

## Editorial

# Does the Nutrition and Food Science Community Value Openness?

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The first issue of a new open access (OA) journal named the Journal of Human Nutrition and Food Science seems like an appropriate forum to examine the question of whether the nutrition and food science community values openness. Openness can mean many things, but I am going to focus on openness as it pertains to OA journals and open educational resources (OERs).

The Budapest Open Access Initiative defined open access as “free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited [1].”

Open access assumes multiple forms. Gold and green are the main OA forms. Gold OA is comprised of three types: direct, hybrid, and delayed. In direct OA, article-processing charges are assessed upfront and the article is openly available when it is published. In hybrid OA, an author pays an additional fee to make the article openly available in a subscription journal. Delayed OA journals make articles open after an embargo period. In green OA, on the other hand, a version of the article that often is not final is archived by the author(s), institution, and/or by other means. It is worth noting that green, hybrid, and delayed OA are all models that work along with subscription journal publishers’ business models, whereas direct OA competes with them [2].

Open access journal articles are perceived to be of lower quality and impact, but direct OA journals have impact scores and citation rates similar to subscription journals [3]. OA publishing is increasing, as suggested by the fact that among biomedical articles indexed by PubMed, the rate of OA publishing increased from 26.3% in 2006 to 50.2% in 2010, with a majority of these articles published in OA journals [4]. Furthermore, a recent analysis projects that gold OA will make up “50 percent of the scholarly journal articles sometime between 2017 and 2021, and 90 percent of articles as soon as 2020 and more conservatively by 2025 [2].” Hybrid OA does not seem to be gaining much traction; only 1–2% of authors use this option, mostly due to its

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Submitted: 21 July 2013

Accepted: 31 July 2013

Published: 02 August 2013

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**OPEN ACCESS****Keywords**

- Nutrition
- Human nutrition
- Food
- Food science
- Open
- Openness
- Open access
- Open educational resources
- Open source
- Textbooks
- Journals
- Publishers
- Subscription
- Professional societies

prohibitive cost [5]. An issue with green OA is that the archived material is not as readily available as published journal articles, which can be obtained through databases such as PubMed or Web of Knowledge. Delayed OA prevents access to articles at the time when they are most in demand, and whether this is a sustainable approach is questionable. A recent survey of academic libraries found that a six-month embargo of all journals would lead 44% and 66% of libraries to cancel all or selected science, technology, and mathematics or arts, humanities, and social science journals subscriptions, respectively [6]. After reviewing the options available, an independent group of academics, research funders, and publishers recommended that the UK embrace policies that move towards direct and hybrid OA [7].

Aside from making research openly available, some advocate for direct OA for other reasons. First, the price of journal subscriptions has become so high that the faculty advisory council at Harvard University issued a memorandum stating that journal subscriptions are financially unsustainable and untenable [8]. In response, institutions are beginning to offer funds to subsidize or cover article-processing charges to encourage direct OA journal publishing. Second, most subscription journal articles are copyrighted, restricting their reuse and adaptation for teaching and dissemination, unlike most direct OA journals, which use creative common licensing that allows reuse and adaptation with attribution.

Using the search terms “open access” and “nutrition” or “food science” in Web of Knowledge searches returned one relevant result, an article about The Nutrition Society’s engagement of OA

publishing [9]. The Nutrition Society should be applauded as the only nutrition or food science association/organization/society, to the best of my knowledge, to offer a direct OA journal (Journal of Nutritional Science) and two delayed OA journals (British Journal of Nutrition and Public Health Nutrition). In addition, the journals use Creative Commons Attribution-NonCommercial-Share Alike licenses [9,10].

Given the perception that most journal publishers are profit-focused, it is surprising that publishers are behind most of the direct OA nutrition and food science journals rather than the major professional societies. In most societies, access to their subscription journal(s) is a membership benefit. The questions I encourage societies to consider are: 1) would their members find more value in their publications being open, potentially allowing them to have more impact through wider readership and dissemination, and 2) because most direct OA journals are not designed to produce revenue like subscription journals, what impact would moving to OA have on their budgets?

Similar to journal subscription prices that increased 6% in 2013 [11], textbook prices also continue to increase at a similar rate [12]. On average, American college students spend over \$1,100 per year on textbooks and supplies [13]. In a survey, 70% of students reported not buying a textbook due to price, despite 78% believing they would do worse in the course without the textbook [14]. Despite the high price of textbooks, Cengage, the second-biggest publisher of college-course material in the United States, recently filed for bankruptcy [15].

An alternative to textbooks are OERs, which are “educational materials that are either (a) licensed under an open copyright license (e.g., Creative Commons) or (b) in the public domain” and can be accessed for free and revised, remixed, reused, and redistributed by others [16]. OERs were the top technology that students indicated that they wished instructors used more in a 2012 survey [17]. OERs are produced by companies such as OpenStax College, as well as by individuals.

I created an OER, The Kansas State University Human Nutrition (HN 400) Flexbook, and have taught from it for the last four years. The term flexbook was coined as “a free and open-source textbook platform where one can build and edit collaborative textbooks” by the CK-12 Foundation, which makes flexbooks for K-12 courses [18]. The Flexbook was one of three finalists for the 2012 Education-Portal.com People’s Choice Award for the Most Open Resource. My collaborator, Koushik Adhikari, and I have previously described the Flexbook’s creation and features [19], and our research has found that students prefer it to using a textbook [12,19]. The Flexbook also has been used by a 30,000-student massive open online course (MOOC) and is the nutrition textbook for the Open Course Library, a project to develop course content for high enrollment courses in the Washington State Community College system [12]. The Flexbook is available for others to use, and I am happy to provide the PowerPoint slides for those interested in using it.

Using the search terms “nutrition” or “food science” in two OER repositories, Multimedia Educational Resource for Learning and Online (MERLOT) and OER Commons, as well as conducting a general Google search for “open educational resource nutrition”

or “open education resource food science,” yielded only one result that appeared to be a suitable textbook replacement: the Flexbook. One obstacle to creating OERs is that most useful figures from nutrition and food science journals are copyrighted and cannot be easily reused and adapted. Thus, the potential for synergy between OA publishing licensing and the production of OERs is high

Given current technology, creating an OER textbook replacement is easier than most probably realize. Some textbooks are compiled by having different authors write chapters; a similar process could be undertaken using available OER platforms, or authors could work more collaboratively on the material using Google Docs or a collaborative OER platform. Professional societies could coordinate the production of branded OERs. Alternatively, professional societies could post approved OERs on their websites, like the American Institute of Mathematic Open Textbook Initiative [20]. Although OERs would be openly available, the ability to contribute to the production or approval of OERs could be a membership benefit. In addition, some universities are providing grants to faculty members to replace their textbooks with OERs to reduce student expenses; moreover, a majority of students that have used the Flexbook support a course fee to provide incentive for more courses to adopt OERs [21]. Thus, society members may have a financial incentive to use OERs in the future.

Evidence suggests that most members of the nutrition and food science community do not yet value openness. Given the increasing demand for OA and OERs, I hope more members of our community will embrace the movement.

## ACKNOWLEDGEMENT

Contribution no. 14-015-J from the Kansas Agricultural Experiment Station.

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#### Cite this article

Lindshield BL (2013) Does the Nutrition and Food Science Community Value Openness? *J Hum Nutr Food Sci* 1: 1005.