# A comparative study of three social networking websites

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**Abstract** Recently, the number of social networking sites is rapidly increasing, and the number of users joining these sites is dramatically increasing as well. This paper aims at comprehensively comparing three social networking sites, and provides an in-depth analysis. We compare three of the most popular social networking sites, i.e., Facebook, Twitter and MySpace. Specifically, we evaluate those social networking sites based on four criteria (i.e., navigation, interactivity, source credibility and intelligence). For each criterion, we propose a list of measures for the comparison. The comparison essentially explores the differences and commonalities among those social networking sites. Based on the analysis of the comparison, a user study is conducted to evaluate the three websites.

**Keywords** Social networking · Usability · Sociability

## 1 Introduction

The number of users registering and using social networking sites is increasing rapidly [4]. According to several reports,[1,2] social networking sites have a great impact on the market of electronic media and serve an effective marketing channel. In other words, social networking sites are not only used for communication among people, but also serving as a new media for advertising and business needs. Many companies use social networking sites as a means for communication and marketing with their target customers. Research [1] has been conducted

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[1]http://www.emarketer.com/Report.aspx?code=emarketer_2000433

[2]http://mashable.com/2010/03/19/global-social-media-usage

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on analyzing log data of website visitor traffic in order to assist the owner of a website in understanding the behavior of the website visitors. Many schools use Twitter as a communicating platform for students, parents and the administration. Organizations use Facebook as their communication tool between their employees. Similarly, MySpace is used as a media for advertising music and video related contents.

The eMarketer statistics[1] reveal that 63.7 % of American Internet users actively use social networking sites. On average, users from 10 countries spent roughly five and a half hours on social networks everyday[2]. Among all these users, Facebook active users are about 52 %, and spend 5 h and 52 min on average per day; MySpace active users are about 15 %, and spend 59 min approximately on average per day; and Twitter active users are about 10 % and spend 36 min approximately on average per day. With the fast growth of social networking sites, researchers start investigating the motivations to use social networking sites. For example, Joinson indentified several reasons (such as social connection) to use Facebook [18], and Caverlee and Webb analyzed a large number of mySpace profiles to understand who is using these social networks and how they are being used [8].

Social networking sites are different from the regular sites that provide contents, and also do not come under blogs where multiple users post information. Social networking sites are a type of virtual community [11], where users meet their friends virtually and also make new friends whom they meet in the community with similar interests. Using a social networking site, a person can create different groups/communities and join in any community that he/she is interested in. Though social networking sites are growing fast, there is no consensus on the guidelines for developing social networking sites. Each social networking site uses different techniques to represent the interface and social networking functionality. Furthermore, each social networking site has different concepts and different terminologies. For example, to form a network in Twitter, a user has to follow someone or he/she has to be followed by someone. On the other hand, in Facebook and MySpace, if a user adds a person as a friend, they will become friends with each other unlike Twitter. In another case of displaying updates from friends, Twitter uses the term "Tweets"; Facebook uses "News Feed"; and MySpace uses "Highlights". Due to the aforementioned differences, it is challenging to make a comprehensive comparison among these social networking sites. The findings in such a comparison can improve our understanding of the working mechanism, the standards and the usability of social networking sites.

Different studies have been conducted to compare social networking websites. For example, Facebook and MySpace have been compared from different perspectives, such as Trust and Privacy [11], offline and online usages [30] and the uses and gratifications [27]. Some study focused on how culture differences affect the usage patterns of social networking services [9]. The previous work therefore focused on comparing certain specific usage scenarios. This paper conducts a measured and comprehensive comparison on Facebook, Twitter and Myspace according to four criteria. A measured and comprehensive comparison can reveal the differences among social networking sites, and provide insightful findings to improve the design of such sites.

We propose a comparative model, called *NICI*, including four criteria for evaluating social networking sites based on *Usability* and *Sociability*: *Navigation*, *Interactivity*, *Source Credibility*, and *Intelligence*. Navigation is an essential factor in web browsing because users must navigate through different pages on a website. Interactivity defines the interaction between users. Source Credibility is important in social networking websites, because only if users trust the source, they may continue accessing the information published by the source and providing information of their own. The more credibility the source provides, the more the site becomes trust worthy. With the growing complexity, a social networking site must be

intelligent to provide information in an efficient way. All these criteria affect the acceptance and effectiveness of the social networking site. We propose a list of measures for each criterion to evaluate social networking sites.

Facebook, Twitter and MySpace being the popular social networking sites are compared. The main purpose of these three sites is for users to build social networks. Each site, however, has a unique characteristic and social focus while fulfilling the main purpose. Facebook is a general social networking site and is more popular among college students; twitter emphasizes on following leaders, popular people, and event organizations; and mySpace emphasizes on music, photos, and video contents. The popularity, the variations and similarities between these three social networking sites and why they are successful in attracting users have motivated us for a detailed analysis and an objective comparison.

Based on the aforementioned four criteria with a list of measurements in each criterion, we compare the above three social networking sites against each measurement. Our comprehensive evaluation and comparison of the detailed implementation in three social networking sites reveal that different social networking sites apply different interface design principles and thus the focus of a social networking site affects its design and implementation. We have also conducted a user study to collect users' subjective feedbacks on each measurement in each social networking site. Those manual comparison and user evaluation provide insightful analysis on existing social networking sites.

The rest of the paper is organized as follows. Section 2 briefly introduces the four comparison criteria: Navigation, Interactivity, Source Credibility, and Intelligence. Sections 3 to 6 compare three websites according to each criterion respectively. Section 7 presents a user study. Section 8 discusses evaluation results. Related work is reviewed in Section 9, followed by conclusions and future work in Section 10.

## 2 A comparative model for social networking sites

According to Boyd and Ellison [5], social network sites are defined as "web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of their users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system". *Usability* and *sociability* are two major factors for evaluating the success of online communities [25, 26]. We defined a comparative model for evaluation social networking sites based on usability and sociability.

*Usability* User experience of web browsing is the key to evaluate a website. In online social networks, connection is represented by a hyperlink, and traversing the list of connections is implemented as navigating through a hyperlinked network that indicates a user's social network. Therefore, an efficient *navigation* facility can help users easily find the information of interest. Due to the diversified backgrounds of social networking users, easy personalization and customization encourage an active role of engaging in an online social networking site and promotes usability, which implies the importance of an *intelligent* interface.

- Navigation. When browsing any website, a user navigates through different web pages to find the information of interest. In other words, the support for navigation is a fundamental aspect in the website design because it facilitates reaching the target location in an efficient way [12]. In social networking sites, navigation measures the degree to which the user feels that he/she is a relevant actor in a computer-mediated communication situation [31].

• Intelligence. With the increasing number of active users of social networking, it is necessary for a social networking website to intelligently handle users' requests and information, such as recommending friends or filtering malicious information. A social networking site is viewed as a hub, where different users with diverse interests share their knowledge and meet people of common interests. It, therefore, needs to understand and analyze users' behavior and specific requirements (such as personal preferences), and accordingly provides appropriate information specific to the user.

*Sociability* Sociability is concerned with how members of a community interact with each other via the supporting technology [25]. Sociability of a social networking website can be promoted by good *interactivity* mechanism that allows users to focus on their social tasks, instead of the interface itself. And a reliable source of information, i.e., *source credibility*, can further encourage the social online participation since trust is important to retain users.

• Interactivity. By taking a sequence of specific actions (such as clicking a button or filling a form), a user interacts with a web interface to reach his/her desired goal. In general, good interactivity can attract more users. In a social networking site, a web page serves as a communication media that allows a user to virtually communicate with his/her friends. In particular, flexible interaction allows users to drive the communication according to their preferences, and plays an important role in interpersonal communication [32]. In other words, greater interactivity leads to greater assertion of a person's presence [31].
• Source Credibility. With the fast growth of websites, credibility becomes one of the most important factors for users to continue absorbing the online information, and websites commonly filter out certain information [34] to assure that the source of information is trustable. The more credibility the source has, the more likely users would trust each other and be active.

## 3 Navigation

Navigation of a website allows users to access the content of one web page or move to another web page that they are interested in. Navigation involves both the physical act of movements and the cognitive act of deciding where to go [3]. To provide efficient navigation, the users must know their current location, i.e., on which particular web page, and what content they are accessing. We compare three social websites according to the W3 navigation guidelines, as discussed in details in the following.

*Bypass blocks* The bypass-blocks provide a direct access to the primary content of the web page [17] to users. In all three social websites, the "Home" link is provided on all pages. However, the navigation links, which direct users to the main contents, are placed in different locations. The Facebook places the primary navigation links at the left side and on the top while Myspace and Twitter only display the primary navigation links on the top. About the organization of navigation links, MySpace has the largest number of navigation links, Twitter has the least, and Facebook is in the between.

*Page title* Providing an appropriate page title helps the users understand the topic of that page and decide if they are interested. Titles should identify the current web page without requiring users to read or interpret page content [17]. If the title is confusing, it might be

difficult for the user to navigate through pages. Each website follows a specific pattern to display the page title. In Facebook, a web page's title in general represents the main content of the page on the title bar with the number of friend requests appended to it in parenthesizes; in Twitter, all the web pages have a common title "Twitter" appended to the title of that content, such as "Twitter / Settings", except for the Help and Profile pages; in MySpace, some web pages have a common title "MySpace", which is not the actual description of the content, while the "Profile" page's title is on a title bar that follows the pattern of "Full Name (first name) on MySpace". In Facebook, some pages, such as Friends, Apps or Games, do not follow the aforementioned pattern to present titles, which can be misleading. For example, as shown in Figure 1, after a user navigates from a page of "Event" to a page of "Friends", the title is not correctly updated.

*Focus order* The navigation sequence in a website should indicate a meaningful operation [17]. Different social websites present the navigation options differently to provide a meaning navigation. Facebook displays navigational links through collapsible and expandable menus and drop down menus; Twitter uses tabs while MySpace organizes navigation options in hierarchy through sub-menus and drop down menus. The operation sequences in three websites are in general meaningful and clear. However, in Facebook, the Friend requests are accessed through "Recently Updates", which seems not appropriate.

*Link that describes the topic* Because users navigate to different web pages using links (like tabs, left/right/top navigation links), the text on the link should describe the destination content. Otherwise, it will cause ambiguity to the user. The labels of navigation links in all three websites are of a good quality. Facebook and MySpace further provide glosses to some links or icons.

Figure 1 A misleading title in Facebook
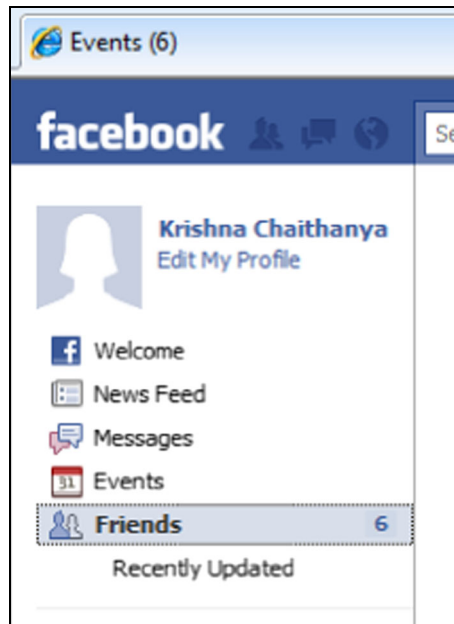
*Multiple ways*  It indicates that more than one way is available to locate a web page within a set of web pages. Facebook has left navigation links and top navigation links representing the site map; Twitter has a very simple interface that has a small list of links in the top as a site map; and MySpace has top navigation links to represent the site map. In all three sites, multiple paths to certain contents are provided. For example, "Find Friends" page can be accessible through a top navigation link or a left navigation link on the Home page in Facebook

*Focus visible*  Any keyboard operable user interface has a mode of operation where the keyboard focus indicator is visible [17]. In three websites, various techniques have been applied to highlight navigation links, such as a different background color. Figure 2 shows screenshots of focus of three websites.

*Horizontal attention leans left*  Web users spend more time on the left side of a page [23]. The navigation links have to be on the left and the secondary content to the right side, which is the conventional way of people looking at a site [23]. Facebook meets this convention by providing navigation links on the left side of the page. In MySpace, in some web pages, advertisements are placed under the top navigation links, instead of the right side, which makes MySpace violate this convention.

 The major aspect comparison for navigation among Facebook, Twitter and MySpace is found in Table 1.

## 4 Interactivity

Interactivity of a website refers to how the interaction/communication is maintained between the user and the website. We consider the following measures when evaluating interactivity of social networking websites: Modality, Layout customization, Feedback, FAQ, Search Engine, and On-line Chat.

*Modalities*  There are many modalities offered by the current websites such as audio, video, touch, and so on which affect the user's interaction with the systems. Similarly, in social networking sites, these types of modalities such as photo, audio and video, can improve the interactivity of the site. Facebook and MySpace support more modalities than Twitter. Twitter does not support multimedia documents, such as photo or video.

*Layout customization*  Customization is the direct consequence of interactivity [32]. In the sites that allow for customization, the users will have more control over the information [19] since users can design the web pages according to their likes—both the look and the content they receive. In Facebook, a user can choose from a list of different languages and once the user selects a language as the primary language, the navigation links on Facebook are



**Figure 2**  Focus visible among Facebook, Twitter, MySpace (from *left to right*)

**Table 1** Navigation comparison summary

| Guideline/criteria | | Facebook | Twitter | Myspace |
|---|---|---|---|---|
| Bypass blocks | Number of links for navigation | Between Twitter and MySpace | Least | Most |
| | Type of navigation links for main content | Left and top | Top | Top |
| | Home page provided on all web pages | Yes | Yes | Yes |
| Page title | | Not appropriate for some pages. | Descriptive and meaningful. | Some pages have an identical title; titles of Web pages in Music and Video are descriptive. |
| Focus order | Grouping of related contents | Collapsible and expandable menus and drop-down menus. | Tabs on a single page | Sub-menus, drop down menus. |
| | Meaningful Sequence of pages | Provided except for one instance i.e., Friend requests through Recently Updated page | Provided | Provided |
| Link that describes the topic | | Provided except for one instance i.e., Current friends list not available in Friends page | Provided | Provided |
| Multiple ways of reaching content | | Between Twitter and MySpace | Least | Most |
| Focus visible | | Background color changes, underlined text | Background color and text color change, underlined text | Background color changes and text color changes |
| Horizontal attention leans left | | Conventional | Non-conventional | Non-conventional |

translated to the selected language. However, Facebook does not provide any options to customize the layout. On the other hand, Twitter and MySpace allow users to change the layout. For example, Twitter provides a list of background images and design colors which a user can choose from while MySpace allows users to customize the user interface by building a theme.

*Feedback* Facebook and MySpace allow users to provide suggestions and feedbacks through the Help page. Twitter has a profile page called "@feedback", where users can send suggestions and feedbacks in the same way as sending tweets to a person.

*FAQ* All the three websites provide FAQ. However, they organize questions in different ways. Facebook organize questions into different categories in the "Help Discussion" page. Twitter divided the Help page into "Twitter Basics", "Something's not working" and "Report a violation". MySpace also provides FAQ through the Help page, which is referred to as "trending topics".

*Search engine* Facebook and Twitter provide a search box on top of all pages throughout the site. MySpace provides a search box in the navigation header of the site. MySpace search is based on different categories, i.e., MySpace (General), People, Music, Videos, Photos, Games, and Web. Facebook provides suggestions based on a user's input. Figure 3 illustrates the screenshots of search interfaces in three websites.

*Online chat* As soon as a user logins to the Facebook or MySpace, the user will find a chat window, through which friends online are available to chat. Unlike Facebook, MySpace maintains a different list for chatting called "IM friends", and only those people in this list will be available for chatting. Twitter does not provide online chat to the users. The comparison for interactivity among Facebook, Twitter and MySpace is summarized in Table 2.

## 5 Source credibility

Credibility is defined as "Believability" [13]. Source Credibility is the credibility or trustworthiness of the source. In other words, accepting the information based on the credibility of the source is Source Credibility. Source is the owner of the information. For example, if a user accepts a friend request from a known person as he trusts the source then it will lead to source credibility. Each person has his/her own criteria to trust the web information and the criteria assessing for one type of information differs with other [21]. We evaluate the source credibility based on the following measures: Networking Transparency, Profile Information,
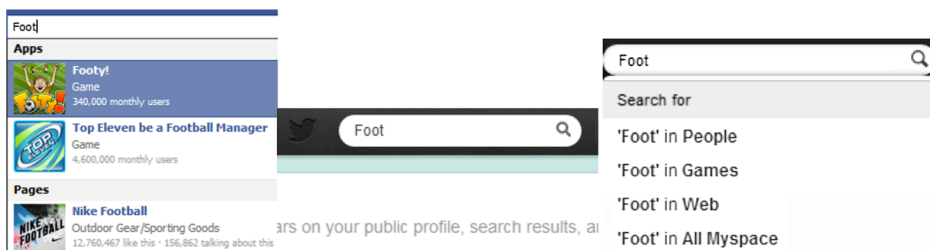


**Figure 3** Search among Facebook, Twitter and MySpace (from *left to right*)

**Table 2** Interactivity comparison summary

| Guideline/criteria | Facebook | Twitter | Myspace |
|---|---|---|---|
| Modalities | Photo Albums and Video provided | Photos, audio and video files not supported | Photo Albums, Music and Video provided |
| Layout customization | Language of UI changable | Layout changable | Layout and Font Styles changable |
| Feedback | Provided through Help page | Provided through @feedback profile | Provided through Help page |
| FAQ | Provided | Provided | Provided |
| Search engine | Searches for all the categories. | Searches for tweets and people | Searches for all the categories |
| Suggestions while typing in search box | Provided | Not provided | Not provided |
| Online chat | Provided | Not provided | Provided |

Advertisements and Pictures, Linking, Grouping of Messages based on Message type, Reputed Credibility, and Experienced Credibility.

*Networking transparency* Facebook and MySpace allow users to see all the conversations of their friends even though the user is not part of the conversation, and all the posts that are not within the user's network if a user's friend is a part of it. In Facebook, a user can respond to any of the postings by simply saying like or unlike, post some comments, share or send as message to specific people. Unlike Facebook, sharing a message in MySpace does not have an option to share with specific people. In Twitter, a user can only see the tweets that are posted by the people that the user is following.

*Profile information* More profile information is provided, the more trustable the person is. Facebook and MySpace support a profile with a lot of information (such as Name, Email, Gender and etc). In Facebook, a user can hide the birth date and gender information from other users, but MySpace can only hide the birth date. Twitter allows less profile information than Facebook and MySpace.

*Advertisements and pictures* All the advertisements in Facebook appear on the right side of the pages and each of those has a small picture. Twitter uses Promoted Tweets, Promoted Trends and Promoted accounts for advertising, and those messages are distinguished from the regular ones by displaying "promoted" on their links. When compared with Facebook and Twitter, MySpace provides a lot of advertisements to the users, and each of them has a larger picture. Advertisements in MySpace can appear on the top, right, left side of a page, which may distract users' attention.

*Linking* Facebook provides links to the profile page for any update or comment made by friends. Twitter provides links to the profile page for all the tweets, and when clicked on the profile page, the summary of the profile appears on the right side of the page. MySpace provides the owner name of the posting for every post, and each of the posts has a link to go to the profile page of the owner. Figure 4 demonstrates the screenshots of linking in three websites.

*Reputed credibility* Facebook displays all the featured games with the number of people that played the game. Also, all the apps that are in the apps directory of the Facebook have a

Figure 4  Linking among the three sites

rating (out of 5). Similar to Facebook, MySpace also provides the live status of the number of people who played a game, installed the game and liked the game. For all the videos, the number of people liked the video are displayed along with popular and top rated videos. For the music section, the top rated albums, artists, videos are displayed. Twitter provides some top tweets when users search for tweets with a keyword that he is interested in. Figure 5 shows the screenshots about reputed credibility.

*Experienced credibility* Known source provider and message familiarity is considered as experienced credibility. Since message familiarity is dependant of the individual user, it cannot be compared. Facebook (See Figure 6) and MySpace display all the games that are played by the user's friends and all the apps that are used by the user's friends. This helps the user in selecting the games or applications since the games and apps played by the user's friends will become more credible to the user. The friend requests sent by the people will include the number of mutual friends. This helps the user to accept or decline the friend request, since people who have mutual friends are more likely to be credible than anonymous. In Twitter, when a follow request is submitted, the user is able to see all the people who are following that user and all the people whom the user is following. Based on this information, the user can find common people. User can also send follow request to the people that are following friends and followers of friends, since these people are more trustable as they are in a friend's network.

The major aspect comparison for Source Credibility among Facebook, Twitter and MySpace is found in Table 3.



Figure 5  Reputed credibility among the three sites

**Figure 6** Facebook displaying games used by friends



## 6 Intelligence

Web Intelligence must incorporate the goals of both AI and IT for building the intelligent web information systems [36]. It combines the interaction of human mind and artificial intelligence with networks and technology [10]. The web must provide the information to the users in an intelligent way. The interface must be intelligent enough to recognize the specific user, and it must also be intelligent enough to provide the interface specific to the user based on the users' previous browsing history and profile.

*Privacy* Privacy is one of the issues that need to be considered while designing intelligent user interfaces [16]. The social networking sites must give the users the ability to personalize

**Table 3** Source Credibility Comparison Summary

| Guideline/criteria | Facebook | Twitter | Myspace |
|---|---|---|---|
| Networking transparency | Displays all the posts from the friends and friends' friends. | Displays only tweets from the people followed by the user and any retweets for these tweets given by other users | Displays all the posts from the friends and friends' friends. |
| Conversation tracking | Tracked as a part of one conversation | Displayed as tweets with other tweets, no grouping. Hard to know if tweet is a reply. | Grouping of posts provided, but conversation posted repeatedly with every new post. |
| Profile information | Allowed to have more information than Twitter | Minimal Information | Allowed to have more information than Twitter |
| Advertisements and pictures | Minimal | Minimal | More and distracting to user |
| Linking | Owner name with profile link on every post, and other links given wherever required. | Owner name with profile link on every post. | Owner name with profile link on every post and other links given wherever required. |
| Grouping of messages based on message type | No grouping of posts | No grouping of tweets | Grouping based on the type of post (Music, Videos, Photos, Topics, Status, etc). All viewable at once. |
| Reputed credibility | By displaying ratings, number of users. | By displaying top tweets | By displaying ratings, number of users used and liked it. |
| Experienced credibility | By displaying mutual friends, games and apps used by friends. | By displaying the people being followed and followers in common | By displaying mutual friends, games and apps used by friends. |

the privacy setting so that they can share the information that they are willing to share. Moreover, social networking sites must provide the ability to users to restrict their information to a certain group of users. Facebook has the privacy setting with many options, which include Connecting, Sharing, Apps and websites, and Block Lists. MySpace also provides a large number of privacy options, but a different set of options from Facebook. On the other hand, Twitter provides only few privacy settings, which include Tweet Privacy and Tweet Location.

*Recommender* Recommender systems are one way of helping users to deal with abundant data by recommending items that match users' personal interests [35]. Social networking sites provide a wide variety of information that includes Advertisements, Videos, Games, etc. There might be a lot of information about each of these categories and it would be beneficial to the users if the system could recommend some of the information to the users based on their interests. Facebook provides recommendations to the users based on the users' interests and their browsing history. In particular, if the user removes any advertisement, Facebook collects the reason for the user's dislike. By collecting this type of information, Facebook provides future advertisements which the user may be interested in. Facebook also suggests advertisements that are liked by user's friends. Furthermore, Facebook displays all the games played by the users' friends. MySpace recommends videos, games and music playlists to the user. Unlike Facebook, MySpace does not provide an option to close the advertisement. Twitter provides trending topics, which indicate the latest popular topics, on the Home page.

*Notifications* Notifications are reminders that users get from the system with no action from the user, once the user set up for the notifications. In social networking sites, it might be beneficial for the users to get notifications (e-mails) when the user receives a new friend request or any other events that the user might be interested in. Facebook provides notifications through emails or SMS. Furthermore, Facebook has numerous options to customize notifications. Twitter and MySpace send notifications only through emails.

*Tracking* A web agent can be described as a program that assembles information without the user's presence and on some regular schedule [10]. A remembrance agent assists human memory by providing the recent activities [10]. So, tracking the user's recent actions and activities is considered a measure for evaluating the intelligence. All the three websites keep track of user's activities, such as recent updates. However, only Twitter tracks and displays recently accessed profiles, while MySpace tracks the people who visited the user's profile recently.

*Friend recommendations* Social networking sites are mostly about building networks of friends and building communities based on people interests. So, these sites are expected to recommend the people the user might be interested in. Facebook and MySpace provide friend recommendations based on mutual friends while Twitter provides suggestions based on the types of accounts that a user is following and whom those people follow.

*Networking search* The social networking website would become intelligent, if an option is provided to search for the users on the network. If the users want to find someone that is not in their network, they should be able to find them so that they can expand their network and add more friends. Some social networking sites are provided with an option to link with other social networking sites so that users can connect people in both the networks. All three social networking sites allow importing contacts from emails, and Facebook further supports

a contact file to import friends. All three sites support to find friends by name, but only Facebook provides suggestions when the user is typing the person name in the search box.

The major aspect comparison for Intelligence among Facebook, Twitter and MySpace is found in Table 4.

# 7 User evaluation

Based on the above analytical comparison, we conducted a user study to evaluate each social networking site using the proposed four criteria.

## 7.1 Design

We have summarized a list of measurements to compare the social networking sites against the four criteria. By using a 5-point Likert-type scale (ranging from "1- very low" to "5- very high"), participants were first asked to provide their subjective feedbacks on the importance of each measurement under a specific criterion and then give a satisfaction scale on the fulfillment of a measurement in each social networking site. In the questionnaire, the measurements are expressed in plain English so that users without a strong technical background can easily understand. In the evaluation, some measurements are elaborated into more than one question to get the appropriate responses. For example, for the measurement of "Modalities" under interactivity, the questions include responses from "Photo Albums", "Music" and "Videos".

**Table 4** Intelligence comparison summary

| Guideline/criteria | | Facebook | Twitter | Myspace |
|---|---|---|---|---|
| Privacy settings | | More options than Twitter | Few options | More options than Twitter |
| Recommender | | Advertisements based on user's interests and through friend liked games and apps. | Trending topics | Videos, Games, Music playlists. |
| Notifications | | Through e-mail and some through SMS | Through e-mail | Through e-mail. |
| Tracking | Recently accessed profiles | Not displayed | Displayed | Not displayed |
| | People who viewed one's profile | Not displayed | Not displayed | Displayed |
| Friend recommendations | | Mutual friends and profile information | Type of accounts that the user is following and who he/she follows. | Mutual friends and Profile information |
| Networking search | Suggestions as typing person's name in people search box. | Provided | Not provided | Not provided |
| | Import contacts | Through e-mail, contact file. | Through e-mail | Through e-mail |

Seventy students from a midwest university participated in the survey as subjects, and some of them have accounts with more than one site. Specifically, 67 participants are Facebook users (52 Male, 15 Female), 33 are Twitter users (25 Male, 8 Female) and 15 are MySpace users (10 Male, 5 Female). Figure 7 summarizes the frequencies of usage among subjects for each site. Most of the Facebook users login to Facebook every day. Most of the Twitter users login once in 2 weeks, whereas most of the MySpace subjects login 2–4 times a week.

The subjects were asked to evaluate the importance of all the measurements of the four criteria based on a scale of 1–5. The average and standard deviation of the responses were calculated for each measurement, as detailed in the following subsections.

## 7.2 Navigation

As shown in Figure 8, the measurements used for evaluating Navigation are appropriate, as the average for all of them is above 3.5. Out of all the measures, subjects considered a page title to be the least important, whereas "Meaningful Navigation links" and "Link to Home page" were the most important.

After evaluating the importance of each measurement, the subjects further evaluated their satisfaction on the fulfillment of each measurement in a social networking site. Facebook rating is better than Twitter and MySpace about providing links at an easily accessible location; MySpace has the best rating for the measurements of focus visibility, multiple ways of reaching a desired page, meaningful sequence of pages, grouping of related contents; and Twitter has the best rating for providing meaningful navigation links. Providing link to Home page is rated the same between Facebook and MySpace. Figure 9 compares the average ratings and standard deviation of Facebook, Twitter and MySpace based on Navigation.

## 7.3 Interactivity

As shown in Figure 10, results show that the measurements for evaluating Interactivity are appropriate, as all the averages are above 3.1. Of all the measurements, the subjects considered Online Chat, Photo Albums and Search Engine essential in making a social networking site interactive.

The results in Figure 11 show that Twitter is less interactive than Facebook and MySpace. FAQ, Feedback, Music, Videos and Customization of the layout are better in MySpace than Twitter and
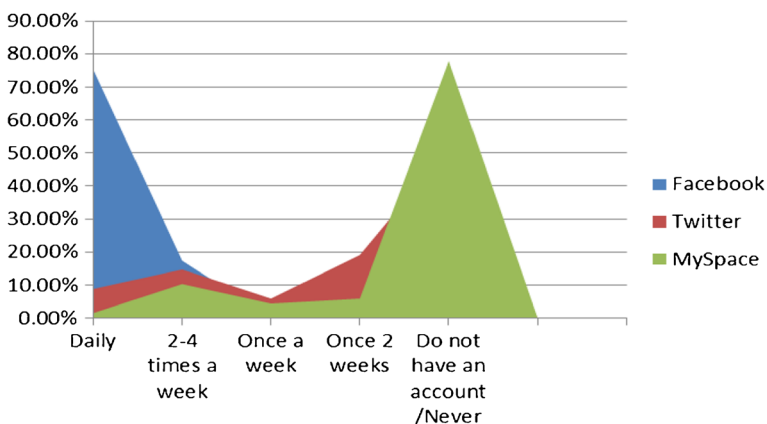


**Figure 7**  Frequency of social network usage
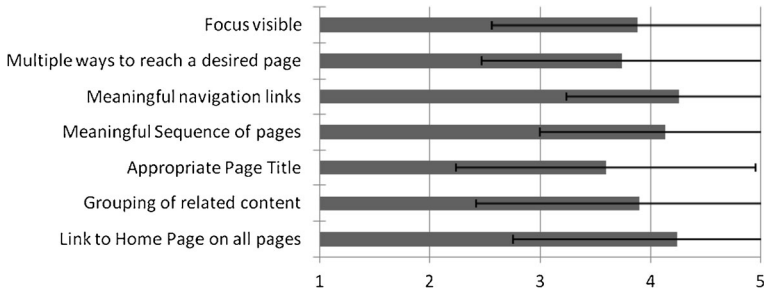
**Figure 8** The importance of navigation measurements

Facebook. The customization of layouts in Facebook supports language change for links, but does not support background or color changes and thus is rated lower for layout customization.

7.4 Source credibility

Results in Figure 12 show that the measurements for evaluating source credibility are appropriate. Based on the results, the following factors are important in making the social networking site credible on the source of information:

- browsing through friends' network,
- giving options to provide sufficient profile information,
- providing linking to posts or friends, and
- tracking the conversation and giving access to friends of friends' profile.

In comparing three websites, tracking conversations and friends' conversations are rated the highest in Facebook. Twitter is rated the best on the advertisement issue as it has the least
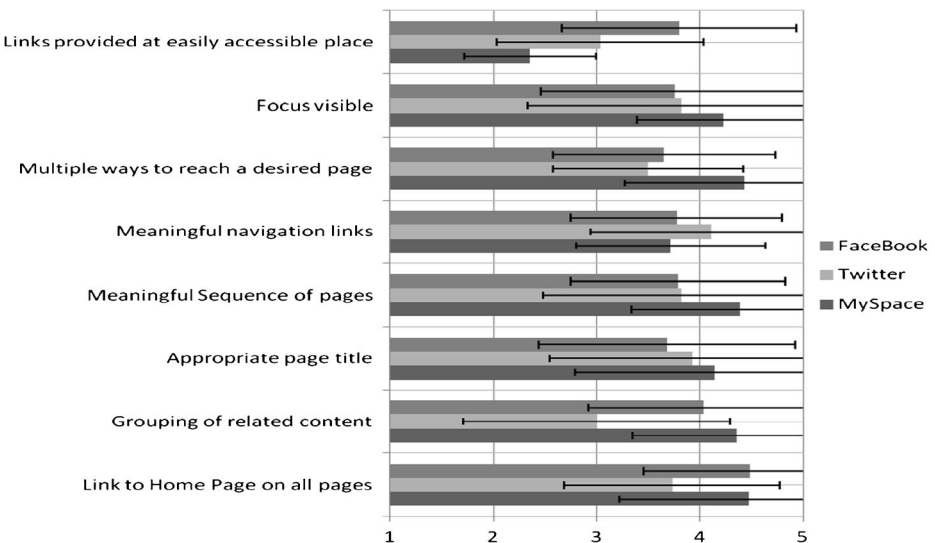


**Figure 9** Navigation comparison
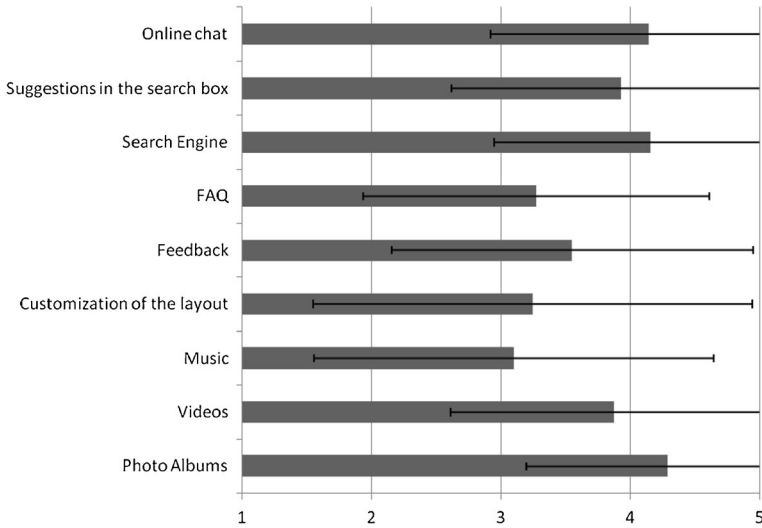
**Figure 10** Interactivity measures

number of advertisements, whereas MySpace is the poorest as it includes too many adver-
tisements. Providing ratings, friends' likes or dislike, linking and access to friends' friends
profiles are the best in MySpace. Browsing through friends' networks and options to provide
sufficient profile information are rated almost the same in Facebook and MySpace. In
summary, Figure 13 compares Facebook, Twitter and MySpace based on Source Credibility.

### 7.5 Intelligence

Figure 14 shows that the measurements for evaluating intelligence are appropriate, as the
average for all of them is above 3.0, in which the subjects responded that "Track recently
viewed profiles by the user", "Recommendations of content" and "Track who visited a user's
profile" are not important in making the social networking site intelligent. Of all the measure-
ments, the subjects responded that providing sufficient options to control the privacy, providing
suggestions while typing the person's name in search box, notifications and import contacts (in
the order) are more important in making the social networking site intelligent.

The results in Figure 15 show that Facebook has better ratings in suggestions while
typing the person name in the search box, Networking recommendation, Notification and
Privacy control settings than Twitter and MySpace. Twitter is rated better for "Recently
viewed profiles", while MySpace rated better for "Tracking who visited the user's profile".
Figure 15 shows the comparative ratings of Facebook, Twitter and MySpace on Intelligence.

## 8 Discussion

### 8.1 Comparison of three social networking sites

We compare the differences among three social network sites and then report a user survey
by collecting the subject feedbacks. The comparison and user survey provide insights on the
current practice in social networking design, and potentially useful guidelines on improving
the usability of social networking websites. In particular, the evaluation on the importance of
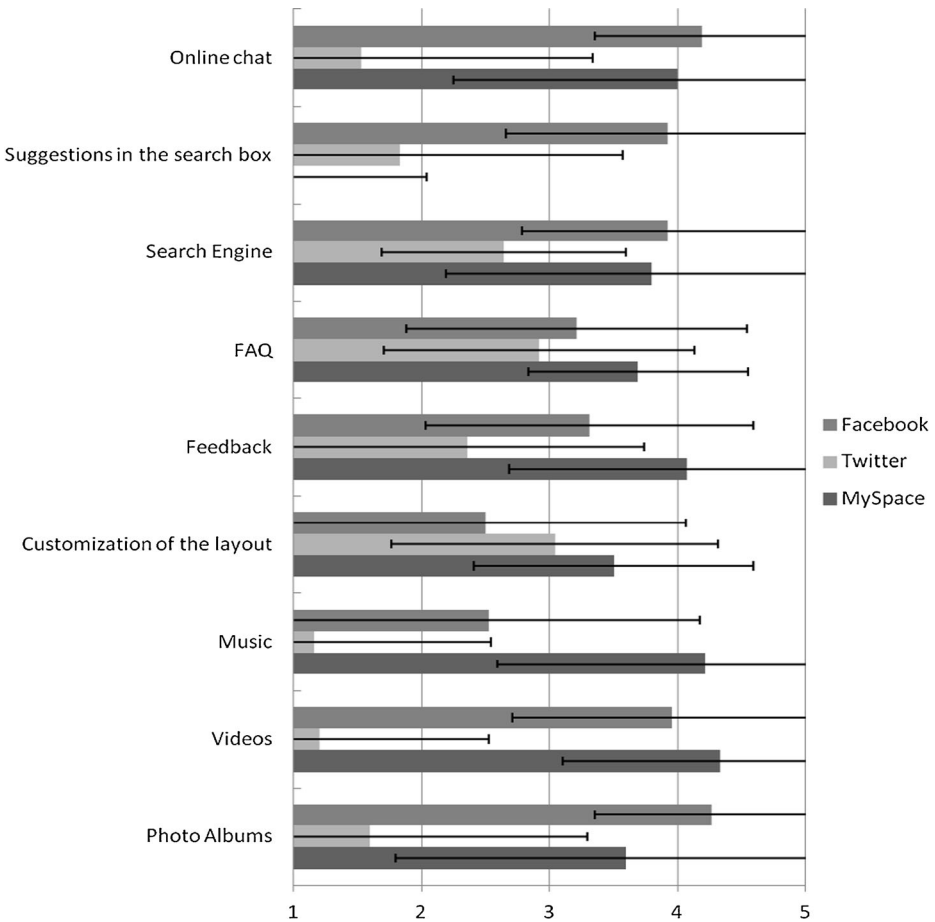
**Figure 11** Interactivity comparison

different measurements provides a list of check points for web designers to consider. The rating on the fulfillment of each measurement provides an objective comparison of three social networking sites.

In the navigation category, the three social networking sites use different techniques to facilitate navigation. MySpace provides the most number of navigation links. The page titles on twitter are the most descriptive and meaningful. Facebook follows the conventional way of putting navigation links on the left and secondary contents to the right side. In the Interactivity category, these sites support different modalities, such as photo albums, video files, or music, and allow certain layout customization. Feedback and FAQ are also provided. Comparison shows that Facebook and MySpace's search engines have better searching scopes. Moreover, Facebook shows suggestions while users are typing in search box. Considering the source credibility, we found Facebook and mySpace have better network transparency that allows users to share messages and show more profile information. mySpace has the most distracting advertisements on its site but it is able to group messages based on message types. All these sites have shown certain web intelligence, such as recommender system and notification system based on users' personal interests. Tracking
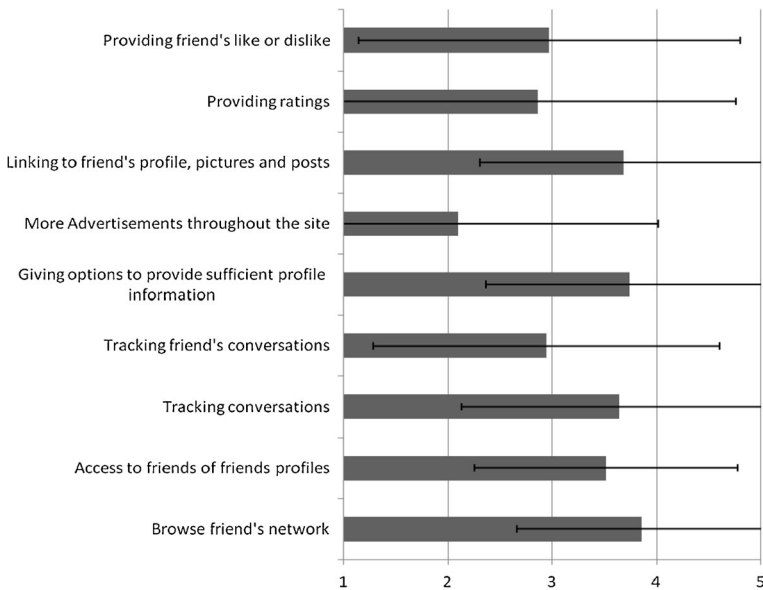
**Figure 12** Source credibility measures

is also enabled in these sites. Particularly Twitter can track recently accessed profiles, while MySpace tracks the people who recently visited a user's profile. As to searching of people's name, only Facebook provides suggestions in the search box.

We summarize the comparison of three websites based on users' evaluation in Table 5. The gray-scale of the dot represents the degree to which the website meets the measurements.

As a general purpose social network website like Facebook, connection and information sharing with friends is one of the most important features. As a social networking website designer, he/she may need to pay attention to the following guidelines:

- Navigation: Create efficient page links and design meaningful pages, so that the user can easily locate the information he/she needs with minimal number of clicks.
- Interaction: Provide diversified services for users. Popular services include online chatting, music, videos, and photo album. Necessary assistance such as Suggestions in the search box can facilitate user interaction with the website.
- Source credibility: One of the major purposes of a general social networking website is to connect users with friends. Access to friend information is therefore required for social networking website. Cautions may be taken to evaluate the credibility of shared information.
- Intelligence: Recommendation of friends can help users to easily enlarge their circles with people they might be interested in. The selection of friends and what information can be recommended need to be considered.

Twitter is a special type of social networking website that focuses on updates and micro-blogging. The main purpose of twitter is getting recent updates from people or organizations that the user follows. The following design guidelines are summarized for this type of websites:

- Navigation: Similar to a general social networking site. Efficient navigation links and meaningful page design are required. It focuses on how to obtain/post recent updates.
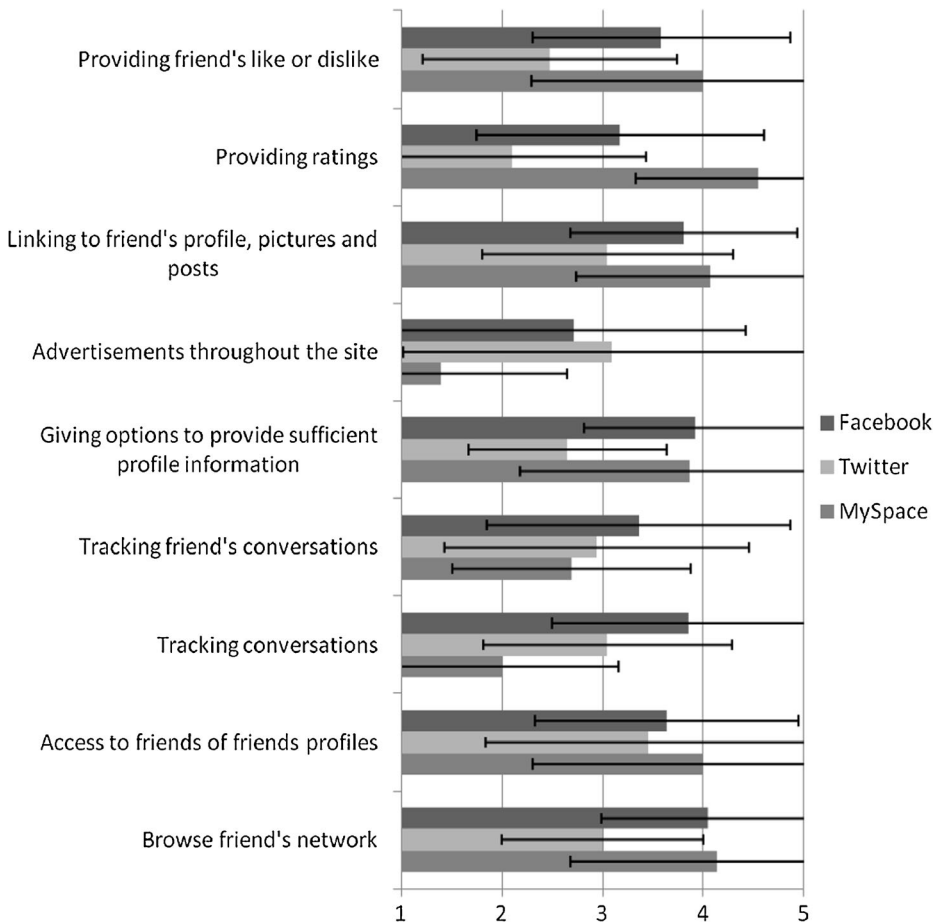
**Figure 13** Source credibility comparison

- Interaction: Fewer services are required. Since users of such websites focus more on the updates of person/organizations, other services, such as sharing of personal photo albums, video, and online chatting are not emphasized.
- Source credibility: Recommendation of people to follow in addition to friends.
- Intelligence: intelligence is required for such websites. However, the criteria of selecting persons/organizations to follow are different from those of a general website.

MySpace is a social entertainment website that focuses on pop culture. It has the general features like those of Facebook. However, its main purpose is to share music, videos, and other cultural contents among friends. Design guidelines of this type of websites include:

- Navigation: Similar to a general social networking site. Efficient navigation links and meaningful page design are required. How to quickly locate persons/ contents of interest according to users' hobbies and get recent updates should be emphasized.
- Interaction: More services on pop culture, such as sharing of photographs, video, and art work are provided.

- Source credibility: In addition to recommending people with similar hobbies as the user, it also suggests cultural contents, such as music, video, and art work.
- Intelligence: Intelligence is required for such websites. The criteria of selecting contents or persons to connect are primarily based on the user's hobbies.

## 8.2 Platform

In addition to the focus of a social networking application, the hardware platform where a social network application is running also affects the interface design. Though navigation, intelligence, interactivity and source credibility in the NICI model represent general criteria that are not associated with a specific platform, we summarize the detailed list of measures based on desktops. There are significant differences between mobile device and desktop. Compared with desktops, a mobile device has a small screen, a different input method (i.e., lacking a keyboard and mouse), and limited computing capacity. All those differences make the mobile interface design distinct from desktops. For example, a desktop based social network application may provide several paths that lead to the same content (refer to Table 1), while due to a limited screen space a mobile application has a simplified interface that provides one navigation path to a specific topic. Consequently, the evaluation results should not directly apply to mobile social network applications.

## 8.3 Threats to validity

Young people, i.e. college students, are one of the target audiences of social networking websites. Subjects of the user evaluation are 70 students from a university in the Midwest. However, the size of the subject set in this study and their educational background may not present a comprehensive view of all users with different ages, interests, and educational
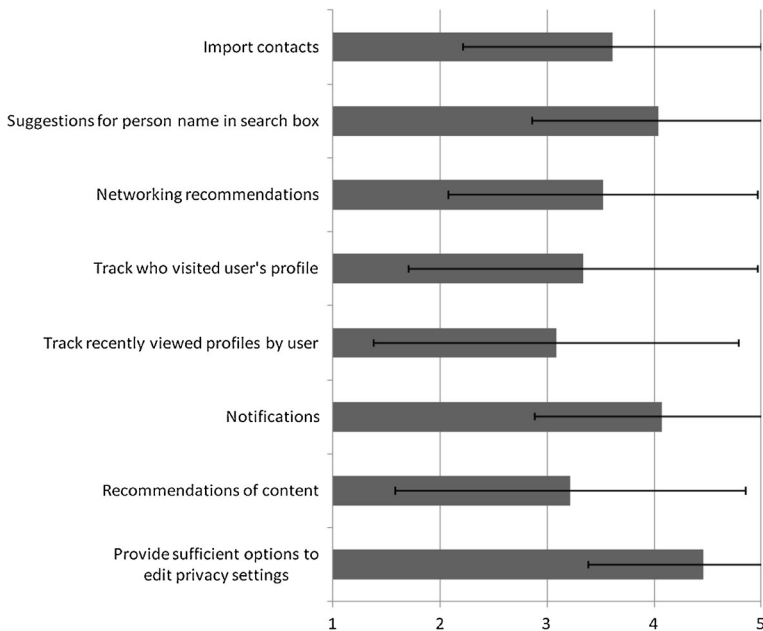
**Figure 14** Intelligence measures
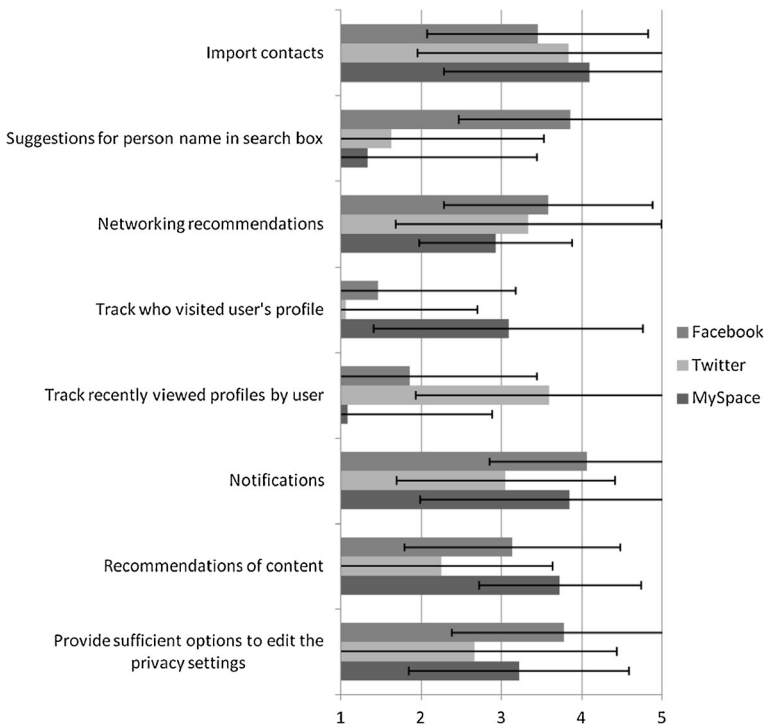
**Figure 15** Intelligence comparison

levels. Users' interest influences their participation in a virtual community and social focus of a website also affects its popularity. As a general purpose social networking site, Facebook gains more popularity than mySpace, a social entertainment website that emphasizes on pop culture.

# 9 Related work

With the advance of Web 2.0, social networking sites have gained popularity on the Internet in recent years. Scott [28] reviews the development of social network analysis and points out current major research areas. Many studies have been conducted on social network analysis from different perspectives [7, 20, 29, 33]. The rapid growth of websites also poses many security and privacy issues [24].

One of the previous studies on the social networking sites [11] compared Facebook and MySpace based on trust and privacy concerns. A survey is conducted to assess user perceptions of trust in the site and trust of other members, what type of information they share and the development of new relationships [11]. The development of new relationships is measured based on whether the users meet the people in their network outside of using the sites. Same survey questions are asked for users of both the sites, and evaluated based on the results. The results from the study conclude that the subjects from Facebook and MySpace have similar levels of concern regarding internet privacy. Facebook users showed more trust of the site and its members, and MySpace users were more active in the development of new relationships. Similarly in this paper, Facebook, Twitter and MySpace were compared, but

**Table 5** Overall comparison summary

| Measurements | | | Facebook | Twitter | MySpace |
|---|---|---|---|---|---|
| Navigation | Link design | Link provided at easily accessible place<br>Link focus visible<br>Multiple ways to reach a desired page<br>Meaningful navigation links<br>Link to home page on all pages | ◔ | ◔ | ◐ |
| | Page design | Meaningful sequence of pages<br>Appropriate page title<br>Grouping of related content | ◔ | ◔ | ◐ |
| Interaction | Social services | Online chat<br>Music<br>Videos<br>Photo albums | ● | ○ | ◐ |
| | Interaction assistance | Search Engine<br>Suggestions in the search box<br>FAQ<br>Feedback | ◔ | ○ | ◔ |
| | Customization | Customization of the layout | ○ | ○ | ◔ |
| Source Credibility | Access to friend's information | Providing friend's like or dislike<br>Linking to friend's profile, picture and posts<br>Tracking friend's conversation<br>Access to friends of friends profiles<br>Browse friend's network | ◐ | ◔ | ◐ |
| | Personal information options | Providing ratings<br>Giving options to provide sufficient profile information<br>Tracking Conversation | ◔ | ○ | ◔ |
| | Advertisements | Advertisement throughout the site | ○ | ◔ | ○ |
| Intelligence | History tracking | Track who visited user's profile<br>Track recently viewed profiles by user | ○ | ◔ | ◔ |
| | Recommendation | Networking recommendations<br>Suggestions for person name in search box<br>Recommendation of content | ● | ◔ | ● |
| | Personal customization | Import contacts<br>Provide sufficient options to edit privacy settings | ● | ◔ | ● |

on different criteria (Navigation, Interactivity, Intelligence and Source Credibility). To meet each of these criteria, various measures have been derived based on previous studies and the three sites were compared based on each of these measures. In this paper, user survey is conducted to obtain users' perception on each of the measures, and users of all three social networking sites were considered.

Subrahmanyam et al. [30] compared the offline and online social networks of young people by studying Facebook and MySpace. Different activities such as instant messaging, blogging, gaming, web browsing, downloading music, email, face to face chatting etc., which users perform on the social networking were considered as measures and a survey was conducted to obtain the conventions of the users for these activities. This study concludes that the emerging adults of age 22 years (avg.) use social networking sites to connect with people from their offline lives. It was confirmed that there was an overlap between participants' offline and online networks. The study also found that overlap was not perfect, suggesting that emerging adults may be using social networking sites and instant messaging to selectively strengthen different connections of their offline networks. In this paper, survey is conducted to obtain users' opinion on all the criteria and measures considered. The current study emphasizes on how the features are implemented in each of the sites, whereas the study of Subrahmanyam et al. [30] compared the offline and online networks.

Raacke and Bonds-Raacke [27] evaluated the uses and gratifications of Facebook and MySpace. A survey was conducted to obtain the participants' opinion on the uses and gratifications of Facebook and MySpace. Participants who did not have an account in Facebook or MySpace indicated failed uses and gratifications. Along with the questions about uses and gratifications, questions about the age, gender, ethnicity and time spent on the site were also collected to assess the impact of these on Social networking site usage. The current study also collects information about age, gender, ethnicity and the frequency of use. To participate in the survey in the current study, users can have an account in Facebook, Twitter or MySpace. According to the results in the study of J. Raacke and J. Bonds-Raacke [27], popular uses and gratifications indicate that users are meeting a "friend" need and also meeting the need by using the site as a source of information. Their results showed that even though men and women meet the same need, men have significantly more friends than women. The results based on ethnicity showed that Native American students were the least represented ethnic group. The limitation of their study is that the participants are primarily first-year college students. In contrast, the current study surveyed graduate and undergraduate students. The study [27] emphasizes on why students use social networking sites, while the current study emphasizes on the features that make social networking sites better in the usage and how they are implemented in Facebook, Twitter and MySpace sites.

Joinson [18] investigated the uses of a social networking site, i.e., Facebook, and the gratifications users derived from those uses. In this empirical study, users are required to describe how they use Facebook and what they enjoyed about their use by using words or phrases. Factor analysis on these phrases identified seven unique uses and gratifications: social connection, shared identities, content, social investigation, social network surfing and status updating [18]. This work guides the study of usage and gratification study of social networks sites, though no further comparisons with other social networking sites are conducted yet.

Some studies [2, 22] compared social networking sites based on the data collected from the individual sites. These studies analyzed the relationships and the topological characteristics of social networking sites. The study by Ahn et al. [2] compared three social networking sites, Cyworld, MySpace and Orkut, based on the network topology collected from the sites. Mislove et al. [22] examined four social networking sites, i.e., Flickr,

LiveJournal, Orkut and YouTube, by evaluating the structural properties of these sites. Even though these two studies compared social networking sites, their study is based on the data collected from the sites. In this paper, we proposed different criteria and measures to compare the selected sites, and a survey is conducted to obtain users' perception on the criteria and measures considered.

The study by Fox and Naidu [14] evaluated the usability of Facebook, MySpace and Orkut. The study mainly focused on evaluating the users' satisfaction, navigational efficiency and general preferences. A usability test with ten tasks is provided to the first-time users. Users are asked to perform the same set of tasks on the three sites and asked to respond the difficulty of the tasks (scale 1–5). The terminology of the tasks is changed related to that site. The on-screen activity of the users was recorded to evaluate the navigational efficiency, time and number of clicks made for a task. Similarly, the study in this paper also evaluates the same measures across different websites, but the measures are generalized, so the terminology is not changed. Moreover, in Fox and Naidu [14], all the participants were required to answer questions on all the sites, where as in the current study, participants were not required to answer questions about all the sites. In Fox and Naidu [14], first time users were considered where as the current study invited participants who are familiar with the sites.

Recently, Benevenuto et al. [4] proposed a click-stream model to analyze user workloads in online social networks. Instead of analyzing "visible" artifacts (e.g., messages and comments), this work analyzes user activities based on detailed click-stream data, and reveals many interesting patterns of user interaction in social networking sites, such as the transition probability among different activities. Our work is complementary to this previous work by analyzing the user interface rather than the user activities.

Visualization of social networks has long been a goal of social network analysis [28]. Zhuhadar et al. [37] build a visual information retrieval system and visually represent massive, dynamic, ambiguous data in a repository of learning objects. They use a graphical model to describe the semantics and hierarchical structures among concepts in the repository. Gilbert et al. [15] proposed to visualize dynamic community structures in social networks, where the social network presents a hierarchical structure led by individuals who play important roles in a society such as decision makers.

Lang and Wu [20] studied how online social network promote uses among their users. They examine the factors that influence users' lifetime in two social networks: Twitter and Buzznet, and make recommendations to social network operators who are interested in promoting usage. To enable users to interact with users in other social network site, Shehab et al. [29] proposed a cross-site interaction framework *x-mngr*, with a cross-site access control policy, which enables users to specify policies that allow/deny access to their shared contents across social network sites [29]. Burke et al. investigated user motivations to contribute more contents in social networking sites [6].

## 10 Conclusion and future work

This paper has proposed the NICI model with four criteria (Navigation, Interactivity, Source Credibility and Intelligence), and various measurements for each criterion, and compared three popular social networking sites, i.e., Facebook, Twitter, and MySpace. The commonalities and differences between the sites are summarized. We have also conducted objective empirical studies on the usability of social networking sites to evaluate the proposed guidelines. The NICI model advances the development of social networking applications in the following two aspects.

- There is a lack of guidelines on developing social networking applications. This paper attempts to extract guidelines by comparing different implementation options and evaluating the user's satisfaction with the implementations. The evaluation of detailed implementations provides a basis for summarizing guidelines in social networking applications.
- The proposed model provides a ground for evaluating the interface design of a social networking application. It includes a list of measurable checkpoints for evaluators to design their evaluation on social networking applications. Evaluators should customize those measures in the NICI model based on the focus of the social networking application being evaluated.

Based on the NICI model, the three social network sites can be classified into two groups. Facebook and MySpace belong to the same group that provides diversified social services, such as photos, videos or applications. On the other hand, Twitter focuses on updates and micro-blogging. For example, Facebook provides more diversified social services than Twitter, and thus implements a more complex navigation layout than Twitter (see Table 1).

Social focuses determine the design of social networking websites. These websites encourage connection between people in different ways. Facebook, a general purpose social networking site, focus on connection and information sharing between people. MySpace, a social entertainment website connects people with common hobbies. These websites both focuses on two-way connection between people. To facilitate the connection capability, we found in the study that Facebook and mySpace provide more navigation links and better network transparency that allows users to share messages and show more profile information. Twitter, an online micro-blogging service that allows users to send and receive instant messages, provides one-way connection between people. Navigation links in Twitter are simpler compared to Facebook and mySpace.

We also find that Facebook and mySpace are more interactive than Twitter because of their social focuses. In addition to messages, Facebook and mySpace allow users to share more information about themselves such as personal photos. In particular, mySpace strongly emphasizes on pop culture by sharing music, photos, and videos. Twitter, on the other hand, has less interactivity and provides a succinct interface for users to send instant message to their followers.

To encourage connection, all these sites have shown certain web intelligence, such as recommender system and notification system based on users' personal information. Facebook suggests friends a user may know according to his/her location and educational background. MySpace suggests persons, music, etc. based on users' hobby and interest. Twitter recommends new persons or organizations based on users' current selection of followings.

The successful IPO of Facebook may further encourage more social networking sites to go for IPO. The competition between the sites becomes increasingly intense. It is therefore foreseeable that higher usability and more useful features will be emerging in the near future for such sites to stay competitive. More varieties of measurements need to be proposed.

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