

# WISETales: Sharing Personal Stories as Informal Learning Experience for Women in Science and Engineering

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**Abstract**— Women are underrepresented in the areas of Science and Engineering, both in academia and industry. This leads to weaker support networks, lower self confidence and lesser access to mentors. We investigate whether a community built with a specific purpose to allow women in science and engineering to share personal stories can support women to reflect and learn from each other’s experience. This paper presents the design of WISEtales, a new online community for sharing personal stories. It discusses the design and the potential role of the community as an informal learning tool based on results of an exploratory user study.

**Index Terms**— online community, women in science and engineering, motivation, participation, cold start.

## I. INTRODUCTION

Women are underrepresented in the areas of Science and Engineering, both in academia and industry. This leads to weaker support networks, lower self confidence and lesser access to mentors who could give advice in their professional development. We investigate whether a new online community that encourages women in science and engineering to share personal stories can support them to learn through their narratives and help in their personal, professional and career development. There is an agreement in literature that stories offer an effective way to convey information. When reading stories of others, women can reflect upon their own experiences. The authors of stories in the process of writing reflect upon what happened. Through discussion, an unbiased, objective perspective can be gained by both the author and readers and knowledge can be created. The community will help to connect women who may be isolated in their workplace, provide a forum to ask questions, get help and informal mentoring, and ultimately, help them build up self-confidence and increase their motivation to achieve success. Other online communities exist for women in science and engineering, but they focus on sharing announcements about opportunities and articles of interest, rather than on personal stories.

We designed WISEtales (or Women in Science and Engineering Tales) a new online community for sharing personal stories. The community is available on the web at <http://www.ourwisetales.com> and <http://wisetales.usask.ca>. It targets professional women from all over the world, of diverse backgrounds, cultures, ages and professional levels (i.e. undergraduates, graduate students, entry level professionals all through senior level professionals, in both academia and industry).

This paper presents the design of the community and discusses its potential role as an informal learning tool

based on results of an exploratory user study. It is organized as follows: the next section discusses related work in the area of gender studies, motivation, media and the cold start problem. Then, the design of the new online community is presented, followed by a section describing an exploratory study of the community, and a discussion.

## II. RELATED WORK

The following is a brief overview of related work done in areas of gender studies (Women in Science and Engineering), learning from narratives and online communities:

### A. Women in Science and Engineering

Research suggests that there are two main factors behind women’s underrepresentation in science and engineering: social gender stereotypes and women’s low self efficacy and confidence in their abilities. According to [11] most cultures encourage boys to set and achieve their goals, while encouraging girls to look after others’ goals before theirs. Gender stereotyping affects the behaviours of both genders and influences their goals and achievements. Of course, there are evolutionary reasons. Men are more motivated towards achievement due to biological reasons; their hormones push them to be aggressive and competitive. Women are more nurturing and social. The climate of male dominated areas rewards assertiveness and single-mindedness, features that are more typical for men than for women. According to [4] these social factors negatively affect women by lowering their expectations of performing well in these fields, thus diverging them away to other socially- and gender-accepted fields. This leads to the “shrinking pipeline” problem in academia, where the ratio of women decreases as they progress in their studies from undergraduate to graduate school and though the career ranks [2]. Career advice and mentoring are essential to help women succeed in their studies and career goals [3] and gain the needed self-efficacy [16], confidence and motivation. Yet mentoring is scarce for women in environments where they are underrepresented. An online community can help women find informal advice, build support networks and find mentors [5].

### B. Learning from Narratives

Some of the most effective ways of creating and communicating knowledge are informal. They are not based on formal textbooks, but through conversation, storytelling

and dialogue [18]. Personal interactions are important, because knowledge is not just representation of what is one's mind; it also involves its interpretation by others [20]. Narratives have always played an important role in informal learning, because humans have narrative brains [12]. Through narratives, people define their identity and roles in relation to those of others. The author of a story learns through personal reflection at the time of writing and by reflecting from different viewpoints, after seeing comments to her story. Readers learn through relating own experience to that of others, and through the realization that their experiences are not unique, but shared by many. They learn also through explicit advice and discussion, as well as through comments given to provide support and encouragement.

Women are generally better at verbalizing their experiences than men, and they are more likely to share candid stories with one another than men, who typically tend to share only stories that present them in a flattering way.

*"Story telling is a feminist teaching strategy endorsed for the value it places on the personal, and for its capacity to develop a voice among women who historically have been silent." ... because moral experience, like all lived experience, always occurs in time and in relationship...whenever an individual has to report "what really happened", the natural impulse is to tell a story, to compose a narrative that recounts the actions and events of interest in some kind of temporal sequence." [1]*

By sharing stories about personal experience women can educate, support or warn other women going through similar situations. While positive stories encourage women in their professional journey by providing role model's original stories, negative stories project a realistic depth into the difficulties they experience at various levels. The diversity and richness of the posted stories would serve many women in different stages in their lives and careers. Finally, as a result of story-sharing online, a repository of narratives evolves providing a deep and realistic perspective of the life and choices females in science and engineering face, which would be an important resource for researchers in gender studies, sociology, and business (human resources).

### C. Online Communities and Encouraging Participation

Every online community faces the Cold Start Problem in the beginning, when the media has been launched, but there is no content yet and/or no users. One way to deal with the cold start problem is to import existing content and/or existing user profiles into their systems [19]. Some authors see the key to stating successfully a new community in its design. Nine design principles were identified as keys to success [10]. These principles evolve around identifying a goal for the community, having a flexible environment, allowing users to create profiles, assigning roles, encouraging social norms, promoting events, creating and celebrating special community occasions and finally assisting users in creating and managing their own subgroups.

One important guideline defined in [10] is to find a unique niche or focus for the community. Our intended us-

ers are women studying or working in the different areas of Science and Engineering, different ages, cultures, backgrounds, workplaces and experiences. The focus of the community is on sharing personal stories. Most of the existing online communities for women in science and engineering (e.g. Systers) are mailing lists or discussion forums, but they are mainly used to post announcements, articles of interest and news. They are only occasionally used for discussing specific situations, experiences or sharing advice. Other communities, for example, MentorNet, focus on mentoring – their purpose is to match mentors with mentees who afterwards communicate one-on-one by email. There are also individual women who maintain personal blogs where they share their personal stories, opinions, and engage in discussion with their readers. However, these are small communities, focused around a certain individual – not around a topic / theme. So WISEtale's goal and audience makes it unique; there are no other communities that focus on sharing personal stories of women in the area of science and engineering.

### III. WISETALES NEW ONLINE COMMUNITY DESIGN

Ease of use is paramount to attract users of different backgrounds and computer skills to participate and contribute content [7]. Immediate feedback to users' contributions makes the interface easier to comprehend, is rewarding and motivating [13], [21]. Our design allows only 4 functions for members which are all directly related to the main purpose of the community – sharing stories. The functions are: read and comment on stories, search for stories with particular tags or published in a particular month, and contribute stories. While it is possible to extend the functionality of the community to include for example supporting discussions, sharing news, personal blogs, chat tool, status update etc., we decided to focus on the unique goal that defines the focus of the community – sharing stories – at least at the start. More communications purposes and their corresponding functionalities can be added later on user demand once the community is formed.

The main requirement in the design of the interface was to be simple and easy to use to allow women of various ages and computer skill levels to participate. We used Drupal, a powerful Content Management System, to create the community infrastructure. We used the Principle of Least Effort and chose a simple layout (see Figure 1) with a short horizontal menu on the top allowing to submit a story, a "contact us" and a "log out" buttons. The left section of the website has a login entry, a calendar to view archived stories, and a tag search to facilitate locating stories. The central space of the screen is used to display the stories, shown in a reverse chronological order with the latest stories at the top. A mission statement for the community is always displayed on the top of the stories space, along with a section with a few motivational questions to give women ideas about what kind of stories to share.

Sharing personal stories can make their authors or commentators vulnerable if privacy of both the authors and the persons or institutions mentioned in the stories is not preserved. Socialization needs can be fulfilled by ensuring that users can have an identity (virtual) associated with their

stories and comments. In this way personal relationships can be developed. We wanted to give women a feeling of security to share personal experiences without the fear of being targeted or identified. Therefore, we incorporated two guidelines in our design; first, users can use aliases when submitting their stories, and they can create as many aliases as they want. Second, in the policy of use, users are discouraged from referring directly to certain individuals or organizations in their stories. After being submitted, stories are moderated before being published, to ensure the privacy of the authors and any other persons / institutions mentioned. To encourage building relationships and common bond [15] we followed Kim's recommendation for allowing users to build profiles [10] and allowed registered users (members) to be represented by avatar icons of their choice, which also adds to the visual appeal of the community. The registered users can see who is online at the moment and who is a new user (see Figure 1, left bottom part of the screen).



Figure 1. The Interface of the Community

When users evaluate the credibility of a website, the visual appearance is the most important factor [7]. The Liking Principle states that the more liked the online community is as a whole, the more persuasive it becomes [22]. We took care to ensure that the homepage of the community looks aesthetically pleasing and offers an inviting space. It incorporates a mild palette of inviting colors that give a sense of calmness and unwinding, so women can enjoy their readings. We chose a simple design with a friendly yet professional look. To increase trust in the community, we placed the logo of the NSERC/Cameco Chair (the second author of the paper) for Women in Science & Engineering (WISE) on the top of the page, and provided a link to the Chair's webpage. This gives the assurance of a legitimate organiza-

tion behind the online community. The terms and conditions clarify who is moderating the content, and provide a list of conditions for users to accept to abide by, before submitting any stories for publishing. We hope that the authority of the Chair and the set policies will make women trust that their identity is protected, and encourage them to follow the suggested guidelines.

Considering our user group – women working in hard technical fields who don't have much free time to spend online reading and writing, we aim to ensure a fairly low (in comparison to other communities) but steady stream of stories - around 2-4 per month. As the community and the number of documents grow, we will focus on building incentive mechanisms to encourage users to focus on specific interest areas and moderate the submitted stories themselves.

We "seeded" the document space by posting two personal stories of the two authors of the paper, so that the users can see examples of the type of stories that can be shared. The first story is a memoir of a school experience where a good Math teacher made a difference in the lives of his students. The second story is about a young female teacher's experience in a class with only male students, the challenges she faced and how she managed to overcome them. Later on to encourage users to post stories that reflect negative experiences as well, we added one negative story about hazing. When the flow of stories slowed down several months later, we added two more positive stories and commented on some of the stories published by others, to encourage others to write comments and motivate the authors of the stories with the feedback.

To "market" our community to women in the Science and Engineering fields we used reciprocity [14], viral marketing [17] and friendly reminders. We started inviting women we personally know to join the online community through email invitations. Personal invitations or "word of mouse" is an important marketing strategy since having members refer others to the site increases its credibility [9]. A wish for reciprocity [6] would encourage mutual recipients to visit the community, share a story or comment and "spread the word".

#### IV. EXPLORATORY STUDY

We launched wisetales.usask.ca on January 31, 2008. At the time of writing, there are 22 stories in total (13 contributed and 5 seeded). In October 2008 we ran an exploratory study mostly to evaluate the usability of the design and the interface and the appropriateness of functionality. We wanted also to receive feedback from a wider audience of women in science and engineering about their need for an online community to share personal stories, if they feel that they learn from the stories, and if they are likely to become active participants. So this study served two purposes – evaluating if the design choices we made were good, and also learning more about our target audience - about the relevance of the community's goal, and most importantly, their motivation to participate. Until October 15, 2008 when the study started, the community had received 16 stories (of which 11 were contributed and 5 were seeded).

There were no stories posted in the first 3 months after the launch, 8 stories were shared in May, and 2 stories were shared in each of the months June, July and September).

### 1) Hypotheses

We formulated the following four hypotheses, which capture our main design decisions.

- **Hc.** Women in science and engineering need an online community to share personal stories.
- **Hd.** The current interface design (focusing on a single purpose) is easy to use and attractive.

This design makes it easy for users to identify the goal of the community, and allows them to focus their efforts on sharing their experiences, rather than being distracted with other purposes and functionalities (like announcements, discussion forums, chat, or twitter-like status updates). It is easy to view stories, to create accounts, to post new stories and comment on existing ones. The options for searching stories by month of publishing and by tag are useful and easy to use. The layout is attractive and the welcome and motivational messages communicate clearly the goal of the community.

- **Hi.** WISEtales provides an environment that supports informal learning.

Women will show appreciation of the stories they have learned from either by commenting on them, or by engaging in discussion of decisions made by the actors in the story.

- **Hp.** Maintaining privacy and allowing anonymity is important for the WISEtales community.

### 2) Methodology, Sample and Tool

Thirty women in science and engineering filled out an online survey. While we reviewed standard usability evaluation tools before developing the survey, we crafted most of the questions in the online survey ourselves. We were interested in more specific aspects of the design and wanted to include open-ended questions.

Since our target audience is women in science and engineering who are at different professional stages in their lives, we tried to attract a diversity of participants in terms of age, educational background and different levels of professional occupation (both academic and industry). We recruited participants mostly through personal email invitations. One of the authors also posted an invitation for the study on her Facebook profile and on the Facebook group for the Grace Hopper Conference for Women in Computer Science. As incentive for participation, we offered a chance to win one of several iPod shuffles in a draw (with a declared 10% chance to win). In order to participate in the draw, the participant had to send an email to the authors (the data entered by the users was immediately anonymized so there was no way to find out who provided which answers).

All, but one of the participants resided in North America (both Canada and United States of America) and identified themselves with different ethnicities (21 participants were Caucasian, 7 Asian, 1 African and 1 Middle Eastern). Figure 2 presents a breakdown of participants according to their age range and current professional status.

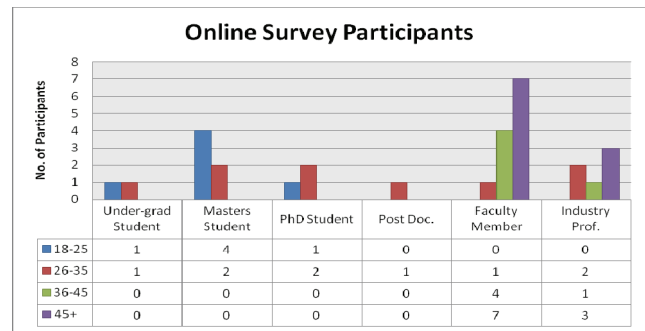


Figure 2. Demographics of participants

The average completion time for the survey was 32 minutes (excluding the time needed for participants to familiarize themselves with the WISEtales community). The survey had 53 questions and was divided into four sections. The questions in the General Section asked participants for general questions about their background, educational experience, professional experience, exposure to online communities and introductory information about WISEtales (for example, their interest in online communities for professional women and their familiarity with WISEtales). The questions in the Design Section aimed to obtain feedback on the main idea, goal and design of WISEtales. The questions in this section included Likert-scale ranking, close-ended questions and open-ended questions. The Motivation Section contained mostly open-ended questions and Likert-scale questions, with one close-ended question and one ordinal question. This online survey provided us with a wealth of information that was useful to test our hypotheses, and brought to our attention other interesting questions that need to be considered when investigating what motivates women in science and engineering to participate in a new online community.

### 3) Results

Twenty five (83.4%) of the 30 participants stated that they are interested in joining an online community for professional women in science and engineering. Furthermore, 27 participants (90%) thought that having a community for sharing personal stories among women in science and engineering is a great idea, which confirms our first hypothesis, **Hc** (women in science & engineering need an online community to share personal experiences). Of the 3 (10%) remaining participants, 2 doubted the chances for success of such community and 1 participant thought it sounded similar to other online communities – she didn't understand the uniqueness in the purpose of this community.

Regarding the ease of understanding the goal of the community from the WISEtales interface/design (**Hd**), 73% were positive (10 participants found it very easy and 11 – easy), 8 thought it was average and 1 participant thought it was difficult. Twenty-seven (90%) found it easy or very easy to read a story. Twenty-six found it easy or very easy to browse the new stories and twenty-five found it easy or very easy to access archived stories. Table 1 shows the participants' answers to the question whether they had any suggestions to improve the design of the community.

**Table 1. “Do you have any suggestions to improve the design?”**

SUGGESTION	TOTAL
No Suggestions	11
Shorten the Introduction / Motivational statement	4
Improve the tag-cloud	3
Offer ‘possible related stories’ / ‘most visited story’	2
Explore both men’s and women’s issues	2
Encourage shorter stories	1
More mentoring / coaching	1
View other members	1
Improve the visibility of comments	1
Resolve browser compatibility issues	1
Other	3

**Table 2. “Would you suggest adding new features?”**

ANSWER TYPE	DETAILS	SUB	TOTAL
No			10
Not sure			10
Yes	Add events / Q&A / achievements history	3	10
	Improve search	2	
	Exposure to other members	2	
	Add ‘most visited story’ / ‘most commented story’	1	
	Bilingual support	1	
	Not stated	1	

The Participants were also asked whether they would like to see any additional features added. We were careful not to be suggestive in asking the question, and the responses were split in three ways. The responses to this question are reported in Table 2. Ten participants suggested adding more features, but most of the suggestions augmented the main purpose of sharing stories. For example, two people suggested to improve the search, two – to create a way to view other members (e.g. members locations), one suggested to add a “most visited story” and yet another one suggested adding bilingual support (English and French, the two official languages in Canada). Only three people (10%) suggested adding functionality related to the purposes of already existing communities for women in science and engineering, like Q&A, events announcements, and a section of historic achievements of women.

To evaluate Hp (that maintaining privacy and allowing anonymity is important for this kind of community) the participants were asked if (as in our current design) WISEtales should require registration from the user to submit a story or post a comment. Twenty-three (77%) of the participants supported registration while four (13%) did not and three (10%) were not sure. When asked whether they liked the anonymity option, 83% said “yes”, 10% didn’t mind and 7% said “no”. When asked about the type of accounts they created, 16 participants (54%) chose anonymous accounts,

four (14.3%) participants selected an alias / pseudo name, five (16.7%) participants chose to show their real first name, and another 5 (16.7%) chose to show their real full name. So 68.3% in total selected to use either anonymous or pseudonymous account, which supports our hypothesis. While anonymity is generally considered harmful for building a sense of community online [8], the type of documents shared in WISEtales requires the availability of anonymous or pseudonymous authoring to ensure candid accounts of negative experiences. We realize that anonymity may also be in conflict with the users’ need to increase their self-esteem / ego by knowing that everyone appreciates and knows that they are reading their story, yet, we believe that if users identify with their online personas, it will be equally rewarding to know that others have enjoyed and learned from their story.

In order to avoid the Hawthorne effect, there was no direct question asking the participants if WISEtales provides learning experience (H1). There was an open ended question what they thought of WISEtales. Twenty-five participants said it is a great idea, but only eleven (37%) elaborated further. Some of the answers provided are listed below:

*‘Help improve our life’*

*‘Pass information & skills to younger generation’*

*‘Women need to hear about experiences of other women, esp. those who are successful in areas which are male-dominated’*

*‘Good opportunity to share and communicate with colleagues in similar circumstances’*

*‘Great idea to share the problems they have faced and let other women know of the problems so they can be handled easily’*

*‘We need to see that others often face the same dilemmas’*

*‘Enjoyed comparing stories and looking for both similarities and differences in other women’s experiences’*

*‘Help to deal with ‘women-specific’ problems, like family and career issues’*

*‘Women in science face unique challenges and having an outlet to share experience and advice is great’*

*‘It provides a platform for this special group of people to get to know what others are doing’*

*‘It is interesting to have an online community for women. Community that is not only to share personal feelings but also education perspective of women’*

These statements by more than a third of the participants emphasize the value of knowing there are other women are going through similar experiences, learning from each other and passing on their experiences through generations. This evidence supports our hypothesis H1 that learning takes place through sharing stories, since it was explicitly acknowledged without providing any cues. Yet, the evidence for this hypothesis could have been stronger.

## V. CONCLUSIONS

We created a new online community for Women in Science & Engineering (WISEtales) to share personal stories using design principles based on theories of motivation, like Maslow’s Hierarchy of Needs and some general design

principles for online communities. We were particularly interested if WISEtales serves a need in the community by helping professional women in science and engineering to connect and learn from one another by sharing their personal experiences through narratives. We were able confirmed our hypotheses through an exploratory study with 30 users. Our results are based on a relatively small sample of users, but in most qualitative studies, more than 15 users are considered sufficient number to account for the possible variability of answers. Yet, our sample was mostly formed by professional women (faculty, graduate students and women already working in industry). There were no high-school students among the sample, and only two of the participants were undergraduate students. So perhaps our results are biased towards women in further stages of their careers.

The timeline of most successful communities shows a long period with few contributions, which later increases exponentially. The specifics of our audience makes it unreasonable to expect a growth of contributions comparable to Flickr, YouTube or Del.Icio.Us. "Success" for WISEtales would mean a stream of sustained contributions at a low scale (2-4 stories a month). We do not think that this goal is unrealistic. Starting a new online community is very hard. Yet, we believe that the goal of creating a community for underrepresented women to share personal stories is noble, and the area of research offers many avenues for investigation. The next stage of our research would be to follow up on the feedback received, enhance the design and investigate ways to elevate the learning curve further by incorporating a social visualization. We are optimistic that we will be able to gain interesting insights into important questions of online community formation.. There aren't many repositories of gendered narratives available currently, even less so in the areas of science in engineering. WISEtales will help to fill this gap.

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