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Student Learning in Online Chemistry Textbooks

Jimmy Cerone

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Intertext Links in Online Textbooks: Hypertext Theory of Learning

Jimmy Cerone, Justin M. Shorb
Holland, MI

Abstract

Rising textbook prices are pushing both students and professors to consider alternatives to the traditional textbook. The online medium is promising because of reduced prices and additional interactivity. One possible solution is an open textbook, which is freely available online. One feature of the online medium is that references within a textbook can be linked, and students can click these links to move easily between topics. The research performed here uses Google Analytics website traffic data to see how the over 2,000,000 visitors per month use intertext links (links to other parts of the textbook) on the 20 most popular pages. Specifically, patterns of use for intertext links were investigated and the insight gained is applied in the form of design principles for continued development of LibreText ChemPRIME textbook and other future online textbooks.

Research Questions

1. Does website analytics data reveal commonly accessed pages that reflect current knowledge of what subjects students have found to be difficult to learn?
2. Within commonly viewed pages, how are various intertext links embedded into the text and how does this relate to the frequency of use by website users?

Methodology

Web analytics was used to identify the 20 most commonly viewed pages of Libretext. These top pages were compared to the literature outlining the most difficult topics in general chemistry. Next, each intertext link of a page was classified as related or unrelated to the main topic of the page. The users usage of the link (identified using web analytics) depending on its relatedness was then analyzed.

Findings

The first analysis regarding the correspondence between the most visited pages and the topics considered difficult by general chemistry students revealed that 11 of the 20 (55%) top pages were considered difficult according to the literature. This result both affirms the existing literature and highlights the trend of students turning to the internet for help.

The results of the second analysis showed that users utilize related links at a significantly higher rate than unrelated links (p-value < 0.05 two sided t-test). While this result may seem obvious, one would be surprised at how many unrelated links are present. This research emphatically shows that if a link is to be used, it most either be obviously related to the topic at hand or else the connection must be made obvious by the author. Otherwise, the link will be nothing more than a bit of blue text to distract the reader. However, these results also show that if a link is related, users will click on it. This is significant in light of hypertext learning theory, as authors can use related links to emphasize the connections between concepts to improve students understanding.

Limitations

Analytics software only allows the analysis of intertext links, and usage isn't tied to specific users and therefore we can't correlate usage patterns to grades. The study was only conducted using user data from the past school year. A longer study would be able to detect long term trends invisible in only a year.

Future Work

Future work includes conducting A/B testing using pages with different intertext link formats to test the results of this study.

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References