

Evaluating the Comprehensiveness of Wikipedia: The Case of Biochemistry

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1 Overview

In recent years, the world of encyclopedia publishing has been challenged as new collaborative models of online information gathering and sharing have developed. Most notable of these is Wikipedia. Although Wikipedia has a core group of devotees, it has also attracted critical comment and concern, most notably in regard to its quality. In this article we compare the scope of Wikipedia and Encyclopedia Britannica in the subject of biochemistry using a popular first year undergraduate textbook as a benchmark for concepts that should appear in both works, if they are to be considered comprehensive in scope.

2 Method

The aim of the research was to compare the scope of coverage between Encyclopedia Britannica (online version) and Wikipedia. The scope of coverage is considered by librarians to be a key measure of the value of an information source and so an important element for the evaluation of the quality of any reference tool. Biochemistry provided the subject for the study. However, instead of just comparing the two works against each other it was decided to benchmark each against a first year undergraduate textbook recommended by instructors in the subject at Nanyang Technological University (Biochemistry, 3rd edition by Christopher K. Mathews). A checklist of concepts/keywords was derived from the textbook and applied to the content of both Wikipedia and Britannica. Given the length of the textbook and the scarcity of time and labour power, one chapter was randomly chosen from each of its five sections. Fortunately, this particular textbook bolded all important concepts in the text, making it relatively easy to pick them out, even for non-experts. Once the list was compiled, a search was conducted. Each concept was first searched for in the Biochemistry page. If it was found, a one was written in the corresponding table entry. Concepts not found on the Biochemistry page, triggered a search within the entire Wikipedia or Britannica site. The process was repeated for all concepts in the four selected chapters. Searching took place during the months of September and October, 2006. For the Encyclopedia Britannica, the research was done using the content available with a premium membership.

As data collection progressed it was realized that three more options had to be taken into account when determining whether or not a concept was included. For Wikipedia there was the possibility that the concept was found in a “stub”, a short article that is considered by Wikipedia management incomplete and in need of expansion. There was also the possibility that the concept was covered under a synonym, in which case Wikipedia provided a re-direct feature. And finally, for both Wikipedia and Britannica, if the search string does not match any term in the database then alternate articles believed to closely match the term are listed instead along with a percentage estimate of their relevancy.

3 Findings

The number of concepts found within the topic page for both Britannica and Wikipedia are almost the same (23 versus 22 percent). However, a much larger number of concepts were to be found in separate articles in Wikipedia (33 percent) than in Britannica (14 percent). Thus, overall it is not surprising that the number of concepts not found in Wikipedia amounted to only 19 percent of the total as compared to 33 percent for Britannica. Is the difference between the number of concepts found and not found in the two reference works statistically significant or could it be due to random variation? Two chi square tests were conducted to answer this question. The first tested the hypothesis that the level of comprehensiveness (defined as the number of concepts occurring within the topic page as opposed to those found in separate pages) in content coverage of Wikipedia was higher than in Britannica. In this case the hypothesis had to be rejected: $\chi^2(1, N = 485) = 2.88, p > .05$. In the second test the breath of coverage (defined as the number of concepts found somewhere in the reference tool as opposed to the number not found) was tested with the hypothesis again being that the breath of coverage of Wikipedia was higher than Britannica. Here, the hypothesis could be accepted: $\chi^2(1, N = 654) = 17.62, p > .001$.

4 Discussion

Our comparison of the main topic page for biochemistry in Wikipedia and Encyclopedia Britannica has shown that both reference works are similar in the scope of their coverage. For the subject of biochemistry at least and in terms of scope of coverage there appears no ground for discrimination against the online collaborative encyclopedia. When we consider, moreover, that Wikipedia actually covers a greater number of concepts than Encyclopedia Britannica, although still falling short of the undergraduate textbook used for the benchmark, this conclusion is strengthened. Of course, our study has nothing to say about the clarity of exposition or even the accuracy of the material presented. These are separate issues that in a comprehensive evaluation of the two information sources would also need to be investigated.