with the Reflective User Interface containing the MTV story. The second question:

“Which of the two interfaces would you most likely trust to receive help that you could actually use?” 70% of subjects choose the Reflective interface.

We were encouraged that the users unanimously concurred with our original aim to provide material that caused them to reflect on their behavior and their options. We attribute the difference between the two scores to a number of factors. First, the static Facebook page provided external links to a number of general Web sources on the Bullying topic, and it is likely the users felt that these sources, which did not appear with the MTV story, were helpful. Second, the users may have valued the authority of Facebook as a trusted source rather than the user-contributed material from the MTV site. Finally, we take the difference between the two scores as indicating there remains significant room for improvement in our interface. But we were encouraged by the majority opinion that preferred our interface as most helpful.

5 MTV Over the Line Remix

Earlier in the thesis, we described the use of story data from the MTV website A Thin Line in our social network Fakebook. We are collaborating with MTV to incorporate Reflective Interfaces and theme-based story matching algorithms (Dinakar & Jones, 2012) into their website to help their users share and find similar experiences among their peers. We are working with the MTV staff on a large-scale public deployment of this interface, which will take place in the next few months. It will involve data collection as described below, which will help verify our results obtained in the lab study.

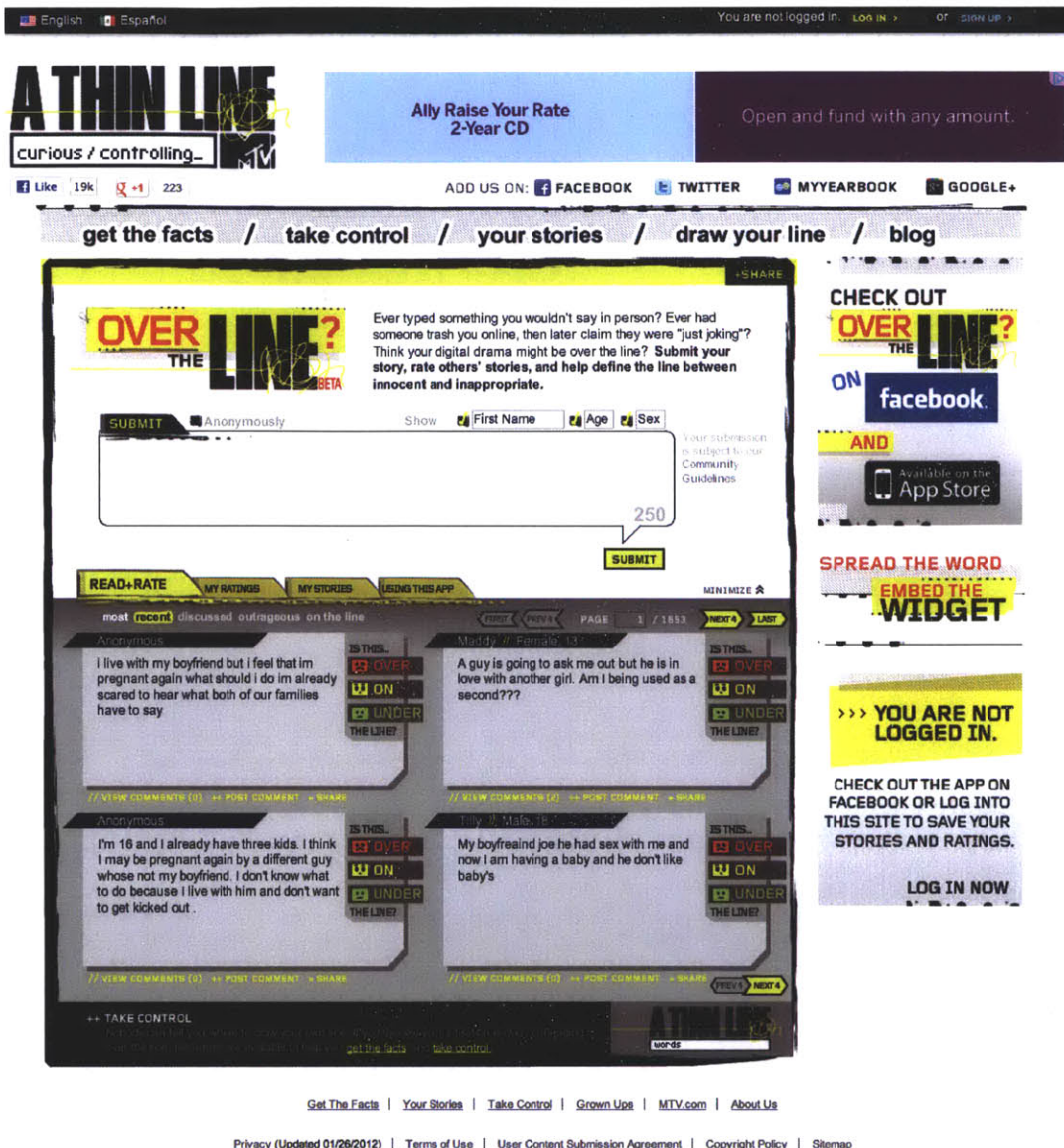


Figure 10. Screen shot of the original MTV Over the Line interface

Teens come to the MTV website with a problem or situation they wish to share, with hopes of finding comfort from the community. Currently, users must wait, an indeterminate amount of time, for their story to get approved by the MTV moderators, before being publically viewable on the site, and available for rating and comments by their peers. If the user did not create a personal account on the MTV website, then there is no way to track their submitted story. Even if the

community gives feedback, there's no way for the user to know, unless they were fortunate enough to find their story among the thousands in the database.

Dan Saffer (2009), in his book "Designing for Interaction" discusses different application interaction postures. The Reflective Interface designed for A Thin Line might be considered a combination of three interaction postures -- *sovereign*, which monopolizes the users' attention for long periods of time; *transient* – which provides a limited set of functionality to the user; and *daemoniac posture*, which are applications running in the background silently on behalf of the user. The Reflective Interface also pays homage to Schön's (1983) idea of the Reflective Practitioner. Though an idea born before the Internet age, the Practitioner constantly reflects on their own behavior to better re-align themselves with their intended goals. Here the goal of the website is to provide respite and assistance for those teens dealing with digital distress. The Reflective Interface uses submissive, passive language so that neither the system algorithm nor the interface will appear to be judgmental of the user. The interface also links generalized help and support to the user in the context of their action.

With our redesign, after the user enters their story, the Reflective Interface uses theme-based story matching to return a similar story. The feedback for the user is immediate, even though their story has not been made public, the interface uses the story-matching algorithm to help the user guesstimate their peers review. The user can then reflect on whether or not they feel the same as the other person in the matched story. The user may offer feedback to the story-matching algorithm to say whether or not the presented story did actually match their situation. They can see how the matched story was rated, read the matched story comments, and they can be presented targeted help based on the kind of story theirs matches to. It is our hope that the user will reflect on their situation, take advantage of other people's experiences, and understand why targeted help is being presented to them. All of these actions will lead the user reflecting on their long-term behavior within the interface.

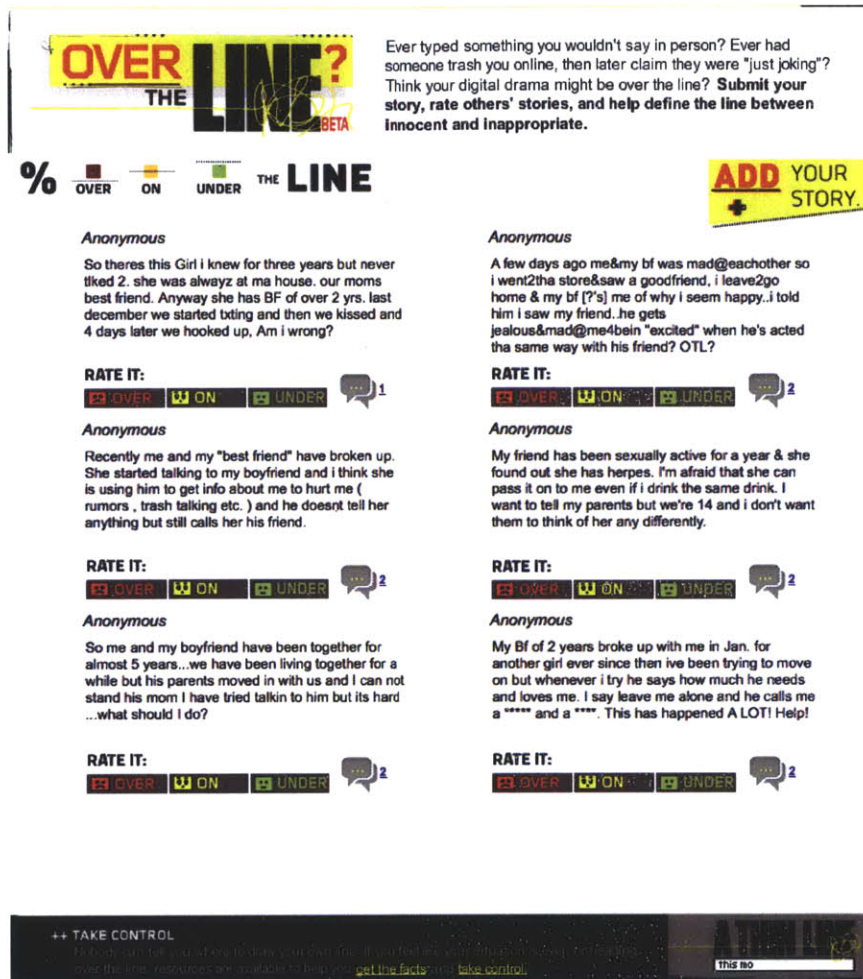


Figure 11. Screen shot of new homepage Reflective Interface of Over the Line (OTL)

5.1 Setting the Mood

Schön (1983) alludes, “The Practioner must first be ready to reflect.” We began with the assumption that users were already prepared for receiving feedback for sharing their story or their curiosity to read others’. Unlike the Fakebook

Reflective Interface, which was more reticent to interrupt the social sharing experience, we devised a process for inducing reflection into the A Thin Line interface.

Beginning with the homepage (see Figure 14), we wanted the entire focus of the Reflective Interface on the user submitted stories. We created a sparse interface that focused primarily on content, not functionality. For the purposes of our project, we also excluded all ad banners, menus, and extraneous interface objects. Only six stories are placed on screen, leaving out the interface for contributing comments, from the original design. At the top left corner, we included a key to help the user recognize the story ratings. At the top right, we included a button to allow the user to contribute their story. Only six stories are presented on the webpage at a time. Underneath the story text, there is the standard over-or-under rating button, along with a comment icon and the number of comments associated with that story. The user on this page may simply read the stories and rate them.

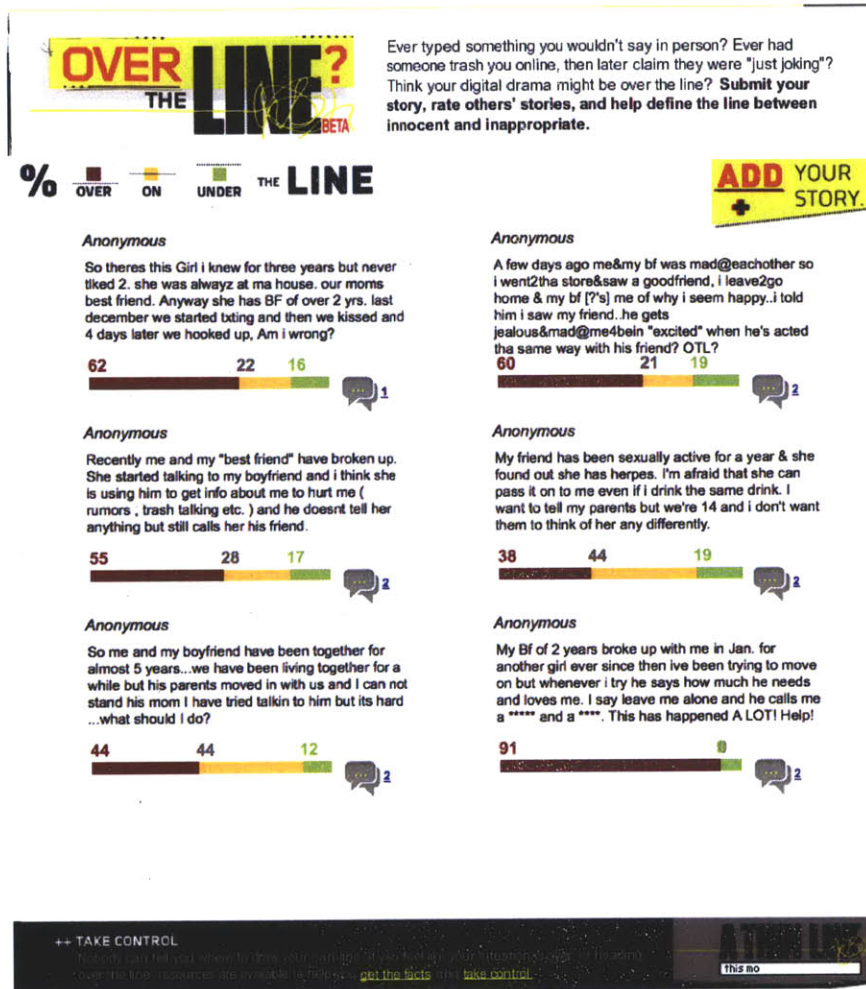


Figure 12. Screen shot of new alternative homepage Reflective Interface of OTL

Often times, users do not know what to expect from an unfamiliar interface and application. Norman (1986) referred to this as the "gulf of evaluation". We designed the interface to encourage the user to contribute their story. To accomplish this, the ratings of the stories are also displayed graphically. This layout gives the user a better understanding of what happens after the end of the submission process. By allowing the user to see an example result of a submitted story, we believe it will help the user to know what to expect from adding their story, and the user may assume that they have the possibility of receiving feedback.

[Sharing Their Experience]

OVER THE LINE?
THE LINE BETA

Ever typed something you wouldn't say in person? Ever had someone trash you online, then later claim they were "just joking"? Think your digital drama might be over the line? **Submit your story, rate others' stories, and help define the line between innocent and inappropriate.**

Share Your Experience

I have been with my boyfriend almost a year he says he loves me and I love him I'm only 17 he's 17 as well but he wants to have sex ... But Idk what should I do ? I do love him but I'm afraid I'll get caught :/ my parents are strict ..

15

SHARE!

++ TAKE CONTROL
get the facts take control.
this mo

Figure 13. Screen shot of OTL Reflective Interface showing user input

Similar to an open living space, open, clutter-free interfaces lessen the cognitive load for the user. (Norman, 1983) We again focus the interface on a few single functions/tasks. Removing any visual barriers or distractions, the user is free to focus on sharing their experience. For teens in distress, often the act of sharing is beneficial release towards overcoming their issues. (Olweus, 1993) For the user input story page, the entire focus of the interface is the story itself. Above the input text box, the title "Share your experience" is displayed. The font of the input text box has a very large size. Helping to focus the user's story into a concise representation of experience, a number representing how many

characters the user has left to type is displayed just below the text input area. As noted by Caroline Jarrett and Gerry Gaffney (2008) in their book *Forms That Work: Designing Web Forms for Usability*, it is important to have a dialogue with the user, so the submit button is changed to “Share!” to best represent the action that the user is about to engage in.

5.2 Getting the User to Qualify

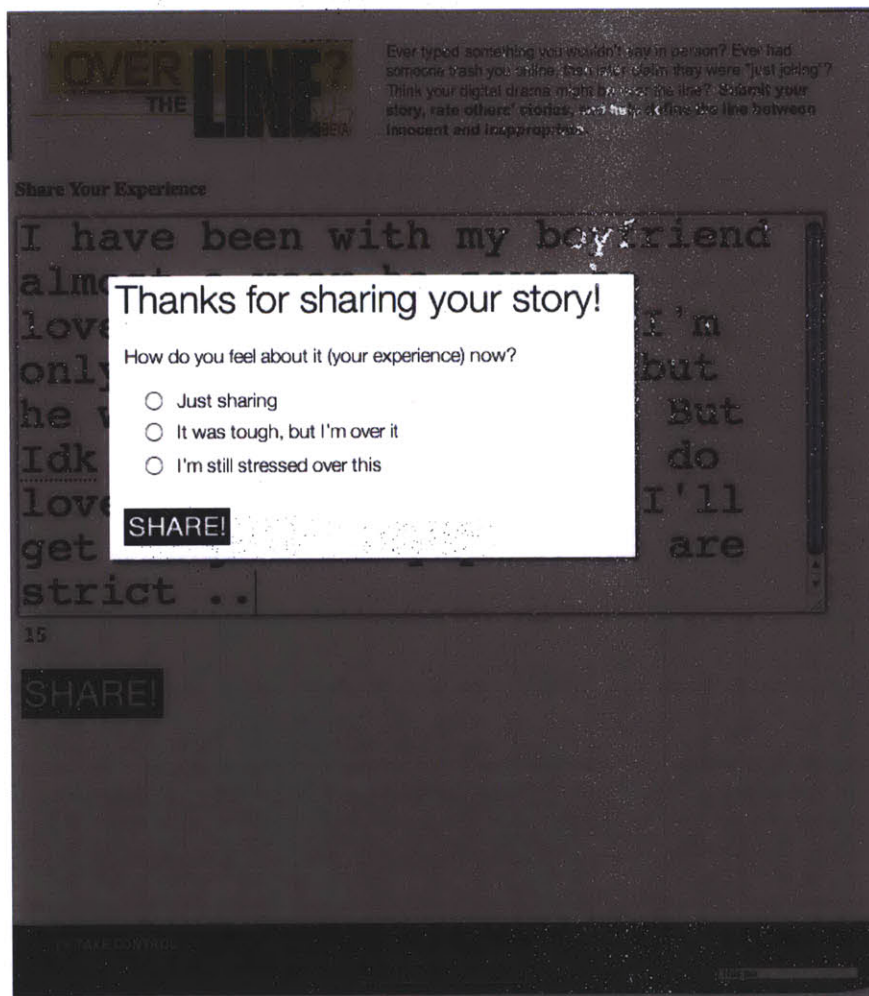


Figure 14. Screen shot of MTV OTL Reflective Interface showing user input

Applications such as recommendation systems sometimes try to create user-centered context by using location-aware services. For example, if a person is standing near a café, a mobile app like Yelp might suggest a coupon for a cup of coffee, based on the GPS location of the user's phone. In cases like this, it is reasonable to assume that the user's location is *indicative* of whether they would find the coupon useful, but in the absence of any feedback from the user, the application has no way of knowing whether *in fact* the user found the coupon helpful or an intrusion. Therefore, it is helpful for heuristics like we are using for story matching to *qualify* their guesses about the appropriate context.

Schön (1983) also said reflective practice is "the capacity to reflect on action so as to engage in a process of continuous learning." After the user clicks "Share," the user is asked to qualify their experience. Instead of bringing the user to a new page the modal window is used. Modal windows in general can be supportive of Reflective Interfaces, as they offer and solicit information from the user without overburdening them with too many interface choices embedded in menus.

The text "Thanks for sharing your story, how do you feel about your experience now?" is displayed. User can choose between, "just sharing," "it was tough but I'm over it," "I'm still stressed over this." Then the user may press the share button again. The "still stressed" choice indicates those in greatest need of help. The "over it" choice indicates a real problem existed, but removes it from the level of a crisis situation. That and the "just sharing" choice both avoid labeling the author or forcing them to self-identify as a victim or troubled person, while still welcoming their participation in sharing the story.

The user may find more utility with the matched story provided by the algorithm if it also matches their circumstances. In our research we found a number of user stories that were more "color commentary" than actual experiences.

Anonymous

I don't have any story to tell or anything. After reading a few posts, there's this one topic that i find ridiculous and stupid. Here's what i have to say, **DO NOT SEND NAKED PICTURES OF YOURSELF** if you don't wat to be called **FLIRT**. Geez!



Figure 15. Screen shot of MTV OTL Reflective Interface showing user input

Qualifying the user's input prior to submission will help moderators in curating the stories site-wide, and may also be used to help associate appropriate help links and banners. It can also be used as feedback to the story-matching algorithm.

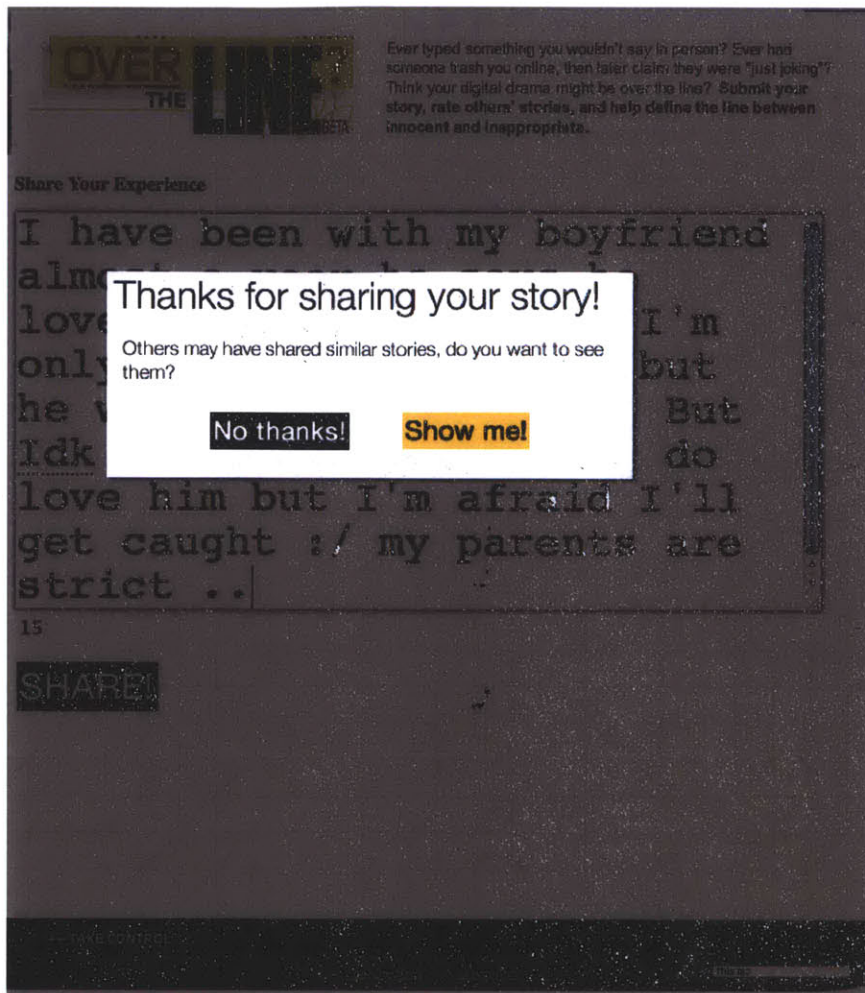


Figure 16. Screen shot of MTV OTL Reflective Interface showing user input

Since the success of the A Thin Line website is due to the number of user submitted stories, every new experience adds more richness to the site. We felt it important to appreciate the user's bravery for sharing. After submitting the story, and qualifying, the user is presented with another modal window. The modal window states "Thanks for sharing your story! Others may have shared similar stories, do you want to see them?" The user may choose between "no thanks" or "show me." If the user does not wish to see a matched story they are returned to the homepage of the website. This modal window helps determine how much engagement a user wants to have.

[System's First Response]

OVER THE LINE?
THE LINE BETA

Ever typed something you wouldn't say in person? Ever had someone trash you online, then later claim they were "just joking"? Think your digital drama might be over the line? **Submit your story, rate others' stories, and help define the line between innocent and inappropriate.**

% **OVER** **ON** **UNDER** THE LINE

YOUR STORY: " I have been with my boyfriend almost a year he says he loves me and I love him I'm only 17 he's 17 as well but he wants to have sex ... But Idk what should I do ? I do love him but I'm afraid I'll get caught :/ my parents are strict .. "

IT'S POSSIBLE: " The community might think you're going through some serious drama. " **OVER**

[Learn why?](#)
[Get some help.](#)

GENERAL ADVICE

PROBLEMS WITH A SIGNIFICANT OTHER?

National Dating Abuse Helpline
1-866-331-9474

National Teen Dating Abuse Helpline Service
Live Chat by LovePerson

DIGITAL DRAMA MORE THAN YOU CAN HANDLE?

Have questions about sex or relationships?
Get answers at www.itsyoursexlife.com

National Suicide Prevention Lifeline
1-800-273-TALK

++ TAKE CONTROL
get the facts take control
this is

Figure 17. Screen shot of MTV OTL Reflective Interface showing user input

Norman (1986) states that poorly designed software often makes user feel stupid. We attempted to build the interface to create trust and respect between user and the interface. The algorithm must appear non-judgmental. Having the user to understand how the algorithm is responding to their input is paramount to ensuring a positive user experience. After the user submits a story, the system gives the user some initial feedback. The user's original story is displayed on one side of the interface. Underneath it, a graphic stating, "It's possible" next to a predesigned quote stating that "the community might think: you're going through

some serious drama.” Next to it, an icon representing whether or not the story was over, on, or under the line. Beneath it, too, links are displayed "learn why" and get some help. We believe that staggering the system feedback it will give the user time to reflect on the response the system will present in the next interaction. The user's story is displayed help reinforce the reflection on what they wrote. The word choice of "its possible" is used to not condemn or judge the user. It also supports Lieberman's (2004) idea of fail-soft AI interfaces. If the system is wrong in how it computes the user story, the user will not be able to immediately declare it, slowing down the user's rush to judge the system.

The rating given is based on the first matched story. "Learn why" is linked to the matched story. "Get some help," takes the user to a designated help screen. At the bottom of the screen, "General Advice," refers to banners that are presented based on the topics analyzed and matched by the algorithm. Generalized help is provided on the screen to give the user an opportunity to choose to receive help, and this help is provided in context and in the same interaction space, rather than simply another section on the website.

5.3 Hey! You May Not Be Alone.

OVER THE LINE?
THE LINE BETA

Ever typed something you wouldn't say in person? Ever had someone trash you online, then later claim they were "just joking"? Think your digital drama might be over the line? **Submit your story, rate others' stories, and help define the line between innocent and inappropriate.**

% OVER ON UNDER THE LINE

“ I have been with my boyfriend almost a year he says he loves me and I love him I'm only 17 he's 17 as well but he wants to have sex ... But Idk what should I do ? I do love him but I'm afraid I'll get caught :/ my parents are strict .. ”

[Get Help!](#)

SOUNDS SIMILAR

Anonymous
im dating this guy & i love him so much but he has cheated and is so controlling, my friends tell me i should leave him and most of my famil dont like him, i love him so much but dont know what to do i need help!:(

90 55 0

did it match? 😊 😐 😞

GENERAL ADVICE

PROBLEMS WITH A SIGNIFICANT OTHER?

National Dating Abuse Helpline
1-866-331-9474

National Teen Dating Abuse IM Service
Live Chat by LivePerson

Have questions about sex or relationships?
Get answers at www.itsyoursexlife.com

DIGITAL DRAMA MORE THAN YOU CAN HANDLE?

National Suicide Prevention Lifeline
1-800-273-TALK

++ TAKE CONTROL

get the facts take control THIS IS

Figure 18. Screen shot of MTV OTL Reflective Interface showing user input

We create a mental “A/B” comparison model for the user. While the system has matched the user’s story to potentially many stories from the database, only one story is presented to the user at a time. During our discussions with the MTV staff about our design process, one of the staff members commented, “I think I’d rather have all the matched stories presented at the same time. When I’m shopping for shoes, I usually hit “see all” so I can see all my choices very quickly scan through them.” Commerce-style interfaces will in variably produce,

commerce-style behavior, which is anti-reflective. Their comment exemplifies the problems of changing a well-established design paradigm in industry. Reflective Interfaces induce user reflection, which by e-commerce standards is “slower” in user interaction.

When the system displays the matched story, the user’s story is displayed to help compare with the algorithm’s match. More white space than normal is used to help the user focus. The matched story is shown to the right of the user story, inside a box, underneath the title “Sounds similar.” The box focuses the user on the matched story as an object, containing the matched story, including the story text, the ratings for the matched story (shown in a bar for quick visual assessment), and an icon representing the presence of comments, and the number of comments associated with the story. The link for “get help” takes the user to the website’s traditional designated help section. And again on this page, general advice banners are presented based on the topics analyzed in the matched story.

5.4 How Did I Do?

The interface also provides a way of letting the user give feedback to the system. This will help the algorithm in the future. The questions presented to the user are displayed in the exact same place each time, to help speed up interaction of answering questions, without the user being overburdened or feeling like they’re taking a survey. Similar to Schön’s reflection on action, having the user provide feedback also helps the user to reflect on whether or not their interaction with the system is supporting their needs.

By utilizing smileys, which are more universal than text copy, and useful in rating systems on a Likert scale, the user may easily comment on whether or not the algorithm’s choice story matched theirs. Once a user enters whether or not the

story matched, “Did it match?” is replaced by “Did it help?” Next, the user is given a choice to see another similar story.

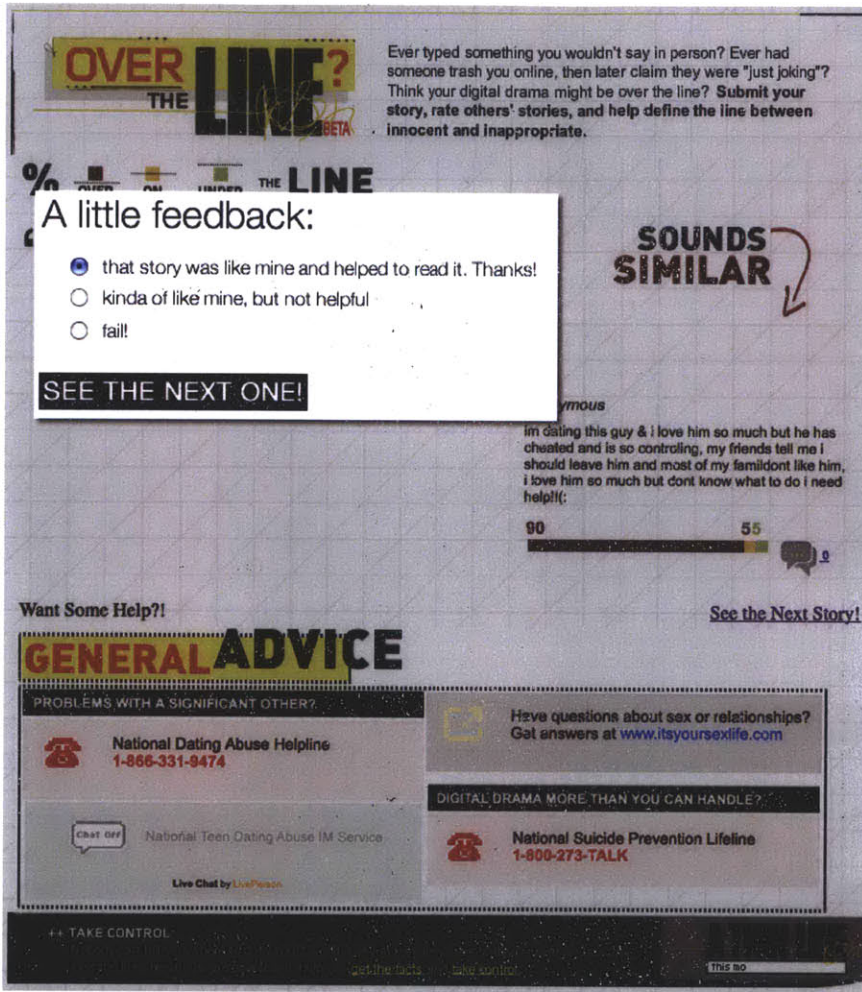


Figure 19. Screen shot of MTV OTL Reflective Interface showing user input

As an alternative to the use of smileys, a modal window is used to provide user feedback via text copy. The modal window states: “A little feedback: that story was like mine and it helped to read it. Thanks!” “Kind of like mine, but not helpful.” “Fail.” Again, this is a qualification step, distinguishing between the pure performances of the algorithm in matching, from the user’s contextual judgment about whether the story was helpful to them in their particular situation. Following the choices, there is a button that states, “See the next one!” referring to the next matched story.

5.5 Next Steps with MTV

All of work on the A Thin Line redesign is being deployed on their real website. Though not shown, MTV requested that we create a few extra interface objects to allow users to simply browse through stories, linking to matched stories in a similar manner without sharing their own. We also followed in the design of original site to allow users to share the stories they've read or written with their friends via social network sites, like Facebook, Twitter, and Google +.

5.5.1 Evaluation of the MTV OTL Remix

MTV, with our guidance, will conduct a large-scale comparative user study involving the "A Thin Line" Reflective Interface and the original MTV interface, analyzing the differences between providing story-matched content and in-context help, and the standard help menu selection interaction currently used in the MTV site. We expect the test to run for a period of several weeks.

5.5.1.1 User Study Goals

Our comparative user study will answer the question: Do Reflective Interfaces succeed in providing assistance to teens in distress seeking online help and support? The goal is to see:

- If users rate the stories as matching well,
- If users find story-matching helpful in not feeling alone in their experience,
- If users find the in-context generalized help useful,
- If users find the story-matching adding to the enjoyment of the overall website experience,

- Comparatively, how much do users share their experiences with others using the social media functions of the website.

Quantitative measures include:

- Number of stories viewed by each user,
- Time spend per-story, and total time spent on the site,
- For users with accounts, number of repeated visits,
- Number of stories shared, and length of story,
- Number of stories rated,
- Number of external help links clicked

5.5.1.2 Participants

MTV will facilitate the choosing of participants, by randomly assigning users entering the website. Users will either see the original website or they will see the newly redesigned one incorporating our work.

From the success of our small user studies, we are excited to observe similar results from a large-scale real world deployment. When we obtain the results of MTV's use of Reflective Interfaces and Computational Empathy algorithms, we plan to publish them in appropriate journals and conference papers.

6 TimeOut

6.1 Social Network Provider Strategies

For the network moderator, a dashboard interface to display high-level network-wide overviews of aggregated user behavior, quickly identify problematic messages, and expedite actionable communications is in development.

The primary concern of social network providers and group moderators is to provide a safe and welcoming environment for their community. It is not necessary to detect or control every single incident of bullying that occurs. Most important is to prevent an initially trivial incident from escalating or spreading within a community, and to prevent negative behavior from becoming the social norm. An important part of maintaining quality social networks would include giving moderators an aggregate view of the behavior of their end-users. Patterns of escalation or spreading of bullying caught early give moderators opportunities to intervene before serious problems arise.

6.1.1 Flagging of messages

Many social networks allow end-users to *flag* messages as inappropriate. Human moderators, who use their judgment to decide whether action is warranted, often review such flagged messages. Automated detection algorithms can contribute to this flagging process by suggesting to a participant that a message might need to be flagged. It can also help by prioritizing a list of flagged messages for review by

the human moderator. This prioritization is essential, because the volume of flagged messages in large-scale social networked can overwhelm moderators.

Flagged comments may be displayed in various ways. The comment may be visibly marked or hidden to the public, hidden to particular end-users, or available for viewing to only the receiver and sender of the comment. The moderator could also hold a flagged comment for review, and send it only after approval.

6.1.2 Visualization of Online Bullying

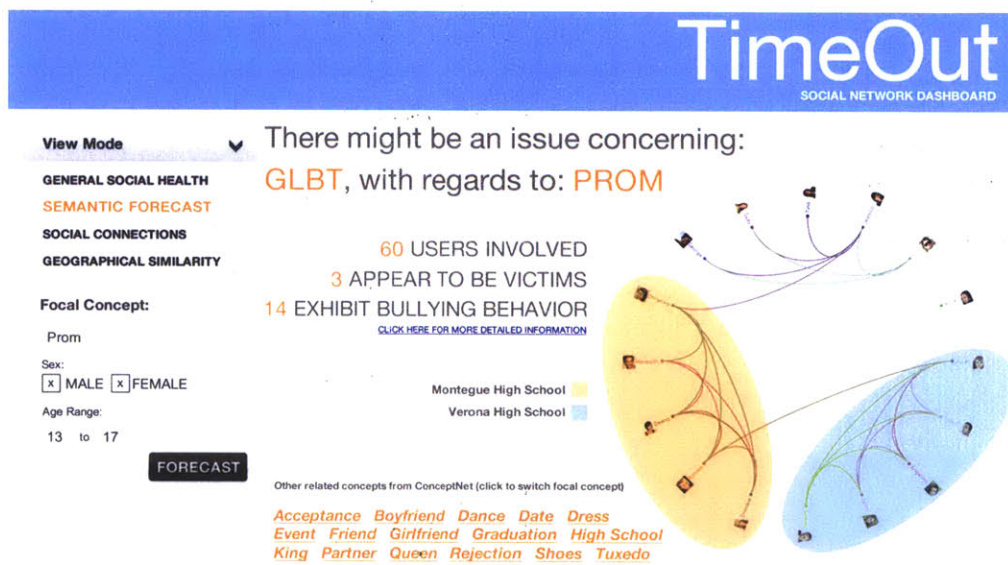


Figure 20 – Mock-up of social network dashboard displaying the community visualization environment.

One view of the dashboard could serve some of the same functions as back channels (McNely, 2009) in calling attention to possibly problematic situations. A social network using a detection algorithm may not want to make any changes to the end-user interface until after understanding the scope and domains of their end-users' negative behavior.

The dashboard would have many display views to reflect key semantic terms, social clusters, events, and basic demographics derived from the network social

graph. It could also display the actual flagged messages related to the semantic terms, prioritized in order of seriousness by the detection algorithm. Providers could use the dashboard to help their moderators get an overview of their supervised space on the network.

Problems in the real world are often reflected in the digital. As a courtesy service, the social network provider could also provide third parties, such as police and school administrators/staff a version of the dashboard using sanitized (anonymous) user names. In this scenario, a school administrator would be able to see an overview of the digital behavior of their school's student population. For example, without giving actual screen names, and real conversations, the school could find out that there are problems such as gay bashing during the weeks leading up to the prom. This information could be vital in scheduling appropriate real world intervention strategies at the school.

Due to the public's growing hypersensitivity of cyberbullying, sometimes one publicized incident can over-represent the severity of problems in a social network. (Collier, 2011) A public version of the dashboard could provide transparency and a more balanced overview about the network's problems, based on objective data.

7 Related Work

This section presents the related work to Reflective Interfaces addressing teen distress online in different research areas, including the use of algorithmic detection, and attempts at software solutions, and user interface design patterns.

7.1 Algorithmic Detection

Apart from spam filters, applications that are of a similar nature to this work are in automatic email spam detection and automated ways of detecting fraud and vandalism in Wikipedia (Chin, et al, 2010). Dinakar's thesis (2012) clearly exemplifies a novel approach to detection of teen distress, which is utilized by Reflective Interfaces.

7.2 Software Solutions

Websites like stopbullying.gov (2012) provide both advocacy and research, for those seeking resources to address the problems of cyberbullying. Though none of the help is embedded in the place of interaction – on the social network software, it could be assumed that the main audience for the website are adults.

As stated extensively earlier in the thesis, MTV's A Thin Line (2012) website is one of the best at engaging teens in the conversation around the issues of digital distress.

Very few applications have attempted to address the Bullying problem directly with software-based solutions.

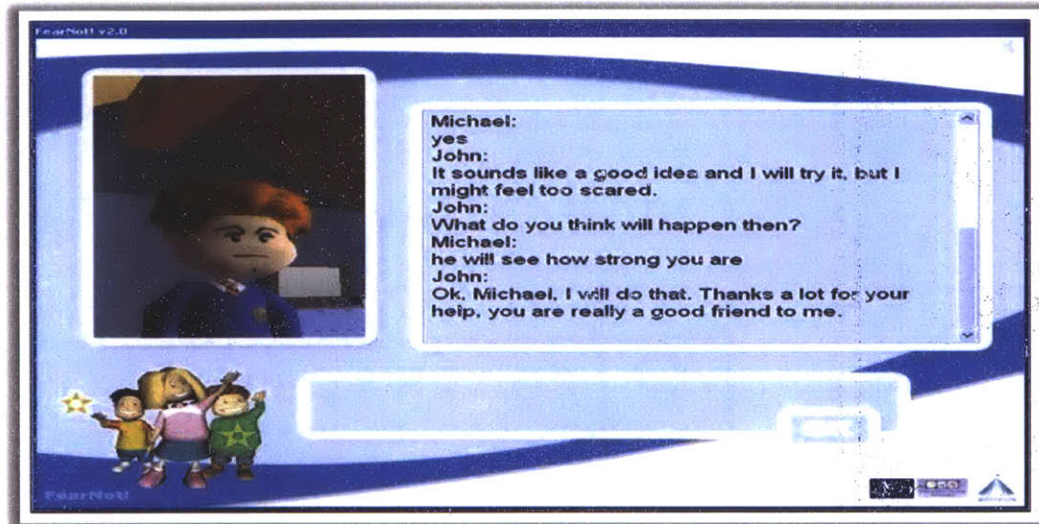


Figure 21. Screen shot of FearNot!

The FearNot project (Vala, et al, 2007) has explored the use of virtual learning environments to teach 8-12 year old children coping strategies for bullying based on synthetic characters. This uses interactive storytelling with animated on-screen characters, where the user gets to play one of the participants in the bullying scenario. The user may select any one of a number of response strategies to a bullying challenge, e.g. fight back, run away, tell a teacher, etc. Though it provides the user with participatory education about the situations, the situations are artificially constructed. They are not part of the users' real lives, as the learning does not happen actually in the social network the children will use. It does not make any attempt to analyze or intervene in naturally occurring situations where serious injury might be imminent and might be prevented.

7.3 User Interface Design

User-Centered Design (UCD) is a comprehensive and structured design philosophy and methodology for balancing the needs of the end-user and the objectives of a given product (website, application, device, etc.). The UCD process supports the construction of Reflective Interfaces, as it focuses on usability goals.

Rubin describes usability objectives as:

- Usefulness - product enables user to achieve their goals - the tasks that it was designed to carry out and/or wants needs of user.
- Effectiveness (ease of use) - quantitatively measured by speed of performance or error rate and is tied to a percentage of users.
- Learnability - user's ability to operate the system to some defined level of competence after some predetermined period of training. Also, refers to ability for infrequent users to relearn the system.
- Attitude (likeability) - user's perceptions, feelings and opinions of the product, usually captured through both written and oral communication.
(WC3, 2008)

Reflective Interfaces adds “user reflection” to the list of usability objectives, empowering the end-user the capacity to self-correct through the interface, with or without machine intelligence. Just as designers iterate different interface objectives, end-users may do the same from their perspective. Building reflection into usability ensures end-users are self-empowered to adapt to changes in their own interaction goals.

8 Conclusion and Future Work

We have presented Reflective Interfaces, a novel approach to user experience design that promotes positive behavioral norms. We discussed the strategic, psychological, social, and analytic dimensions of Reflective Interfaces, and how they support both individual end-users and the groups they participate in. We explore the design of several Reflective Interfaces for helping teens in distress over social network interactions. These included:

- Fakebook, two interfaces - each with a small user study, representing just-in-time and just-in-place help;
- collaborated project with MTV on their site, A Thin Line, which finds stories analogous to a users' particular situation and helps reduce feelings of isolation;
- TimeOut, a dashboard for social network providers that alerts them to situations where outbreaks of bullying escalate in a community.

Future work (Jones, 2012) will focus on exploring new application spaces such as constructive feedback, promotion of introspective end-user self-learning, and working with visiting Harvard Law School Professor and Professor of Urban and Environment Planning at MIT Dr. Lawrence Susskind (2012) on digital conflict resolution. We are also working to extend the functionality of TimeOut, and continue our collaboration with social network provider Formspring, to test and deploy the Reflective Dashboard on their network. Currently, I am also advising and designing a Reflective Interface for a semi-finalists' project called iReflect for the MIT \$100k business plan contest (Pengelly & Macbeth, 2012). iReflect is a mobile computing-based psychotherapy system.

It is our hope that this thesis will contribute to the advancements of user interface design methodologies, as we believe Reflective Interface principles can be applied across a wide variety of social computing interactions and other domains.

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