

Usability Evaluation of an Online Resource Designed to Help Educators Recognize and Respond Appropriately to a Concussion

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Abstract: Concussions are serious brain injuries that can significantly influence the brain's ability to function at its normal capacity. Following a concussion, it is common for students to experience difficulties in the classroom. If unrecognized and untreated, these problems have the potential to significantly impact the student's academic career as a whole. By understanding concussive neurological issues, educators can use their expertise to create flexible, temporary, and fluid academic adjustments allowing the student to continue to learn during recovery from a concussion. A private school on Oahu created a website to provide instruction and resources for educators to help them to recognize and respond appropriately to a concussion. This usability study evaluated the content and organization of the website. Usability participants navigated the website to complete four tasks that the target audience might encounter. Content and navigation of the website were well received and feedback for improved ease-of-use was discussed.

Introduction

Concussions have become a major public health concern. According to the Centers for Disease Control (CDC), about 1.7 million people sustain a concussion annually (Centers for Disease Control and Prevention, 2006). Additionally, an estimated 300,000 sport-related concussions occur every year in the United States (Guskiewicz, Weaver, Padua & Garrett, 2000). By the time their high school playing career is finished, more than 60 percent of all teenage athletes will experience some type of concussive injury (Collins & Hawn, 2002). To exacerbate the issue, many concussions sustained by younger athletes go unreported because their coaches, parents, and the young athletes themselves do not fully understand concussions. (McCrea, Hammeke, Olsen, Leo & Guskiewicz, 2004).

A concussion is a traumatic brain injury that can significantly influence the brain's ability to function at its normal capacity. This disturbance can be caused by a direct blow to the head or body that results in a rapid acceleration or deceleration of the head and neck. This invisible injury disrupts the way the brain normally works by affecting mental stamina, as the brain must work longer and harder even to complete simple tasks.

Concussions also affect reaction time, short-term memory, working memory, and cognitive processing speed (Collins & Hawn, 2002).

It is especially important for educators of young athletes to know how to recognize a concussion, what to do if their student sustains a concussion, and the importance of physical and mental rest in the recovery process. The key to recovery from a concussion, both in the athletics and in the classroom, is physical and mental rest, followed by a gradual progression back to activity (McCrory, et al., 2013). Most concussions resolve within a few days or weeks, so the management of a concussed student may not be any different than that of one who missed a few days due to minor illness. However, some concussion symptoms linger and have the potential to cause long-term academic and social difficulties for the student. If unmanaged, these problems have the potential to significantly impact the student's academic career as a whole. Proper classroom management of a concussed student by his or her educators can allow the student to continue making academic progress through accommodations designed to help prevent permanent damage to the student's academic record.

While an abundance of online resources exist to help educate coaches, students, and parents about concussions, there is limited information specifically for educators. Educators are often forced to search for and curate information about concussions on their own. This is both ineffective and time-consuming. An Oahu private high school has created a website to help their educators recognize a concussion and properly manage it in the classroom. This website is a resource allowing teachers to read at their leisure and repeatedly revisit to find quick, relevant information for their specific situation. The purpose of this usability study is to evaluate the content and organization of this website designed to help teachers at this Oahu private high school to recognize and respond appropriately to a concussion.

Background

One of the most important steps in building a website is testing for usability. Internet users often will not learn how to use a website and are accustomed to experimenting with a new website. Research has shown that the design and aesthetics of a website significantly impacts its' usability, credibility, and educational effectiveness (David & Glore, 2010). Additionally, online resources should be easily navigated by the diverse technological skills of its' target audience. Quality organization of content on such website is paramount to the goal of providing helpful information to its' audience. Quality content is only as good as the navigation of the site.

Website Description

The website to be evaluated was created by the Communications Department at the school with direct input from the athletic trainers. The athletic trainers have direct authority to modify the content and organization of the site. The site was developed to provide instruction and resources for educators who wish to learn more about concussions and how to properly manage them in their classrooms. The participants in

this usability study are educators who work at the private high school. Participants were selected based on their varying levels of technological expertise.

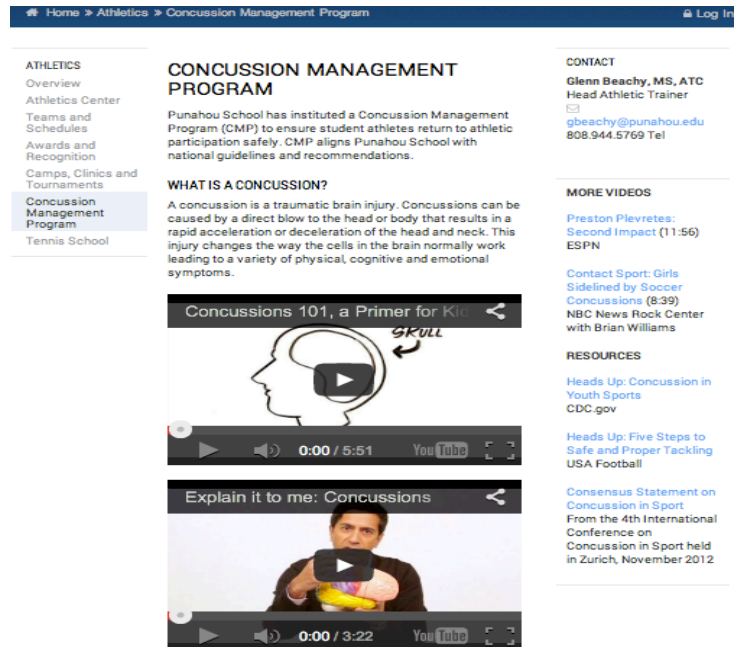


Figure 1. Concussion Management Program Homepage

The website was designed to be a concussion resource for parents, students, teachers, and coaches. The content is based on the current best practices established by the literature. Resources were drawn from a multitude of online resources, such as the Centers for Disease Control, The Nationwide Children's Hospital, The Rocky Mountain Youth Sports Medicine Institute, and YouTube. The content and resources were curated and organized to provide a central resource for the target audience. A combination of text, videos, and embedded links were used to convey the information in an engaging manner.

Methods

The usability test procedures are based on Krug's, *Rocket Surgery Made Easy* (2009) book. For the usability study, 15 educators from the school were contacted via email and given information about the purpose and design of the usability test. Before beginning usability testing, each participant was asked to complete a Google Form, containing the pretest questionnaire to measure their comfort level navigating websites and their prior use of the website to be tested. Six teachers were chosen from the pool of respondents based upon their level of technical expertise and prior use of the site. There were two iterations of the usability test, with three participants in each. Before beginning usability testing, each participant was asked to complete a Google Form, containing the pretest questionnaire to measure their comfort level navigating websites and their prior use of the website to be tested.

As displayed in Table 1, this usability study was conducted over a period of five weeks. Usability tests were conducted individually in the educator's office. To reduce the amount of variables, each participant used the same laptop and web browser during all usability testing sessions. Additionally, all applications were closed on the testing computer except for the web browser and screen cast software. Participants were given identical instructions to review website with open, objective responses. QuickTime was used to record the screen and audio during the usability test. The touch pad was used by all participants to navigate the website.

Table 1. Usability Test Timeline

Week	Action
1	Identified potential participants and collected their demographic information via a pretest questionnaire on Google Forms.
2	Performed the usability test and aggregated the collected data.
3	Data from the first round of testing was analyzed and the website was redesigned accordingly.
4	The second iteration of the usability test was conducted.
5	Data from the second iteration was analyzed and the website was redesigned accordingly.

The four tasks took about 40 minutes to complete. Tasks were based on common questions made by educators at the school about concussions. The tasks were meant to address common reasons why educators would visit the website as well as frequently asked questions and content. Each participant completed the tasks in a random order.

The tasks were written as follow:

1. Please explain to me the school's Return to Play Protocol for Concussions.
2. Please explain to me the signs and symptoms of a concussion an educator might observe in their student.
3. Please open up the resource: "Heads up: Concussion in Youth Sports".
4. Please explain to me how you may accommodate a student who has the following symptoms in your class:
 - a. Difficulty learning new concepts
 - b. Difficulty concentrating
 - c. Feeling slowed down

While the participants navigate the site to complete the tasks, the test administrator asked him or her to verbally explain why they chose certain links and buttons, whether what they clicked on was as expected, and if it satisfied the task. After the tasks were completed, the participants were asked more general questions about the content and organization of the site.

The test administrator recorded the top three usability issues that came up during each test. Additionally, the QuickTime recordings were reviewed and evaluated to aggregate a list of the usability issues arising during each test. The issues and demographic data were grouped and displayed using a combination of spreadsheets and graphs.

Results

Pre-test Demographic Survey

The participant pool consisted of four males and two females with an average of 13 years of teaching experience. All of the participants reported having a concussed student in their class, however only 17% reported having visited the Concussion Awareness Website prior to the usability test. Participants reported being fairly comfortable navigating websites with 67% of the participants rating themselves at least a 4 on a 5-point scale.

General Comments

Participants immediately identified the resource website as an official school website where a user might go to learn about concussions. They described the website as “clean” and “professional looking”. Although there was a lot of information, they liked the use of bullet points and boxes to separate the target audiences. The inclusion of videos to accommodate the visual and auditory learners was also noted and appreciated.

Several participants noted that, although they appreciated the depth of content on the website, when first landing on the home page, they had to scroll down to see most of the content meant that they were less likely to take the time to explore the website. Although participants appreciated the inclusion of a clickable link that starts an email to the Head Athletic Trainer, they noted that they should have access to all of the athletic trainers employed by the school in the same manner.

Drop Down Boxes

A major issue with the resource website was the drop down boxes in the middle of the page. The website utilized drop down boxes to guide users and separate information. In the first iteration, one participant was not able to complete the task involving explaining the Return to Play Protocol for concussions because she did not know that she could click on the box. Additionally, three participants commented that the boxes were “confusing” and they “didn’t know what to do with them”.

Participants were also confused by the horizontal layout of the target audience boxes. Two participants commented that they thought the target audience boxes were merely headers for the content below it. The layout of the target audience boxes made it impossible to hide the content inside. This caused one participant to incorrectly complete the task to explain the signs and symptoms of a concussion an educator might observe

because the student tab was open instead. Two participants commented that the boxes are not easily identified and should be placed higher up on the web page where a user can identify and click on their respective target audience box without scrolling down the web page.

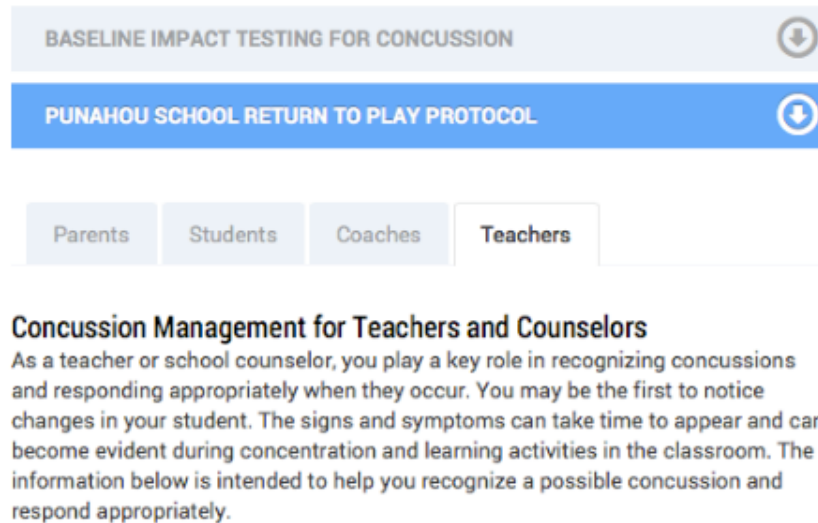


Figure 2. Drop Down Boxes

Resources

Another issue that emerged involved the resource section of the website. Although, all of the participants appreciated the inclusion of additional resources, one participant in the first iteration was not able to complete the task to find a specific resource. Three participants also commented that they were confused by the organization of the resources, especially the purpose of the heading "More Videos", since videos were also present under the "Resources" heading.

Discussion

The current literature suggests that online educational resources can have a measurable impact on the users knowledge of concussions (Glang, Koester & Beaver, 2010; Bagley, et al., 2012; Covassin, Elbin & Sarmiento, 2012). According to David and Glore (2010) the organization of a website can significantly impacts its' usability, credibility, and educational effectiveness. The purpose of this usability study was to evaluate the content and organization of an online resource designed to help educators at a private high school on Oahu to recognize and respond appropriately to a concussion.

This usability study revealed how educators at the school use online resources. Educators want to find specific information quickly when they need it. Although seven distinct usability issues emerged during the testing, only three were addressed in this phase of the sites development. This was to stay in line with Krug's (2009, p. 145) philosophy of focusing on a small number of the most important problems.

Although participants appreciated the overall depth of the information, they found the amount of information on the home page to be overwhelming. Based on this feedback, the amount of videos on the home page was reduced from two to one. The layout of the target audience boxes was also rearranged from horizontal to vertical. Combined, these changes allowed a viewer to immediately see all of the information when they enter the website. In the future, since the participants found the target audience boxes in the middle of the page confusing and hard to find, the website would be improved by moving the target audience boxes to the top of the web page. However, in the spirit of Krug's (2009, p. 145) mantra of "doing the least we can do", this wasn't done at this time.

It also became apparent that the resource section needed better organization. The initial site had resources housed under two headings: "More Videos" and "Resources". This tended to confuse participants because videos were housed under both headings. Additionally, the organization of the resources lacked a clear and logical order. Four participants found it challenging to find a specific resource in the section. Originally, all of the resources linked on the website were also linked in the resource section. The logic was to provide first level access to specific resources to users. However, this led to twenty-one resources being listed in the section. Based on feedback from the participants, resources were separated into two groups: videos and PDF's. Videos were kept on the left side of the webpage while PDF's were moved to the bottom of the webpage. Additionally, PDF's were grouped according to their target audience.

Conclusion

In summary, concussions have become a major health concern. School aged children are particularly vulnerable to concussions. If unrecognized and managed improperly, concussions have the potential to significantly impact the student's academic career as a whole. Although there are numerous websites educating parents, coaches, and athletes about concussions, the online resources specifically for educators are extremely limited. Educators are forced to search for and curate the information on their own. This is both time-consuming and ineffective.

Overall, the content and navigation of the website was well received. Participants found the website to be very informational and professional looking. Resource websites for educators need to be easily navigated by a diverse population who bring varying levels of comfort level with technology. Content organization is vital to providing an efficient and effective website. The major issues that emerged were the use of drop down boxes to separate information and the resource section of the website. This resource website would benefit from some minor modification to the layout as well as additional usability testing.

References

- Bagley, A. F., Daneshvar, D. H., Schanker, B. D., Zurakowski, D., d'Hemecourt, C. a, Nowinski, C. J., Goulet, K. (2012). Effectiveness of the SLICE program for youth concussion education. *Clinical journal of sport medicine : official journal of the Canadian Academy of Sport Medicine*, 22(5), 385–9. doi:10.1097/JSM.0b013e3182639bb4
- Centers for Disease Control and Prevention (CDC). (2006) Traumatic Brain Injury in the United States: Emergency Department Visits, Hospitalizations and Deaths 2002 – 2006.
- Collins, M.W., & Hawn, K.L. (2002, February). The clinical management of sports concussion. *Current Sports Medicine Reports* 1(1), 12-22.
- Covassin, T., Elbin, R. J., & Sarmiento, K. (2012). Educating Coaches About Concussion in Sports: Evaluation of the CDC's "Heads Up: Concussion in Youth Sports" Initiative. *Journal of School Health*, 82(5), 233–238. Retrieved from 10.1111/j.1746-1561.2012.00692.x
- David, A., & Glore, P. (2010). The Impact of Design and Aesthetics on Usability, Credibility, and Learning in an Online Environment. *Online Journal Of Distance Learning Administration*, 13(4).
- Glang, A., Koester, M., & Beaver, S. (2010). Online training in sports concussion for youth sports coaches. *International Journal of Sports Science Coach*, 5(1), 1–12. doi:10.1260/1747-9541.5.1.1.
- Guskiewicz, K.M., Weaver, K.M., Padua, D.A., & Garrett, W.E. (2000). Epidimiology of concussion in collegiate and high school football players. *American Journal of Sports Medicine*, 28(5), 643-650.
- Krug, S. (2009) *Rocket surgery made easy: The do-it-yourself guide to finding and fixing usability problems*. Berkeley, CA: New Riders Press.
- McCrorry, P., Meeuwisse, W. H., Aubry, M., Cantu, B., Dvorák, J., Echemendia, R. J., ... Turner, M. (2013). Consensus statement on concussion in sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012. *British journal of sports medicine*, 47(5), 250–8. doi:10.1136/bjsports-2013-092313
- McCrea, M., Hammeke, T., Olsen, G., Leo, P., & Guskiewics, K. (2004). Unreported concussion in high school football players: Implications for prevention. *Clinical Journal of Sports Medicine*, 14(1), 13-17.

Appendix A: Top Usability Issues

1. Drop down boxes confusing.
2. Target Audience Boxes were not intuitive.
3. Too much information on home page. It takes too long to find information on the bottom of the page.
4. Resource section lacked logical organization.
5. Too wordy – hard to find information quickly.
6. Should have included the contact information for all of the athletic trainers.
7. Should have a FAQ section.
8. Didn't like how links opened a new tab