

# Accessibility of Registration Mechanisms in Social Networking Sites

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**Abstract.** This paper discusses the use of social networking sites in higher education and the accessibility issues which arise for students using assistive technologies when they register for these systems. Many instructors incorporate social networking into their daily teaching by creating learning groups, enabling collaborative work, or just by simply synchronizing course items with students' personal sites within these networks. This study examines the registration process for several social networking sites. Sites were evaluated according to their compliance with Section 508 of the Rehabilitation Act; evaluation also included the use of CAPTCHAs and the use of email for user identification. The paper concludes with a summary of the current status of registration processes for social networking sites and recommendations on how to improve the situation considering their application in higher education.

**Keywords:** social networking, accessibility, higher education.

## 1 Introduction

Social networking sites are extremely popular with teens and college students, and many students participate in several social networks. The development of social networking sites connecting individuals across the globe is part of a larger technological movement, often referred to as Web 2.0. Web 2.0 offers new ways of information exchange, involving user participation including collaboration and information sharing; changing computer consumers to “prosumers”, who are not only consuming information, but are also producing and sharing information [1, 7, 18].

E-learning is largely based on the World Wide Web, and Web 2.0 is expected to have a strong impact on e-learning environments. Several researchers refer to e-learning using Web 2.0 technologies as “e-learning 2.0” and predict that learning in these environments will become increasingly collaborative, learner-centered, and learner controlled [7, 6, 18]. Instructors already are using facebook groups, wikis, blogs, or podcasting, and current Learning Management Systems like Blackboard offer synchronization with student facebook accounts [1, 3]. New learning theories

like connectivism, distributed cognition, and communal constructivism are emerging and all address the shift to networked knowledge and community learning, applicable not only to student learning, but also to faculty department work and staff collaboration, making it crucial for educators to consider integrating social networking into their courses [14, 17, 19].

Students with disabilities can especially benefit from this development. Students have increased access (often 24/7) and have increased flexibility when studying and completing assignments. In addition, students can work collaboratively, join communities from the comfort of their own home, and become active contributors to the learning environment and the community [13]. Using Web 2.0 in the classroom will also better prepare students for the future work force, where many will encounter Web 2.0 applications that are being used in a variety of settings [1, 13, 18]. Because of the importance of web 2.0 to online education for people with disabilities, there have been recent legal efforts to ensure that podcasts downloaded from itunes remain accessible for people with disabilities [5].

Web 2.0 technologies like JavaScript, CSS, or Ajax increase interaction and although they provide a more dynamic and rich web, they also increase complexity and challenge assistive technology [7, 8, 10]. In addition, technologies that are used for site administrative purposes, like CAPTCHAs or account activation through user email, can further complicate access for users employing assistive technologies [23].

CAPTCHAs are used for distinguishing between humans and an automated registration process, usually powered by bots or viruses. In most cases, this is done showing distorted letters that the user then types in manually. CAPTCHAs are used by many sites to address undesirable and/or malicious Internet bot programs and present a significant challenge to users using assistive technology [15, 22]. Email can further complicate the account registration process for users. Many sites require users to use their email account as login names. Often verification is enforced during the login process which requires the user to connect to his/her email and then connect back to the registration process, incorporating yet another element for users to handle during the process.

This project evaluates 22 social networking sites with possible application in higher education. Accessibility is checked by evaluating the user registration process of social networks. User registration is the first task that connects a user to the site. If a user experiences an accessibility problem on the initial site with a basic task, this usually prevents the user from accessing other pages of the site or can make it extremely difficult to navigate the site [13].

## 2 Research Method

Two well-known sets of accessibility rules for web content are available, the Web Content Accessibility Guidelines developed by the World Wide Web Consortium's Accessibility Initiative, and U.S. federal rules mandated in Section 508 of the Rehabilitation Act [20, 16]. Many educational institutions are required to comply with Section 508, since they receive U.S. government funding. Because Section 508 (section 1194.22) rules are the defacto law for web accessibility in the US, these rules will be the focus of this study. Several tools are available to evaluate web content accessibility according to Section 508 rules. For this project, the software tool RampPE

(www.deque.com) version 6.0 was used. On the settings for RAMP, violations for paragraph 1 (scripting) report all noscript violations (i.e. both the absence of a noscript tag, and inappropriate noscript code). For specific assistive technologies, a separate functional test could clarify if the noscript tag is needed, as it theoretically is possible that a content-free strictly graphical script would not need an equivalent. However, since this project does not test for compliance with a specific assistive technology (only general accessibility guidelines), all noscript violations are included. For paragraph 0 (skip navigation links), the minimum number of links to turn on violation is set to 3 links. Manual evaluation of CAPTCHAs and email confirmation will also be performed. CAPTCHA and email are evaluated by exploring how they are being used in the registration process, and if any alternatives are offered to the user during the process.

Twenty-two social networking sites are evaluated regarding the accessibility of their user registration process. Accessibility of the user registration process is checked by evaluating all steps necessary to register a user and arrive at the home page within the account. All steps are summarized under the registration process. Sites were selected using the Wikipedia/Alexa Top 500 social network compilation [21]. The following selection criteria have been applied: sites have to focus mainly on the U.S., must have applicability in higher education, and sites with a higher number of registered users were selected over sites with a lower number of registered users. Sites were divided into three categories: a) strictly social (e.g. MySpace or Facebook), b) social with a special focus (e.g. Youtube or Flickr), and c) social with a professional focus (e.g. LinkedIn or Xing).

### 3 Results

Results are displayed by a) the number of instances of all violations during the account creation/user registration process, b) the number of rules that have been violated during the account creation/user registration process, c) the use of CAPTCHAs and email during the registration process. Table 1 presents an overview of evaluated sites and category, including the site's URL and the total violation instances per site.

**Table 1.** Overview of Sites including URLs and total violation instances

Site	URL	Total Violation Instances
<b>1 Social</b>		
MySpace	www.myspace.com	71
Facebook	www.facebook.com	7
Xanga	www.xanga.com	36
Twitter	www.twitter.com	18
Multiply	www.multiply.com	49
Classmates	www.classmates.com	106
MyYearbook	www.myyearbook.com	127
Hi5	www.hi5.com	116
Graduates	www.graduates.com	74
Student	www.student.com	380

**Table 1.** (continued)

**2 Social with Special Focus**

Blogger	www.blogger.com	31
Livejournal	www.livejournal.com	126
Flickr	www.flickr.com	30
YouTube	www.youtube.com	137
Buzznet	www.buzznet.com	83
Secondlife	www.secondlife.com	22
Wikipedia	www.wikipedia.org	17

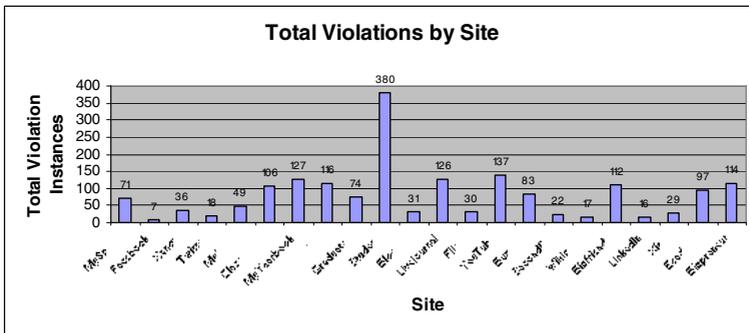
**3 Professional**

LinkedIn	www.linkedin.com	16
Bizfriendz	www.bizfriendz.com	112
Xing	www.xing.com	29
Ecademy	www.ecademy.com	97
Bizpreneur	www.bizpreneur.com	114

Violation instances show the total number of violations that occurred. The number of rules violated shows the number of different rules that have been violated during the user registration process, not considering how many times a particular error has occurred. The number of rules violated is also important; generally it is more difficult for a developer to make updates if 10 different rules were violated, rather than if 10 instances of the same rule were violated [12]. In addition, the use of CAPTCHAs, alternatives offered to CAPTCHAs, and forced email logins during the user registration process are also discussed.

**3.1 Total Violation Instances by Site**

Results in Figure 1 and Table 1 show the total number of violation instances by site. The largest number of instances is 380 instances of Section 508 violations, followed by seven sites with violation instances between 100 and 150. Seven sites have 30 violation instances or less, unfortunately no site is completely accessible. That is not surprising, since, as web sites move towards web 2.0, they often add updates which are not accessible, and often wind up decreasing web site accessibility over time [4, 9, 11]. It is especially disappointing that the site with the most violations is a site that specifically targets students (www.student.com) and promotes student social networking and



**Fig. 1.** Total Violation Instances by Site

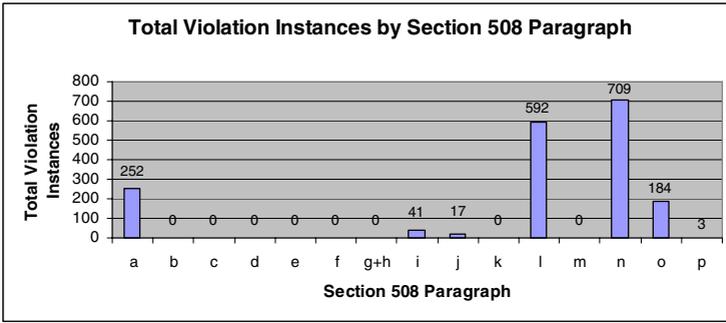


Fig. 2. Total Violation Instances by Section 508 Paragraph

student resources like college information, jobs and careers, test preparation, textbooks, and others.

### 3.2 Violation Instances by Section 508 Paragraph

Figure 2 clearly points out the four main problem areas of web accessibility during the user registration process. Paragraph n (forms) undoubtedly is the most problematic area with 709 instances; the main issues reported are labels and grouping. The next largest area of concern is paragraph l (scripting) with 592 violations, with a substantial number of violations due to device dependent scripting and missing noscript declarations. It should be noted that violations in paragraph l also contain noscript violations. Paragraph a (alternate representations) follows with a total of 252 violations, then paragraph o (skip navigation links, minimum number of links set to 3) with 184 violations. All other violations are significantly lower, paragraph i (frames) shows 41 violations, paragraph j (flickering) shows 17 violations, paragraph p (timed responses) shows 3 violations. Violations in paragraph p were all due to the use of autorefresh or autoredirect. All other paragraphs (b,c,d,e,f,g,h,k,m) show no violations.

### 3.3 Number of Rules Violated by Site

Figure 3 displays the number of rules violated for each site’s account user registration process; not considering how many times each rule was violated. Two sites have

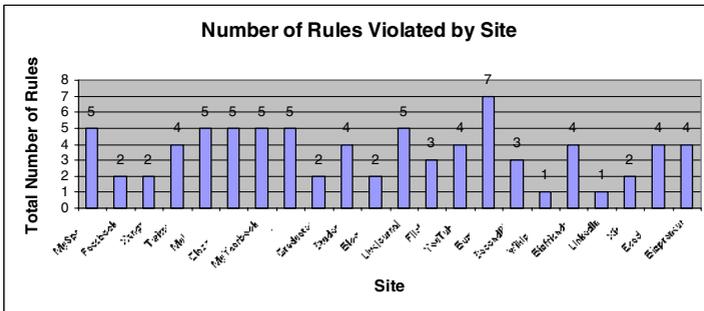
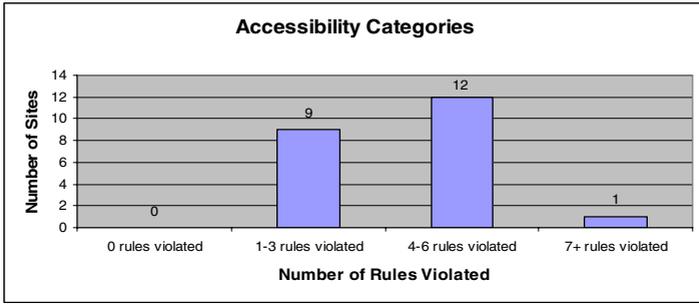


Fig. 3. Number of Rules Violated by Site



**Fig. 4.** Accessibility Categories

violated only one rule, however, most sites have violated between 4 and 6 rules, and one site shows a violation of 7 rules.

### 3.4 Accessibility Categories

Figure 4 summarizes the accessibility status of the user registration process of all sites. Considering that it is more difficult to correct violations for several rules than correcting several instances of the same rule, a ranking system based represents the site's accessibility status [12]. Accessibility status is defined by the following four categories:

0 rules violated	accessible
1-3 rules violated	marginally inaccessible
4-6 rules violated	moderately inaccessible
7+ rules violated	substantially inaccessible

Using the above defined accessibility categories, 9 sites are marginally inaccessible, 12 are moderately inaccessible, and 1 site is substantially inaccessible. Unfortunately, no site was completely accessible using the accessibility status evaluation.

### 3.5 CAPTCHAs and Email

Figure 5 describes the percentage of sites adding CAPTCHAs and email confirmation to the user registration process. In this study, over 77% of all sites used character based CAPTCHAs, and unfortunately, only 27% of the sites provided sound based CAPTCHAs. The sound based CAPTCHA was the only alternative provided, no other options were available on any of the evaluated sites. Half of the evaluated sites also use email confirmation, which forces users to open their email program and reply to an email during the user registration process. In addition to problems resulting from violations of Section 508 rules, this further increases the challenge for users depending on assistive technology by adding more elements to the already not fully accessible process.

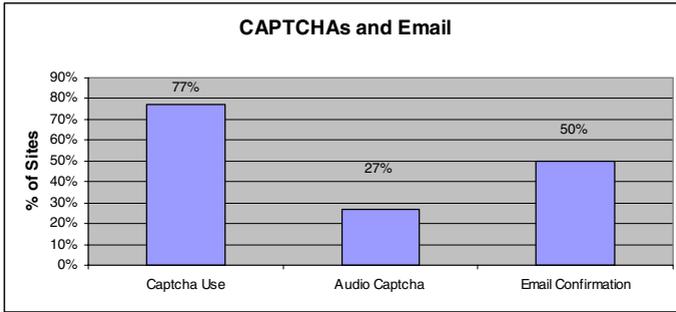


Fig. 5. CAPTCHA and Email Use

## 4 Conclusion

The evaluation points out two problem areas in web accessibility of the user registration process of social networking sites. Violation instances of paragraph l (scripting) and n (forms) together are responsible for over 72% of all violation instances. It is not surprising that violation instances concentrate in these two areas, considering that user registration consists mostly of forms for data input and often uses scripting to assist in data collection from forms as well as to aid users in entering data and filling out forms. These violations are often multiplied as sites go through several screens to collect user data. However, the high number of violation instances is disappointing; users with assistive technology may experience a significant challenge completing the user registration process.

Considering that social networking sites are modular and complex sites and that the user registration process is only a very small part of the complete site, it is to be expected that additional problems arise for users using assistive technology once they use other features of the site. For instance, users without disabilities have had a very hard time removing their profiles from Facebook [2]. However, it should also be noted that some sites (e.g. facebook and linkedin) have very few violations during this process and that the few violations occur in only one rule.

The accessibility status shows that 40% of all evaluated sites are marginally inaccessible (1-3 rules violated). Unfortunately, 59% of all sites are moderately inaccessible (4-6 rules violated). If any of these sites are planned to be integrated into the educational environment in higher education, it seems essential to reduce the number of Section 508 violations during the user registration process.

Some instances of violations suggest that increased developer awareness could avoid some of the problems making content inaccessible. One page, for example, shows 35 instances of label violations, an issue that could easily be resolved by adding the label element.

Use of CAPTCHAs and forced email logins further complicate the user registration process by introducing elements not under the control of the developer. Text-based CAPTCHAs especially provide a challenge for users with visual impairments; this situation could be improved by offering several alternative methods for users [15].

The breakdown by category did not show any main difference, except for two categories, social networks with a professional focus had less violations in paragraphs l (scripting) and o (skip navigation). However, total violation instances, the number of rules violated, and other paragraphs aside from paragraphs l and o did not show a notable difference between the categories.

The use of web development tools supporting assistive technology could be a first step to improve the situation. Development tools can assist the developer; they can alert the developer when content is not accessible and can provide guidance on making the content accessible. In addition, educators planning on using social networking sites in the classroom should carefully evaluate which sites provide the best support for assistive technology.

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