Project report

Using Wikipedia to teach scholarly peer review: A creative approach to open pedagogy

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Abstract

This paper outlines a creative Wikipedia-based project developed by the University of Kansas (KU) Libraries and the KU Biology Department. Inspired by the tenets of open pedagogy, the purpose of this project is to use Wikipedia as a way for students to learn about the scholarly peer review process while also producing material that can be shared and used by the world outside the classroom. The paper is divided into three sections, with the first summarizing pertinent related literature related to the paper's topic. From here, the paper describes the proposed assignment, detailing a process wherein students write new articles for the encyclopedia which are then anonymously peer reviewed by other students in the class; when articles are deemed acceptable, they are published via Wikipedia. The parallels between this project and academic peer review are emphasized throughout. The paper closes by discussing the importance of this project, arguing that it fills a known scholarly need, actively produces knowledge, furthers the aims of the open access movement, and furthers scientific outreach initiatives.

Keywords

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1. Introduction

For seasoned academics, the term 'peer review' is an all-too-familiar one, as it is widely considered the premiere way to ensure quality and rigor in scholarship; it is, in other words, the life-blood of academic publishing. But despite its importance, the process is often shrouded in mystery; this is especially true for those who have just entered into the world of academia, such as undergraduates, first-year graduate students, and junior researchers. Arguably, much of this confusion is due to a fundamental misunderstanding: Many professors assume that their students already understand the basics of the process, whereas many students assume that their professors will teach them these basics (Guilford, 2001; Trautmann et al., 2003). Due to these mismatched expectations, many students, and even some professionals (Mulligan & Raphael, 2010), are never formally trained in peer reviewing and are instead forced to teach themselves the basics 'on the job' (Alam & Patel, 2015, para. 3). With this problem in mind, the present paper – which was developed by the University of Kansas (KU) Libraries and the KU Biology Department – outlines a creative project that uses Wikipedia.org (the free encyclopedia

that anyone online can access)[1] to teach students how peer review works by having them 'learn by doing,' (Dewey, 1938).

A quick summation of the project is as follows: First, students choose a topic about which there is not already a Wikipedia article. The students then research and write an encyclopedic article about this topic. The articles are then submitted for an initial round of double-blind peer review conducted by other students in the class. After receiving anonymous comments from their peers, the students then revise and resubmit their articles to the course's instructors. Once an article is deemed acceptable by the instructors, a library specialist familiar with the inner workings of Wikipedia helps upload the textual content to the site. During this entire process, the course instructors function as journal editors, responsible for organizing double-blind peer reviewing, communicating with the article authors, approving the final submission, and making modifications to the final Wikipedia article.

2. Literature Review

To better understand the nature of the project described in this article, it is first necessary to review three areas of previous research: studies that look at Wikipedia in higher education, those that consider how peer review is taught to university students, and those that explore open approaches to pedagogy.

2.1 Wikipedia in the University

The majority of published research into using Wikipedia in higher education analyses or discusses how university students make use of the site as a source for information (e.g., Clark, 2011; Colón-Aguirre & Fleming-May, 2012; Garrison, 2015; Head & Eisenberg, 2010; Knight & Pryke, 2012; Lim, 2009; Patch, 2010; Selwyn & Gorard, 2016). Of these articles, perhaps two of the most relevant for the current topic are Head & Eisenberg (2010), and Lim (2009), which – despite differences in time, space, and populations studied – nevertheless reached similar conclusions; Head & Eisenberg (2010), for instance, argued that 'far more students [out of 1,627], than not, used Wikipedia' (Results, para. 1), while Lim (2009) more emphatically declared that 'all respondents [n=134] reported having used Wikipedia' (p. 2194). A little over half a decade later, Selwyn & Gorard (2016) seemingly affirmed the findings of Head & Eisenberg (2010) and Lim (2009), concluding that 87.5% of undergraduate students surveyed (n=1658) admitted to using Wikipedia when working on academic assignments.

Many studies that explored students' use of Wikipedia have also explored *why* students choose the site. Head & Eisenberg (2010) argued that while students used the encyclopedia for a variety of reasons, most respondents were drawn to it simply because of its information utility, which in turn 'is tied to four Cs it delivers—currency, coverage, comprehensibility, and convenience' (The four Cs, para. 8). Likewise, Lim (2009), using statistical regression, proved that it was information utility that best explained why participants made use of the site. Synthesizing these two reports, it can be argued that Wikipedia is appealing because it often has robust information that does not require a reader to expend exorbitant labor in tracking down this information. This means that Wikipedia's popularity with university students may have much to do with Zipf's law, which (at least in the field of library and information science) maintains that information users will make use of some informational resource largely because it requires the lowest amount of effort on the part of said user (Case & Given, 2016). One could also invoke the ideas of Kuhlthau (2004) to argue that Wikipedia is so popular with students simply because it is replete with the sort of background information that is necessary for the successful production of research.

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[1] Accessible at: https://en.wikipedia.org/wiki/Main_Page

A subset of articles that focus on university students and their interaction with Wikipedia do so by looking at how students themselves can actively edit the site, often with the express purpose of making the site's content stronger. It is not uncommon for these studies to frame this behaviour in an activist light; consider, for instance, the articles that discuss the impact of student modifications made during dedicated 'edit-a-thons' aimed at improving topical coverage (e.g., Evans, et al., 2015; Hamlin, 2020; Krause, et al., 2017; Phetteplace, 2015; Roued-Cunliffe & Copeland, 2017). It is also common for student editing to be framed as a type of 'outreach', especially in fields like the humanities and the hard sciences (Burdo, 2012; Evans, et al., 2015; Krause, et al., 2017; Moy, et al., 2010). Still other studies discuss Wikipedia editing as a method by which students can improve their personal writing skills (Tardy, 2010; Witzleb, 2009; Vetter, et al., 2019). Finally, there are those publications that argue Wikipedia is an excellent opportunity for students to engage in creative and critical thinking (Pollard, 2008; Cummings, 2009; Vetter, et al., 2019).

At this point, it is worth noting that while some articles have mentioned the peer review aspect of Wikipedia in relation to writing or the academy (e.g., Black, 2008; Cummings, 2020; Vetter, et al., 2019), there is a dearth of research that focuses solely on the site as a pedagogical tool to teach students first and foremost how academic peer review is conducted.

2.2 Teaching Peer Review in Higher Education

As was discussed at the beginning of this paper, peer review is one of the most important aspects of modern academia, but many students do not know much about how it functions (Guilford, 2001; Trautmann, et al., 2003). To ameliorate this issue, many scholars have started to explore the question of how peer review can be taught to students before they are thrown into the proverbial deep end of the scholarly world. Perhaps one of the first scholars to consider this question was Lightfoot (1998), who explicitly noted that students—especially undergraduates—have trouble understanding what is meant by 'peer review.' Embracing the ethos of 'learning by doing', Lightfoot (1998) assigned his students three different studies throughout a semester, specifically chosen so that his students would 'have differing knowledge bases' (p. s57) when analyzing said studies. The students then critiqued the studies, and these critiques were peer reviewed by other students in the class. Lightfoot (1998) made use of double-blind, single-blind, and open review methods so as to teach his students the diversity of peer review methods. After each study review, the class would then discuss a specific method of reviewing, deliberating as to its merits and defects. This experiment led to the students directly 'appreciate[ing] the effort and issues that arise as part of the review process' (p. s60).

Building somewhat off Lightfoot's (1998) desire to demystify the peer review process, Guilford (2001) outlines a project wherein students are assigned what is ostensibly called a 'term paper', but which is in reality a review article. First, students write a letter of inquiry to determine if their topic is acceptable; this is given to the instructor who approves or critiques the idea. The students then work on their papers, with each student turning in 3 copies. Two of these copies are anonymously distributed to other classmates, while the third is kept by the teacher. The teacher and the other students then evaluate the manuscript separately and submit their findings. The teacher then returns the reviews to the student, who revises their work and submits the final draft. As one can likely tell, the process outline by Guilford (2001) is not substantially different from the actual process of peer reviewing journal articles – a feature of the process that Guilford (2001) stresses is critical, as it exposes students to the reality waiting for them in the larger world of academia. It is thus a classical example of Deweyan 'learning by doing' (for more, see: Dewey, 1938). Of note, the project detailed here is very much in line with the ethos of Guilford (2001), with perhaps the biggest difference being that this project fills a hole in the literature by considering the potential of a Wikipedia assignment – rather than a 'term paper' – as a creative way to teach students about the peer review.

2.3 Open Pedagogy

The final area of research that needs to be discussed in this paper are those projects that explicate a philosophical approach to education known as 'open pedagogy.' According to Hegarty (2015), this educative approach: 1) is predicated on the use of 'participatory technologies' such as emergent media platforms, 2) built on a foundation of open and people-centered understanding of trust, 3) embraces an attitude of pro-innovation, 4) has a penchant for the exchanging of ideas, 5) stresses the importance of connection, 6) is learner-generated, 7) is reflective, and 8) embraces peer review. When taken together, these attributes produce an environment conducive to learning in the connected, digital, and multivalent world of myriad viewpoints that we now find ourselves in. Open pedagogy is thus decidedly subversive, putting it arguably in the same grouping as such works as Freire (2000), hooks (1994), Morris & Stommel (2018), and Shor (1993) – all of which embrace, in one shape or another, a sort of liberatory praxis that engenders change in the world.

A particularly important subset of open pedagogical research is focused on the development of 'renewable assignments,' which are defined by Van Allen & Katz (2019) as projects 'that add value to the world because students share their work openly' (p. 312). Renewable assignments (also known as non-disposable assignments or NDAs) are usually contrasted to more traditional disposable assignments, which Seraphin et al. (2019) contend 'constitute the vast majority of student work prescribed in contemporary instructional settings and are typically the result of a student's work being submitted to and thus shared with only the instructor for evaluation purposes' (p. 2). Perhaps the textbook example (no pun intended) is a term paper that is (often hurriedly) written by the student, read (often hurriedly) by the instructor, graded, and then tossed into the proverbial or literal trash can. For many students and instructors, these assignments are – to be blunt – somewhat pointless, as they do not lead to anything other than a vague feeling of 'learning' – if that. Renewable assignments, conversely, encourage students to create something that matters not only to them, but also to the world at large. In other words, these are assignments that, once completed, still have a sense of meaning, which can be shared with or transmitted to others. Because these assignments can be said to 'live on,' even after the class for which they were produced ends, research suggests that students are more willing to sink time into them (Seraphin et al., 2019; Van Allen & Katz, 2019).

As with all concepts in education, there are various formations of what exactly is meant by a 'renewable assignment.' With that said, Seraphin et al. (2019) have provided perhaps the best delineation of the concept, arguing that 'renewable assignments' have five key attributes:

1. Renewable assignments are built on an ethos of 'information collaboration and exchange' (p. 3).
2. The assignments embrace open communication and 'opportunities for revision, creativity, modifying key terms and objectives, etc.' (p. 3).
3. They are often communally produced and thus engender teamwork.
4. They embrace the tenets of open and constructive peer review.
5. They break from traditional educative assignments and are decidedly creative and subversive.

At the end of the day, renewable assignments – given that they are predicated on a fundamentally open pedagogy – have much potential to change the way both students and instructors approach not only their own work, but also the nature of education itself.

3. The Assignment

This section outlines an open, Wikipedia-based project initially developed in the spring of 2020 by the University of Kansas. The point of this project is to have students learn what is meant by 'scholarly peer review' by having them take on the role of both author and peer reviewer,

thereby having them learn by doing (cf. Dewey, 1938; Rangachari, 2010). In essence, students are asked to imagine that they are scholars hoping to publish an article in a journal, with the 'journal' being Wikipedia. To accomplish this, students create new articles, which are constructively critiqued by their classmates and their instructors. When all are in agreement that the articles are of satisfactory quality, they are published on Wikipedia. Through the duration of this project, it is useful for the instructor to emphasize the parallels between this classroom assignment and the way academic research is actually produced and peer reviewed. The assignment itself can be broken down into five key phases, or steps, which are outlined as follows (see also Fig. 1):
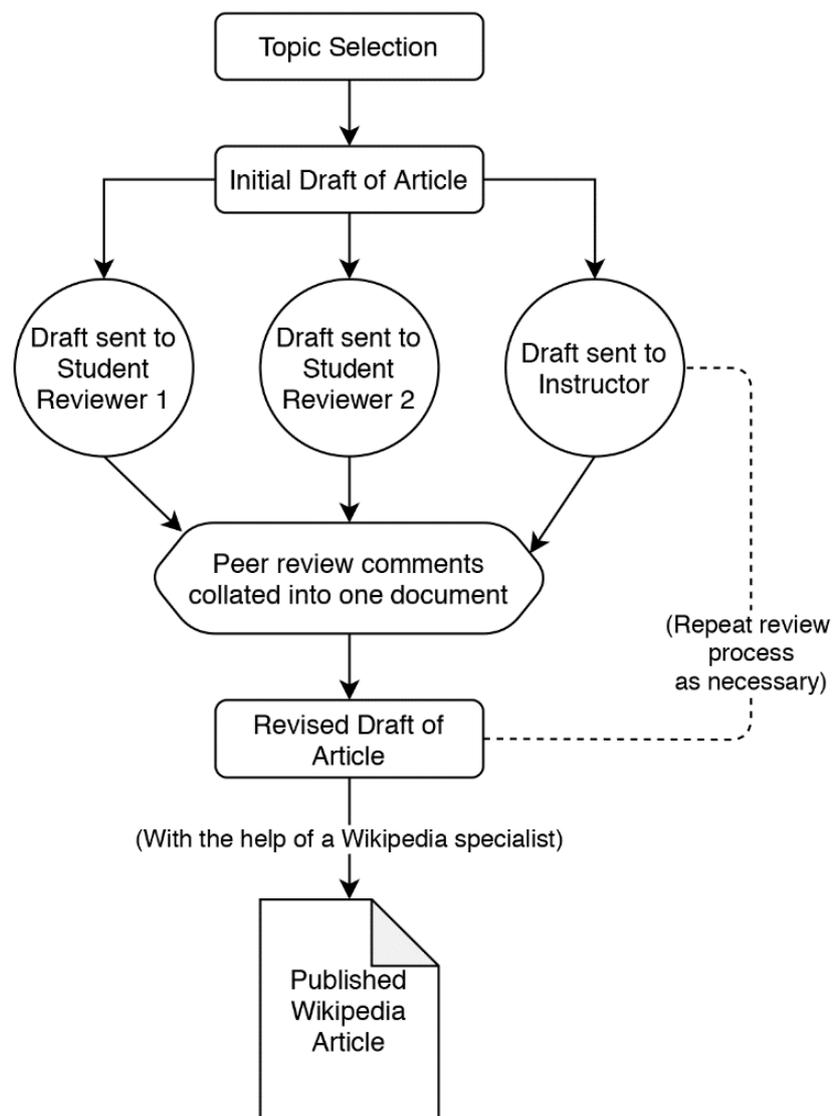
Figure 1: An overview of the assignment discussed in this section

3.1 Step One: Topic Selection

The first step—which ideally should occur a few weeks after the start of the course—is for students to choose a topic about which there is not already a Wikipedia article (in the class for which this project was developed, students were asked to identify a fossil mammal taxon that did not have an article). There are many ways that teachers and students alike can identify these sort of content 'holes'; an instructor may, for instance, provide a list of potential subjects

based on personal knowledge of the website. Alternatively, an instructor could also ask students to choose articles that already exist, but which are under 500 words. These short entries, which are referred to in emic Wiki-slang as 'stubs' (Wikipedia:Stub, 2020), comprise about 3.4 million of Wikipedia's 6.5 million articles (Wikipedia Statistics, 2019). Regardless of whether the course instructor decide that students should create new articles or expand existing ones, the instructor should emphasize that students are to look for topics that fit the 'scope' of the class (i.e., it is pertinent to the course's subject matter). This, in turn, allows instructors to illustrate what is meant by the 'scope' of a peer reviewed journal.

3.2 Step Two: Research and Writing

Once topics have been selected, the students then research and write an encyclopedic article. Students will first be asked to format their work in the style of extant Wikipedia articles. This expectation means that final articles will have a short intro section (a 'lede') that summarizes the topic in roughly a paragraph, followed by the body of the text, and concluding with a list of citations. At this point in the assignment, students are being asked to understand how the encyclopedia is formatted, so that they will later be able to apply this knowledge when working on their own articles (cf. Bloom et al., 1956).

When students begin the research and writing process, they should also be reminded that Wikipedia requires its article to be:

- **Citational:** Wikipedia is epistemologically citational, which means that every sentence on the site needs a verifiable source (Wikipedia:Citing Sources, 2020)
- **Neutral:** All articles must be written from a neutral point of view, meaning that articles should detail significant viewpoints 'fairly, proportionately, and, as far as possible, without editorial bias' (Wikipedia:Neutral point of view, 2020).
- **Devoid of 'Original Research':** Wikipedia strictly catalogs what the so-called experts have to say about a topic in question. This means that when writing an article, editors must eschew putting forth their own ideas and instead use published, reliable sources (Wikipedia:No original research, 2020).

These three content policy points, when embraced in full, encourage the student editor to apply information-seeking methods, analyze the literature, and critically evaluate why certain texts should be included in the final article.

3.3 Step Three: Initial Peer Review

The articles are then submitted for an initial round of double-blind peer review conducted by other students in the class. Ideally, the article is to be submitted sometime around the middle of the academic semester (Guilford, 2001). During this step, the article write-ups are first submitted to the course instructors (be they professors or graduate teaching assistants), who – 'acting as editors-in-chief' (Lightfood, 1998, p. s59) – strip them of identifying information and assign them to two (or more) students for peer review. Choosing student peer reviewers is an important aspect of this process, and instructors are advised to pick students whose research interests are similar to the article that they are going to review (Guilford, 2001). If necessary – and if the opportunity presents itself – outside advisors, such as graduate teaching assistants or instructors of other classes, can also be brought in, contributing their subject expertise to the project. It is important, however, to emphasize that these more knowledgeable reviewers should critique *alongside* the students, having them function essentially as Associate Editors or Subject Editors; after all, the purpose of this project is for the students themselves to gain actual experience peer reviewing academic material.

To aid the student reviewers, the instructor will also prepare a short set of guidelines, outlining the expectations of the finished articles (Guilford, 2001). This set of guidelines will be composed

of questions that assess whether the article has been properly formatted (e.g., 'Does the article feature a lede, a body, and a reference section, in that order?'), is accurate (e.g., 'Does the body of the article accurately reflect the extant literature on the topic?'), and is correctly sourced (e.g., 'Does the article feature correctly-formatted citations, and are they used properly?'). Following Guilford (2001), it is recommended that instructors base these guidelines on those issued by actual peer reviewed publications (Guilford, 2001, for instance, based his guidelines on those used by the *Annals of Biomedical Engineering*, p. 170). The entire process challenges students to actively analyze and evaluate the scholarly content that they are reading (cf. Bloom, et al., 1956), rather than simply accept it as fact.

3.4 Step Four: Revising and Resubmitting.

When the peer reviews are completed, they are to be submitted to the course instructor, who ensures that the write-ups are anonymous before distributing them to the students whose articles were reviewed. The students then revise and resubmit their articles, including in this new submission a letter that explains what the student changed, and why those changes were made. Likewise, if a student does not agree with changes that the peer reviewers recommended, then they should use this letter as a place to explain why they feel this way.

At this point, there are two possible paths that a student will take, depending on the quality of their second submission: If the instructor judges their resubmission to be of quality, the student can proceed to step five. If, however, the resubmission still needs work, the instructor can inform the student and explain what needs to be changed. If necessary, the resubmission can also be sent back to the initial peer reviewers or given to a new peer reviewer for a second opinion. Theoretically, this process can be repeated as many times as necessary until the article meets the required standard, though an article should ideally require only two or three resubmissions.

3.5 Step Five: Publication

Once an article is deemed acceptable by the class instructor, an individual familiar with the inner workings of Wikipedia (such as a student in the class, a library specialist with whom the instructors have been collaborating, or even the class instructor) will help upload the textual content to the site, thereby resulting in a final, published article. Entrusting the publication of the article to a dedicated Wikipedia specialist ensures that the students themselves will be able to focus their energy on the development of articles and the peer review process, rather than the often Byzantine nature of Wikipedia formatting. This approach reduces student stress while also streamlining the entire publication process. When the assignment concludes, the instructors of the class should once again emphasize how this project closely mirrors the way academic research is produced, peer reviewed, and published.

3.6 Goals and Importance

Many articles discuss ideas for pedagogical evolution, but such articles are worthless if they do not fill a need that students and teachers actively have or can somehow enrich the educative process. As such, this project was designed to accomplish four main goals: First, this project helps shine light on the world of scholarly peer review. As discussed in this paper's literature review, undergraduates and even many graduate students often struggle to fully conceptualize what exactly is meant by 'peer review,' (e.g., Guilford, 2001; Lightfoot, 1998; Rangachari, 2010; and Trautmann et al., 2003). But while 'a significant proportion of reviewers' – and likely even more undergraduate and graduate students – feel that guidance and formal training in peer review is needed' (Alam & Patel, 2015, p. 1), there is not much research about how classroom instructors can work the concept into their day-to-day lessons or assignments. With this project, the goal is to provide educators with a ready-to-go project that not only fills the needs of the students, but does so in a way that is engaging.

Second, the project aims to improve the content of Wikipedia by having university students create reliable, good-quality articles on nascent topics. Wikipedia is one of the most-used scholarly resources in the world (in June of 2020, for instance, the site was viewed 22 billion times, with 86.4% of users viewing the site from outside the United States; Wikimedia Statistics, n.d.); this is especially important when one realizes that the site provides much-needed access to scholarly information to researchers, who might otherwise not have the funding or infrastructure to access said information through 'traditional' means (e.g., inter-library loan). By creating free, usable articles, students are not only producing something that can be graded, but also creating an object that can be released unto the world and actively used by others. In this way, it can be argued that Wikipedia editors are actively constructing the 'sum of all human knowledge' (O'Sullivan, 2009, p. 78) and ensuring that it is of quality.

Third, the project aims to engage with ideas about open pedagogy and 'renewable assignments' by being fundamentally predicated on an ethos of openness, creativity, freedom, and collaboration. As many education scholars (again, namely Freire, 2000; hooks, 1994; Morris & Stommel, 2018; and Shor, 1993) have argued, most of the contemporary educational world is locked in a rigid mold that discourages creativity, innovation, or novel thinking by labeling such behavior as insubordination (or the like). Open pedagogy aims to break away from these arguably oppressive structures, freeing students to pursue their own interests in ways that make sense for their abilities and temperaments. The project also encourages students to embrace constructive criticism, improve that which they have already created, and continuously strive to produce material—thereby turning them into the much-lauded 'lifelong learner'.

Fourth and finally, this project furthers scientific outreach initiatives by helping provide students with an opportunity to better understand one of the most important aspects of modern scholarship while also 'engag[ing with] an audience outside of academia' (Varner, 2014, p. 334). This sort of scientific outreach is critical in promoting scientific literacy amongst the public—especially in an age such as ours where disinformation circulates just as quickly as quality information. By having students actively create high-quality articles, they are producing sources of information for the average human user, who may or may not have the time, ability, or knowledge to thoroughly evaluate certain scientific resources for themselves. Additionally, this project follows the guidelines set by Varner (2014), who argued that outreach efforts should 'generat[e] a dialogue whenever possible' and '[use] assessment to iteratively improve effectiveness' (p. 335); the Wikipedia project does just this, responding if necessary to the needs, wants, or questions of students, while also providing an opportunity for students to engage in a 'dynamic activity' that iteratively leads to a finished product accessible (and potentially editable) by the public itself (p. 335).

4. Reflections and Lessons Learned

The biggest hurdle in implementing a peer review component to student projects is the need for students to turn in a nearly complete manuscript by the middle of the semester. Several students submitted little more than outlines for their drafts, which in turn did not provide enough material for the students assigned as peer reviewers to critique. Some of these students expanded upon their initial outline and provided the new version to the peer reviewers when alerted to this fact, but this delay resulted in less time for peer review and may have resulted in lower quality first drafts than students who had spent the beginning of the semester writing complete articles. Because assignments in other classes may require an initial outline and/or rough draft to be reviewed by the instructor(s), many students may not have understood the need to turn in a more complete draft in order to be peer reviewed. This fact should be clearly stated at the beginning of the semester and in the syllabus, and reiterated often in the early weeks of the semester.

The challenge of producing an essentially complete article as a first draft was exacerbated by the lack of time the students had to complete this project, which constituted their most extensive writing assignment during the semester. Taxon choices were due roughly three weeks into the course, with initial drafts due approximately one month later. Students had two weeks to complete peer review of two other articles, and another three weeks to revise and submit their final Wikipedia article. Several students required additional edits to their resubmitted manuscript and would have benefitted from another round of peer review, but unfortunately not enough time remained in the semester to allow for additional peer review of those articles.

To remedy this situation, requiring students to select their topic within one week of the beginning of the course—while allowing the same amount of time to complete the other deadlines—would allow for an additional round of peer review at the end of the semester, where necessary. Unfortunately, this means that students only have the most general introduction to the course before selecting their topics. At the beginning of the semester we provided students an optional list of species from which to choose; this would likely be a necessity for students selecting topics after only one week of class. To ensure that all students are conducting an equivalent amount of peer review (i.e., so that no students have to review more articles than their classmates simply due to the varying quality of other students' work), the second round of peer review can be conducted by the instructor(s) and/or teaching assistant(s).

Another challenge posed by this assignment, at least from the perspective of the instructor, is the large amount of variability in the quality of students' work. Although this is always present in student assignments, it was especially salient in this project. For one, the course for which this assignment was used (an upper level biology course in mammalian paleontology) included students from a wider variety of backgrounds—everything from graduate students in mammal paleontology, to those with little-to-no experience in paleontology or academic writing. As such, the quality of student work varied greatly (particularly with respect to the first draft, as mentioned above). Perhaps the most common criticism of students' work on behalf of the instructors serving as 'editors' was that students were not properly using citations. This was especially prevalent among the less-experienced undergraduate students, who are less likely to be familiar with the basic format of scientific writing. One strategy to alleviate this, on part of the instructor, could be to give more guidance on what a first draft or end product should look like. Specifically, this guidance should deal with the format and structure of academic writing. While students were given examples of appropriate Wikipedia articles, they likely were not paying attention to small details such as the use of references, or the order in which information is presented. Making these things clear upfront to students could potentially go a long way toward reducing the gap between the basic quality of students' work.

In the course for which this project was developed, the students offered some feedback on the project in the form of their course evaluations. For those that willingly commented on the project, its use was unanimously lauded. Several students applauded the opportunity to delve into the primary literature, and a few others mentioned that they had excitedly told their other professors about the project, which had encouraged those instructors to adopt it for their own classes. These comments – and the absence of negative comments about the project – suggest that the assignment was well-received.

6. Conclusion

In our digital and uncertain age, it is now more important than ever for educators to embrace creative, innovative practices that allow students to thrive while also solving real-world needs. Likewise, it is the responsibility of library and information professionals to aid instructors in the dissemination and access of information. In this paper, the authors have described one such approach, that uses the free encyclopedia Wikipedia as a veritable playground for peer review experience, allowing students to create usable articles about topics of their choice while also

learning about the intricacies of the often opaque peer review process. Not only does such a project allow students to learn by doing, but it also results in reduction of student uncertainty and a greater sense of scientific outreach, while also producing an open object that can be used in the 'real world'.

7. Acknowledgements

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