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Security in the Online E-learning Environment

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ABSTRACT

This paper addresses the role of security in the collaborative e-learning environment, and in particular, the social aspects of security and the importance of identity. It represents a case study, completed in Nov 2004, which was conducted to test the sense of security that students experienced whilst using the wiki platform as a means of online collaboration in the tertiary education environment. Wikis, fully editable websites, are easily accessible, require no software and allow its contributors (in this case students) to feel a sense of responsibility and ownership. A comparison between two wiki studies will be made whereby one group employed user login and the other maintained anonymity throughout the course of the study. The results consider the democratic participation and evolution of the work requirements over time, which in fact ascertains the nonvalidity of administrative identification.

1. INTRODUCTION

While many developments in the e-learning arena have been focused on the technicalities of providing and delivering e-learning content (The Learning Group 2003; Saxena 2004; European Commission 2005), the need for security in the e-learning environment has often been neglected.

The role of security in e-learning is to provide a secure end-to-end session between the student and the institution’s e-learning network (Graf 2002; El-Khatib, Korba et al. 2003; Davis 2004; Saxena 2004), where security can be defined in terms of technical mechanisms. For example, this can be illustrated with the implementation of data integrity using data encryption via virtual privacy for organizations using e-learning (El-Khatib, Korba et al. 2003) and (Davis 2004).

From a student’s perspective, the issue of security within an e-learning environment is on a different focus. The focus is on building a sense of security for the purpose of interaction and collaboration. This encompasses the need to provide privacy and trust for students. The ability for a student to maintain a ‘personal space’ is paramount especially when personal information is shared (El-Khatib, Korba et al. 2003). This is imperative to preserving privacy for students. Trust on the other hand is an age old issue. Trust can be used to denote that something can be trusted (Karvonen 1999). That is, something trusted is something that the users feel safe with and is proven to be reliable. Within an online e-learning environment, trust is vital when physical interaction is denied and when reliance on trusting others virtually is the only option (Karvonen 1999). A student would feel more confident in interacting and collaborating with others when there are mechanisms in place to create that privacy and trust.

For the purpose of this particular research, a thorough wiki investigation was conducted (Raitman, Hamadi et al. 2004) to determine basic wiki functionality, review different wikis and to finally select the appropriate wiki which would highlight the necessary features and ensure a useful technology for teaching and learning online (Augar, Raitman et al. 2004). Wiki (meaning fast in the Hawaiian language) is a completely interactive website which is driven by a specialized web server generating dynamic pages from the results of visitor edits (Bergin 2002). It was discovered and developed by Ward Cunningham in 1993 for the purpose of being used as a composition system, a discussion medium, a repository, a mail system and also a tool for collaboration (Leuf and Cunningham 2001). Additionally, wikis can provide an efficient, flexible, user friendly and cost-effective interface for collaboration, knowledge creation and archiving, and student interaction (Schwartz, Clark et al. 2004).
2. SECURITY IN THE ONLINE E-LEARNING ENVIRONMENT

There is a social aspect of students NEEDING to feel secure in online e-learning, which is further investigated in this section. This is followed by the importance of an identity, with a detailed explanation of user logins and secured logging systems.

2.1 Social aspect of security

For an online e-learning environment to work, the need to feel secure must be present for students. Students expect an online e-learning environment to function just as well, if not better, than the traditional learning environment. For example, in traditional learning, students submit their assignments in hard-copy format and forward it to the examiner for assessment. However, online e-learning has changed this traditional approach. Both the format of the assignment and channels of delivery are in electronic form. This exposes online e-learning to the threats and vulnerabilities of the Internet. Therefore, basic security requirements such as the integrity, confidentiality and availability must be assured when students are learning in this environment. Here, we present a scenario describing student concerns. Each of these concerns is explained within the context of each basic security requirement.

- **Confidentiality** refers to the assurance that information and data are kept secret and private and are not disclosed to unauthorized persons, processes or devices. In an e-learning perspective, students need the assurance that their assignments they submit online are kept private and only disclosed to the intended examiner.

- **Integrity** refers to the assurance that information and data have not been accidentally or maliciously modified or destroyed, and is in accurate, correct and complete original form. In an e-learning perspective, students need the assurance that their assignments arrive to the intended examiner in its original and 'unedited' state.

- **Availability** refers to the assurance that information and communication resources are readily accessible and reliable in a timely manner by authorized persons. In an e-learning perspective, students need the assurance that they have reliable and timely access to the e-learning system in order to submit their assignments on time.

2.2 Importance of Identity

The advent of electronic communications such as the Internet has significantly contributed to the exponential growth of identity theft and fraud. According to the recent Federal Trade Commission survey of identity theft in the U.S., 23.3 million persons were affected in the past five years and billions of dollars of losses were felt by consumers and businesses (Federal Trade Commission 2003). Protecting the identities of users has become crucial in cyberspace. The Internet has made it easier for criminals to obtain identification information and data such as passwords and banking information. Once obtained, criminals can use it to purchase online products and make fraudulent withdrawals from bank accounts. It is so vital that our online identities are not stolen or fraudulently used by others.

The fundamental and distinctive sets of characteristics of an entity are what constitute that identity and it is what enables others to distinguish it from others (Abelson and Lessig 1998). This may comprise physical traits, personal preferences or other people’s perceptions of the individual’s personality. This concept insinuates that no two identities are the same and that each identity is associated with a unique set of characteristics which are either intrinsic or are appointed by another. Within an online environment, identities of users are commonly referred to as digital identity. The simplest form of providing protection of digital identities is with the use of user logins (DigitalIDWorld 2004). Next we discuss the importance of user logins and secure logging system in terms of providing security for students in an e-learning environment.

2.3 Importance of User Login and Secured Logging System

Users have come to expect instant and effortless access to information. Therefore, providing timely and accurate access to users is of utmost importance. This is especially important for distributed online e-learning environments whereby users are dispersed around the world.

User logins are the simplest means for providing identity and access services. All that is needed is a user ID and a password from the user’s behalf. As a result, user logins provide three crucial identity and access services:
1) **identification** – recognition of the user as a genuine member of a user community
2) **authentication** – verification of the user’s identity
3) **authorization** – permission to access specific resources.

The secured logging system provides three security abilities: 1) **auditing** – examination of user online transaction activities; 2) **accountability** – association of user actions; and 3) **non-repudiation** – elimination of a refuted activity performed by a user.

Both security methods contribute to building a sense of security for the users. They both play a role in building confidence and trust in an e-learning environment. User logins restrict access to eligible users to access resources and systems and the logging systems keep record of all users’ activities once in the system.

3. METHODOLOGY

This two fold case study, completed in Nov 2004, was conducted to test security using the wiki platform as a means of online collaboration in the tertiary education environment. Although the objectives for both of these case studies remain the same, there is a difference. The first exercise was trialled on 541 students at Deakin University. Known as the Ice Breaker, it requires participation and a user login. Students must engage, and hopefully, once they get caught up in the activity, they will strive to improve the relevance and quality of their work, because they are now on display. This is in fact true for many students, because it is more embarrassing to make public postings that have no value (Klemm 1998). Whilst registered users can write articles, edit and discuss changes, administrators can exercise a certain degree of institutional authority. Hopefully this deters graffiti attacks, unnecessary yet intentional deletions and general misconduct (malanguage, offensive postings etc) (Ciffolilli 2003).

Student tracking and member authentication was initiated since there is a risk of mass deletion and other similar problems in such an open environment. The registered user login requirement is to deter users from causing such chaos. Students can delete information on purpose (e.g. information no longer necessary or offensive), but there still remains concern about the student who may abuse the environment. Consequently, all wikis are currently backed up every night, enabling the history facility. This in turn could allow the wiki to rollback to an archive of any given date.

Conversely, the second exercise does not require any user identification. It involves the implementation of a wiki in a collaborative group setting hosted by the unit, Information Systems Project. This unit sees 15 groups, each comprising ten members, undertaking an industry-based information systems project involving analysis, development and implementation of an information system for a client assigned to each group. The unit also addresses numerous project management techniques and gives each student the opportunity to apply these techniques to their allotted project (2004). This open access platform where readers and editors can not be identified, realistically might incur a higher risk of misuse. It has been suggested that open access wikis for editing deters regular university use for content that must not risk change (Schwartz, Clark et al. 2004). This case study will therefore shed light and either assume the suggestion credible, or prove otherwise.

It must be noted though, that since there was neither a rollback facility nor any student identification obtainable, students were given the following warning on their wiki page (which also could have been deleted by a nuisance, but was not):

“...please be aware that if you choose to use the wiki as a tool to collaborate on important documents, you do so at your own risk. Document inconsistencies can result when multiple parties edit the wiki simultaneously. Because all tools and features of the wiki can be edited, it is CRITICAL that users make copies of their important documents. Always save your own work!”

Again, this warning only appears for the open access wikis where readers and editors can not be identified, thus incurring a higher risk of misuse.

In case of general chaos, wiki moderation was sustained throughout the exercises in the form of tutors. Although student feedback can be in the way of questions, suggestions or requests for clarification, it appears to be as essential as the learning itself in a collaborative environment (Cockrell, Caplow et al. 2000). The main function of the tutor / facilitator is to keep the group on task, focus and deepen the inquiry, guide the synthesis of information toward decision making and problem solving, resolve disputes among participants and critique work. The tutor has the ability to offer expertise in the relevant field, friendship in the learning environment when students can benefit from the socially humane input, authority, and the command to reward or punish the progress with grading, recommendations, grants etc. (2002). The facilitator was placed in position to devote attention to forming the groups of appropriate size and assessing the levels.
of intelligence, dealing with members who were not contributing, unmotivated, bossy, resistant, abusive, and instilling in the members a sense of responsibility, which makes them accountable for all their actions and input (2003).

4. RESULTS AND ANALYSIS

Following are the results that were extracted from the survey that was completed after the conclusion of the two separate case studies, which was differentiated by user login and anonymity.

Once the wiki exercises were underway, it was evident that 92% of the students participated with continuous activity. And 73% found the wiki software easy to use. Assessment was the motivating key, as is in any tertiary unit, but students remained focused, whilst checking and editing the content of the wiki (Raitman, Augar et al. 2004).

The nature of the wiki, in that it is fully editable, thus empowering the user with a sense of ownership and authority, gave the students the platform to collaborate in a relaxed environment. Why relaxed? Because basically they could voice their opinion, submit work and be sure that unless it was defamatory, it appeared as validated work. This lends to a democratic feeling among members who know that they are building on opinions and research and as a result can add their input without any consequential repercussions. As one student commented, ‘it is non confrontational’. With all students operating on an equal footing, appearances, accents and body language simply hold no bearing on the quality of the work or the confidence of the contributor.

For the purpose of the user login case study, using the signature and timestamp was necessary for the purpose of assessment, because students were to be graded on their participation. This feature proved popular because when viewing the page, although not highlighted, one was able to glance at the timestamps to ascertain if any new editions were made to the wiki page, and they were able to recognize which participant had contributed to the wiki.

In fact, it can be noted that one of the main concerns of content deletion and simultaneous editing were well highlighted by the students in the feedback, but in reality, there was not one incident that occurred to validate their anxieties. This is illustrated in Table 1. The FEAR of losing work or having to duplicate their input was enough to dissuade them from believing the wiki environment was fiercely reliable. Students voiced their concerns about the possibility of losing work or having other wiki members defame the wiki page. However since no malpractice occurred at all, and therefore none of the survey respondents could actually pinpoint an incident of concern, they simply felt insecure just by the possibility of what could happen.

<table>
<thead>
<tr>
<th></th>
<th>User Login with ID</th>
<th>User Anonymity</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of pages (excluding personal profiles)</td>
<td>120</td>
<td>22</td>
</tr>
<tr>
<td>No. of page edits</td>
<td>5932</td>
<td>224</td>
</tr>
<tr>
<td>No. of registered users</td>
<td>549</td>
<td>40</td>
</tr>
<tr>
<td>No. of registered administrators</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>No. of page views</td>
<td>44926</td>
<td>889</td>
</tr>
<tr>
<td>No. of unsolicited incidents (e.g. mass deletion, abuse etc.)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 1 – Usage statistics

The legitimate pages include all the unit groups and links to other pages such as Main Page, SITwikiFAQ, Recent Changes, Help, Disclaimer and Special Pages. Having provided the platform with the facility to track down misuse offenders, it must be emphasized that no abuse was actually reported. In one instance out of 6156 edits, a student deleted a page and wrote over it, but that was not intentional or offensive in any way and it did not lead to frustration by any of the members. The student was simply grappling with the new technology.

In the anonymous wiki, where users had complete control over their actions, with no accountability, nor the fear of being accused of misconduct, there still remains an incident free platform. Students could have deleted wiki content with the intention of pure annoyance, or used abusive language, knowing they would confidently remain unidentifiable, yet they did not behave in this manner. The results as highlighted in Table 1 reveal that user login vs. anonymity bears no effect on the security of the usage of the wikis in the online environment.

5. CONCLUSION

In an effort to determine the significance of security from a students perspective, two units with similar principles were set up in a wiki environment, with the only difference being that one required a user login
requirement. In the other unit, users had complete control over their actions, with no accountability, nor the fear of being accused of misconduct. If they deleted wiki content with the intention of pure annoyance, or used abusive language, they were confident in knowing that they remained unidentifiable. The results indicate that even with student anonymity, there was in fact no misconduct or reprehensible behaviour apparent. This paper has shown the value and benefits of fostering a sense of security in the online e-learning environment. Students were able to instill an honor and trust into their research and collaboration which nurtured a collaborative piece of work that they could claim ownership. However, for their own sense of identity and security, they emphasized the fact that a user login was preferred. Students felt secured, confident and positive in what is generally an insecure, exposed and vulnerable environment. Their actions were all recorded and traceable with a logging system. As a result, they felt that their work was void of malicious behaviour from other students in a secure environment, supporting a personal and communal accountability.

6. REFERENCES

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