Student Learning Outcomes using Wikipedia-based assignments

Fall 2016

Research Report

June 2017
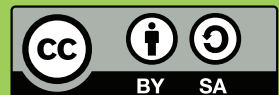
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Executive summary

Student Learning Outcomes with Wikipedia-based assignments

A goal of higher education is to ensure that students learn information that enriches both their lives and their careers. Instructors constantly seek out new tools to help students engage and thrive in a shifting marketplace of ideas, technologies, and career paths. Students must master new skills to prepare for the world beyond the classroom and improve their careers, lives, and future scholarship. Among the most cited skills deemed valuable are digital/information literacy, critical research, teamwork, and technology skills.

In Fall 2016, over 6000 students used a Wikipedia-based assignment in lieu of a traditional paper assignment. We conducted a mixed methods research study using surveys and focus groups to study attitudes, context, and skills transfer. Surveys employed a variety of quantitative and qualitative questions administered online. Thirteen focus groups were also conducted. A total of 1627 students and 97 instructors completed the surveys.

Preliminary statistical analysis suggests that both students and instructors valued Wikipedia assignments more for learning digital literacy, critical thinking, learning to write for the general public, and learning about reliability of online sources. Students reported that they were proud of their work, spent more time, and were more satisfied with their class assignment than with traditional coursework.

Qualitative findings suggest overwhelmingly that respondents' perceptions of Wikipedia positively change after having edited Wikipedia. While many students expressed having perceived the space as unreliable prior to editing Wikipedia, their perception shifted through completing the Wikipedia assignment to show more trust in Wikipedia as a reliable information source.

Triangulating focus group responses and quantitative survey responses showed that overall students perceived the assignment as useful for developing researching, writing, and information literacy skills, in addition to demonstrating mastery in these skills. Students found their assignments valuable because their work was useful for a public audience as it contributed to conversations outside of the classroom. Responses suggest that students directly engaged concepts outlined in the Association of College and Research Library's (ACRL) *Framework for Information Literacy in Higher Education*, particularly when engaging understandings of systemic biases, construction of information, and value of information.

This research suggests that in addition to their value in learning digital/information literacy, critical research, teamwork, and technology skills, Wikipedia-based assignments also help increase students' motivation to complete work over traditional writing assignments.

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Image: Wiki_Education_Foundation_logo.svg

Background and history

Wikipedia started in 2001 as an online, open-license encyclopedia open for anyone to edit. In the 16 years since it was launched, an active community of volunteer contributors—known as "Wikipedians"—have expanded the corpus of knowledge to include over 5 million articles in the English Wikipedia. But article quality varies widely. Because Wikipedia's authors are all volunteers, they naturally gravitate toward writing about what they're most interested in. And because the editors are 80-90% men, articles on topics such as video gaming, military history, or sports are of high quality, while articles on more academic subjects like art, feminism, or public policy lag behind.

In 2010, a program launched to specifically tackle the content gaps in academic subject areas. In the program, college and university faculty assign students to edit Wikipedia articles related to course topics as a class assignment; the program staff provide Wikipedia training and expertise so the faculty do not need to have any experience editing themselves. In the United States and Canada, the program is run by the Wiki Education Foundation (Wiki Ed), which in the Fall 2016 term supported more than 6000 students in more than 270 courses as they contributed academic content to Wikipedia.

Previous research suggests that Wikipedia provides an opportunity for students to experience public writing, often results in increased student motivation and engagement, and is comparable or better for learning writing skills than a traditional research paper (Cummings, 2009; Roth, 2013; Vetter, 2014). However, the majority of analysis on these assignments has been theoretical, or limited to small-scale studies. Despite the increasing popularity of the Wikipedia assignment, the evidence Wiki Education has gathered regarding Wikipedia as a teaching tool been limited to anecdotal evidence. In Fall 2016, Dr. Zachary McDowell was brought in to conduct research to understand how learning outcomes from Wikipedia assignments affect student learning outcomes such as digital literacy, peer review, and collaboration in comparison to outcomes achieved by more traditional research paper assignments.

This large-scale study examines student experiences with a Wikipedia-based assignment. The study draws participants from over 6000 students enrolled in courses across the U.S. that used a Wiki Education-sponsored Wikipedia assignment in the Fall of 2016. The mixed methods study (which combines literacy assessments, surveys, and focus groups) examined students' information literacy and research skills, their attitudes toward the assignment and toward Wikipedia, and their reflections on the experience. While this study yielded data that can be analyzed for a variety of research questions (only some of the preliminary findings are represented here), the data is of significant interest to those studying education, communication, online communities, and composition, because the questions utilized deal specifically with learning in a technologically mediated environment.

How to use this document

This research report is intended to help contextualize the data, codebooks, and other documentation provided alongside this report, as well as to present preliminary findings and analysis to help inform future research.

We hope to empower and encourage researchers to conduct their own analyses as well as future collaboration and discussion about student learning through Wikipedia-based assignments. All the data and tools from the research are released openly under a CC-BY-SA license.

Methods overview

We conducted a mixed methods research study that assessed students' information literacy and research skills, alongside surveys of attitudes toward the assignment and toward Wikipedia, and reflections on their experience.

Student survey respondents were recruited via email and the Wiki Ed Dashboard course management software. Focus groups were recruited via email through the instructors participating in Fall 2016. We utilized a drawing for Amazon.com gift cards for incentivization. The focus groups were recruited by emailing instructors participating during the semester.

Survey design and implementation

Each survey was designed in collaboration with a variety of instructors, researchers, and instructional designers (please see Acknowledgments section). Surveys were designed to assess a variety of outcomes, skills, and attitudes. Although this research was designed with few overarching questions in mind, the overall intention was to create research data that would be beneficial to a variety of instructors and researchers.

Surveys were administered online, on the Wiki Ed Dashboard using a custom-built survey tool. There were three surveys that employed a variety of questions, mostly quantitative but a few qualitative and follow-up questions, as well as thirteen focus groups. A total of 1627 students and 97 instructors completed the surveys.

The first survey (N=1228, referred to in the codebook as "Pre-Assessment") included demographic questions, comfort questions, and questions from the Information Literacy Assessment & Advocacy Project (ILAAP). This survey was administered in the beginning of the course (which varies, but we have dates starting from early September through late October).

The second survey (N=888, referred to in the codebook as "Post-Assessment") included contextual questions about the student's assignment, comfort questions, and questions from the ILAAP. This survey was administered at the end of the course, triggered in the last couple weeks of the timeline on the Wiki Ed Dashboard.

The final survey (N=558, referred to in the codebook as "Post-Course Survey") was administered immediately after the second survey was completed to minimize student dropout rate on the second survey. This survey included comfort questions, perceived value questions, as well as specific questions about students' interactions on Wikipedia during the assignment.

Not all students took every survey, so survey respondents that did not answer questions have blanks for their answers. All of the questions and potential answers can be found in the codebook.

Information Literacy Assessment & Advocacy Project data

We utilized a series of questions from the ILAAP (ilaap.ca), a Creative Commons licensed information literacy assessment question set. These questions are mapped to the Association of College and Research Libraries (ACRL) information literacy standards and framework.

Although initial survey results showed promise, comparative data between the pre and post-test led us to believe that students at the end of the semester tended to "click through" or skipped over assessment questions, which were long and required much more time commitment than the standard survey questions. Many students who scored high in the pre-test scored far worse afterwards, with a very short overall test time length. We believe this was in part ampli-

fied by the incentivizing system in place, as students were reminded that taking the second survey would enter them into a drawing for an Amazon.com gift card.

There are additional tests for validity that can be performed on this data, but we believe that this was a methodological oversight. Future studies utilizing this assessment tool should be administered separately using ILAAP's system rather than integrating it into the Wiki Ed Dashboard.

Quantitative analysis

We conducted univariate descriptive statistics and bivariate relationships of pre- and post-assessment survey data using students' responses to close-ended questions. We then ran a series of multivariate analysis using ordinal logistic regression models, each with a different dependent variable that assessed outcome (Cameron and Trivedi 2005; Kleinbaum and Klein 2010). The coefficient of these models measure the odds ratio, or the odds that respondents will report the reference category ("much less valuable").

The total sample (N=1228) containing demographic data included more females (65 percent) than males (33 percent), and was predominately white (54 percent). The average age of respondents was 22, with ages ranging from 17 to 74. Very few (4.69%) participants indicated they had used Wikipedia for a class assignment before. The full descriptive statistics report can be found in Table 1.

Dependent variables

The dependent variables for this analysis were based on five point Likert questions regarding how students found the assignment compared to traditional ones (from much more valuable to much less valuable) for helping them learn: (1) about the topic, (2) critical thinking, (3)

Focus groups

Alongside the surveys, we conducted thirteen focus groups in the Northeastern United States. The focus group data was intended to help triangulate deeper understandings of student learning outcomes when assessed with the survey data.

Due to the difficulty of fully de-identifying the entirety of the focus group transcripts, we are releasing only some of the focus group transcripts, which include some preliminary analysis (see Focus group analysis section).

reliability of online sources, (4) digital literacy, (5) writing clearly for the general public, (6) writing a literature review, (7) working on a team, (8) technical or computer skills, and (9) peer review skills.

Independent variables

The independent variables for this analysis included contextual and demographic factors for the influence on students' attitudes towards Wikipedia assignments. These factors included age, gender, race/ethnicity, year in college, institution type, academic discipline, prior experience with Wikipedia, first-generation status, and additional five-point Likert questions regarding students' prior comfort with a variety of skills from writing publicly, working on a team, to digital literacy.

Descriptive statistics

Despite mixed initial reactions to hearing they would be using Wikipedia in the classroom (30% negative, 30% neutral, 40% positive), a majority of students spent more time (31% more time versus 20% less time), were more satisfied with their work on the Wikipedia assignment (50% more satisfied versus 13% less satisfied), and found the assignment more valuable in a variety of ways.

Variable N=1228	Frequency	Percent
Gender		
Male	407	33%
Female	795	65%
Non-Binary/no response	26	2%
Race		
White	668	54%
Hispanic or Latino/a	82	7%
Black or African American	72	6%
Asian/Pacific Islander	259	21%
Multiracial/more than one	104	8%
Other (includes American Indian)	43	4%
Year in College		
Freshman	228	19%
Sophomore	194	16%
Junior	222	18%
Senior	372	30%
Graduate	173	14%
Non-Traditional	39	3%
College/University		
Public Research University	605	50%
Public Liberal Arts College	136	11%
Community College	55	4%
Private Research University	119	10%
Women's College	12	1%
Private Liberal Arts College	130	11%
Hispanic Serving Institution	5	0.5%
Historically Black College and University	5	0.5%
Not Sure/no response	161	13%
Academic Discipline		
Social Science	312	25%
Humanities/Arts	192	16%
Natural Sciences/Mathematics	318	26%
Medical	154	12%
Business	19	2%
Introductory Writing	233	19%
First Generation to Attend College		
Yes	228	19%
No	988	80%
Don't know/no response	12	1%

Table 1: Descriptive overview of quantitative data

Comparing assignments

Instructors found Wikipedia assignments much more valuable when rating a Wikipedia assignment against a traditional assignment in developing digital literacy (96% more/much more valuable), for learning about the reliability of online sources (85% more/much more valuable), and for learning to write clearly for the general public (79% more/much more valuable).

Students survey responses skewed slightly to the center, with a high percentage (~30%+) selecting "about the same" for their valuation. However, similar to instructor responses, students were most confident about Wikipedia being more valuable for the reliability of online sources (63% more/much more valuable), developing digital literacy (70% more/much more valuable), and learning to write clearly for the general public (72% more/much more valuable).

In fact, none of the ways in which students or instructors were asked to rank a Wikipedia assignment—learning about the topic, developing critical thinking, computer skills, peer review, or working on a team—were perceived as "less valuable" than a traditional paper assignment.
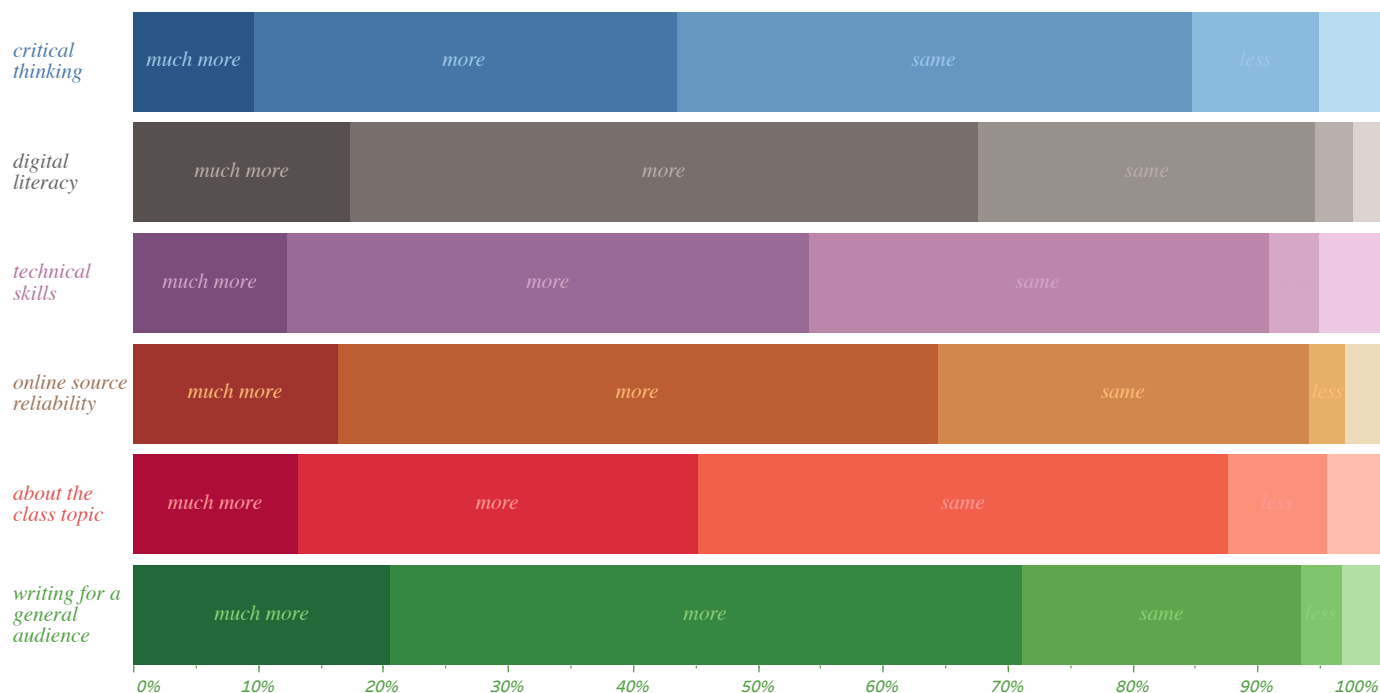
Image: Instructor comparison of perceived value of Wikipedia assignment versus traditional assignment

In comparison with a traditional assignment, **instructors** value Wikipedia assignments for learning
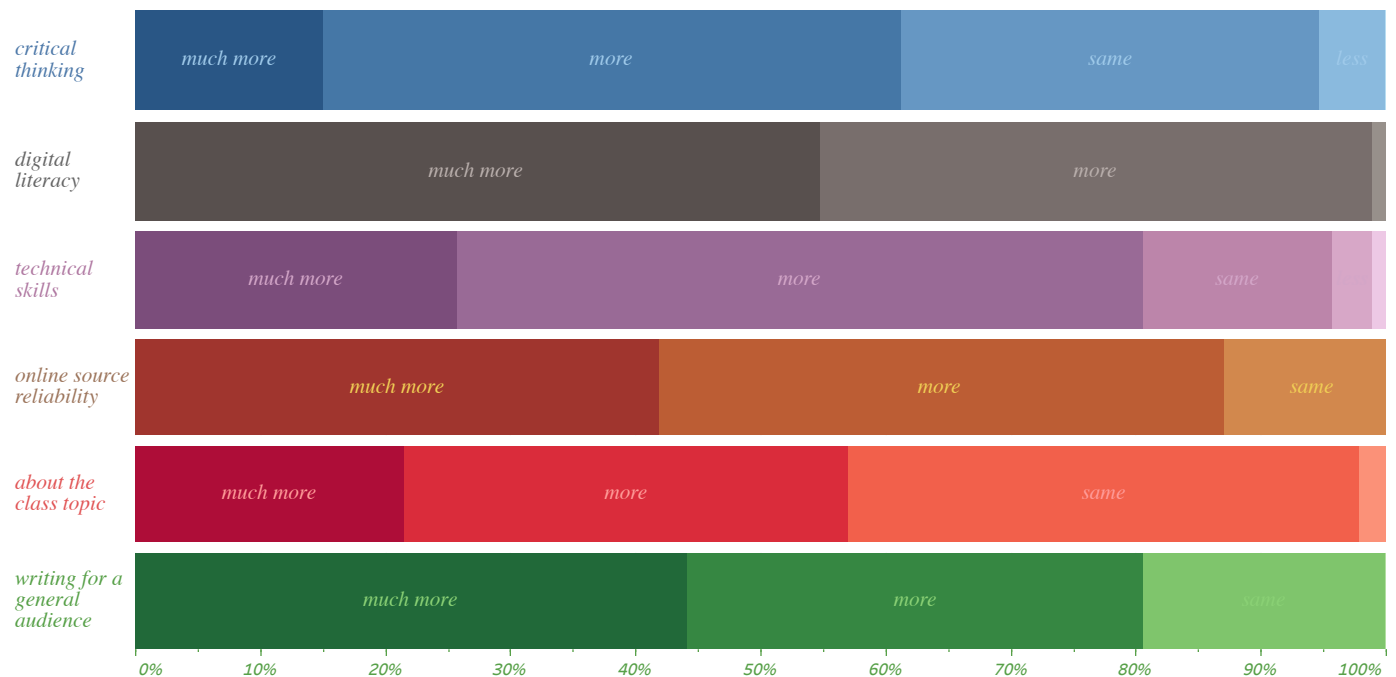
In comparison with a traditional assignment, **students** value Wikipedia assignments for learning

Image: Student comparison of perceived value of Wikipedia assignment versus traditional assignment

Bivariate and multivariate analysis

The value students place on Wikipedia assignments was affected by several contextual factors: type of assignment, satisfaction with work, team vs. solo work, time spent on assignments, comfort with writing, digital literacy, and teamwork. In particular, students marked assignments as especially valuable for learning to write for a public audience, developing skills for working in groups, and gaining digital literacy and peer review skills. Engaging more fully in Wikipedia assignments through using multiple types of assignments, or making more substantial changes is linked to the value stu-

dents placed on Wikipedia assignments. Basically, the more involved the Wikipedia assignments were, the more value students place on Wikipedia assignments, with particular gains through assignments that involved critiquing a Wikipedia article for developing peer review, literature review, and public writing skills. This suggests that using Wikipedia assignments that involve critiquing Wikipedia articles and/ or using multiple types of assignments may be most effective for developing skills, particularly for peer review, literature review, and writing publicly.

General

Students who reported less comfort with writing publicly reported more value in Wikipedia assignments for learning to write for the general public. In addition, those reporting less comfort with giving peer feedback were more likely to report higher value in Wikipedia assignments for learning to write a literature review. Those reporting having worked on a team were more likely to report Wikipedia assignments as helping to learn to work on a team. Finally, there was a statistically significant relationship between the type of assignment in which students were engaged and Wikipedia assignment value. Assignments that involved critiquing a Wikipedia article also reported more value in Wikipedia assignments compared to traditional ones for helping to develop peer review, literature review, and public writing skills. This suggests that this type of Wikipedia assignment (critiquing Wikipedia articles) is especially effective for students' development of peer review, literature review, and public writing skills. These assignments may show the most improvement for those who have least comfort with these skills from the outset.

Social location factors

Social location indicators— gender, social class, and race —were found to mostly not affect assessment of Wikipedia assignments, with a few notable exceptions. First, women reported some different scope and perception of Wikipedia assignments than men students. In particular, women students were less likely to report working on things in Wikipedia that were not directly part of their assignment, while the knowledge that the assignment is public was more likely to affect the way that they approached the Wikipedia assignment. Future research might examine gender variations further by considering, for example, in what ways this knowledge affected women and men students' approach to Wikipedia assignments.

Turning to social class indicators—measured as whether or not students were the first generation in their family to attend college—we found that compared to first generation students, those who were not first generation report less value in Wikipedia assignments for learning to write a literature review. These findings suggest that Wikipedia assignments may be especially

Critiqued Article	Peer Review	Small Edit	Significant Contribution	Much more	More	Same	Less	Much less
Yes	Yes	Yes	Yes	37	97	27	2	5
			No	3	4	5		
		No	Yes	4	14	3	2	1
			No		9	2		
	No	Yes	Yes	10	20	7		
			No	5	9	4	1	
		No	Yes	6	4	3		
			No	2	3	4		
No	Yes	Yes	Yes	5	23	10	2	2
			No	2	1	2		
		No	Yes	10	8	11	1	
			No				1	
	No	Yes	Yes	4	14	10	3	2
			No	5	17	10	1	1
		No	Yes	31	44	21	4	5

Image: Contextualizing value of "Learning to write clearly for the general public" across assignment types

effective for helping first generation students learn to write a literature review.

There were not enough students within other demographic categories to determine significance in this comparison. Future research might seek to include a greater number of students of color to assess if there are other significant variations in learning attitudes across racial and ethnic groups.

Other contextual factors

Besides social location, there were other contextual factors—including academic discipline, year in college, type of institution—that we found to be correlated with students' assessment of assignments. In terms of current course category/academic discipline, we found that compared to students in the social sciences, those in medical, humanities/arts, and introductory writing courses were more likely to place higher value on Wikipedia assignments, particularly for helping to develop critical thinking skills (medical) and for developing peer review skills (medical, humanities/arts, intro writing). Compared to those in social sciences, students in natural sciences, mathematics, or other/undecided fields were more likely to also report that writing in Wikipedia changed their understanding of concepts related to writing.

The qualitative responses to this question address some of the ways that their understanding changed. In terms of year in college, we found that— compared to freshmen — juniors, seniors, and non-traditional students were more likely to place lower value on Wikipedia assignments for helping to develop technical or computer skills. In addition, compared to freshman, graduate students were less likely to work on things in Wikipedia that were not directly part of their assignment, and less likely to report taking the initiative and being "bold" through Wikipedia assignments. These findings suggest that freshmen found Wikipedia assignments more useful than others for developing certain skills, while they may feel less likely to take initiative and explore aspects of Wikipedia that fall outside of the specific bounds of the assignment.

While the type of institution didn't seem to affect students' assessment of assignments, those attending public research universities were less likely than students at all other types of institutions to report the knowledge that the assignment is public affected their approach to the Wikipedia assignment.

Academic discipline	Much less	Less	Same	More	Much more
Social Science	3.70%	2.47%	30.86%	46.91%	16.05%
Humanities / Arts	4.00%	8.00%	22.00%	42.00%	24.00%
Natural Sciences / Mathematics	2.11%	2.11%	23.16%	62.11%	10.53%
Medical			24.44%	46.67%	28.89%
Introductory Writing Course			12.50%	50.00%	37.50%
Other	1.49%	2.99%	32.84%	47.76%	14.93%

Image: Contextualizing value of "Learning digital literacy" across academic disciplines

Qualitative analysis

The post-course survey included a few qualitative questions as well as some qualitative follow-up questions. We did not fully analyze all of the qualitative responses, instead focusing on two of the questions, questions 212 and 213, that were presented back-to-back. The questions asked: "Before you first edited Wikipedia, what were three adjectives you would have used to describe the space?" and "Now, after you have edited Wikipedia what are three adjectives you would now use to describe the space?"

We created categories for the words, taking an iterative approach that is common in coding and analyzing qualitative data that involved developing categories that surfaced from the data, while also examining the data for themes developed from the survey data (Saldaña 2009). Categories were then associated with "positive" and "negative" traits

(see Table 2). Results from comparing the three words students associated with Wikipedia before editing to after editing offer four notable shifts in how perceptions of Wikipedia changed after gaining experience editing.

First, the most significant shift is in the increased reliability students placed on Wikipedia after having edited, with an overall indication that editing helped students become more certain that Wikipedia is reliable. We counted 370 words associated with reliability after editing, while only 171 words used prior to editing. Similarly far fewer words associated Wikipedia as unreliable after editing (N=230) than before (N=375).

A second notable shift is in the use of words associated with collaboration with more students reporting Wikipedia as collaborative after having edited Wikipedia (N=159) while only
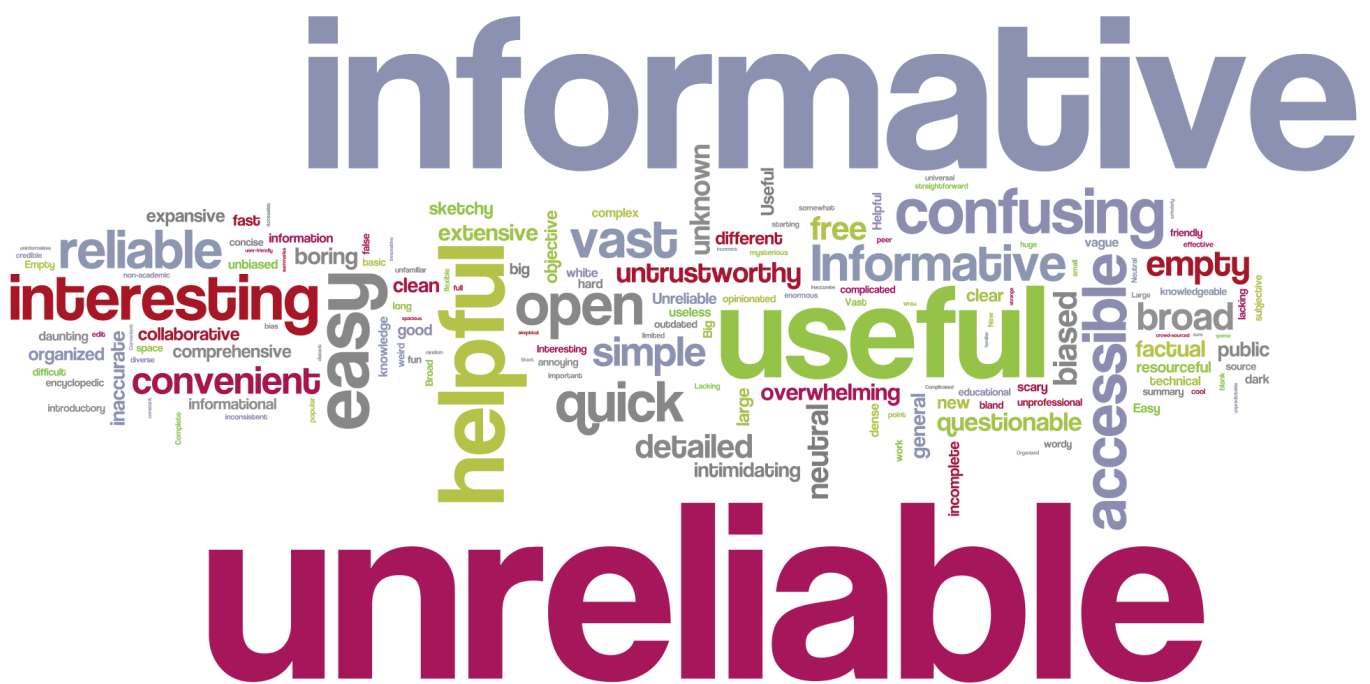

Image: Pre assignment word cloud

Frequency (n=558)	Before	After
Informative	297	286
Reliable	171	370
Inclusionary	56	61
Accessible	253	212
Clear	86	113
Dynamic	22	33
Positive Social Perception	69	109
Collaborative	57	159
Total Positive	*1,011*	*1,343*
Neutral terms (not "neutrality")	*387*	*277*
Uninformative	58	33
Unreliable	375	230
Exclusionary	25	22
Inaccessible	46	43
Confusing	60	28
Static	16	4
Negative Social Perception	49	36
Total Negative	*629*	*396*

Table 2: Q212 and Q213 word analysis

57 collaborative words were used to describe Wikipedia prior to editing. The third notable shift was seen in the count of neutral terms before and after editing, with 387 terms using this language before editing, while only 270 terms used neutral words post editing. This indicates more specific descriptions of Wikipedia post editing, suggesting students felt they had a better understanding of Wikipedia after gaining editing experience.

Finally, overall the count of words went from being less positive in their description of Wiki-pedia before editing (1,011), to more positive after editing (1,343). Negative perceptions were far more limited at both times, although far fewer associated negative words with Wikipedia after gaining editing experience (from 629 to 396). This shift, combined with the decrease in neutral words post editing, suggests that negative perceptions of Wikipedia may be due to lack of understanding of Wikipedia, since respondents descriptions became more positive and descriptive after gaining experience editing.

Image: Post assignment word cloud

Focus group analysis

In the focus group data, students express three common experiences regarding Wikipedia assignments. First, students share shifting perceptions in the reliability of Wikipedia after being an editor. Second, students reported higher motivation for completing Wikipedia assignments as compared to traditional assignments because their work was accessible to a public audience. Third, students found the assignment useful for developing their researching and writing skills. Across these three areas, students demonstrate development of digital and information literacy through their engagement with Wikipedia. Students especially expressed this in their shifting perceptions of Wikipedia by demonstrating learning how to assess information for accuracy and in expressing development of research and writing skills.

Shifting perceptions

When triangulated with the three-word comparison and survey data results, we found that data suggest overwhelmingly that respondents' perceptions of Wikipedia changed after having edited Wikipedia. While many students expressed having perceived the space as unreliable prior to editing Wikipedia, completing the assignment shifted their perception to show more trust in the reliability of Wikipedia as a source for information. Through responses about how their perceptions of Wikipedia changed after having been an editor, many students demonstrate information literacy, recognizing when information is needed, and learning to evaluate it effectively (Association of College & Research Libraries 2017). Students express that they now view Wikipedia as an important, relatively reliable source of information, while also demonstrating their learning around how to effectively evaluate information.

Example quotes from focus groups

> *Before I always thought you can put, sorry for my word, but you can put bulls**t on it.* That's what I always thought about it, that's why my high school teachers … it's not credible, it's not credible, *there's lying on Wikipedia. Now that I was an editor, I was like no there's not, like there is but it was so hard to … I had to source every sentence.* Every paragraph or anything I learned about, because I was like someone's going to flag me down. I was like maybe I will leave it, I was like I don't want to be flagged or I don't want to be a liar online. I was like oh no, so every sentence I did I wanted to have a credible source behind it.

> Yeah, in high school, they told me, *every teacher told me that Wikipedia was not a reliable source* because anyone could edit it. After looking at the process and all that stuff, it can be a valuable source. We found out *Wikipedia is really picky with information that goes in.*

> *I didn't know anything about what happened behind the curtains of Wikipedia…* I didn't know, again, *there's a huge discussion, it gets reviewed by your peers, other people, Wikipedia, and everyone else.* I thought it was you click on edit and you just say whatever you want and somehow you submit it and that was it. *I think it to be more credible now knowing how much work goes behind it* and it's not just simple as cut and paste from different links so I find it more credible now than I did before. *I see myself defending Wikipedia now, I guess.*

Motivations

In addition to positive shifts in Wikipedia perceptions after being an editor, students expressed notable benefits of Wikipedia assignments, compared to traditional ones, for increasing their motivation to engage in the assignment as compared to traditional ones. In particular, students were much more motivated to complete the assignments because they saw it as useful beyond the classroom; besides wanting to earn a high grade, students were motivated to complete the assignment well because it would inform a public audience, and not just be seen by their instructor. This sentiment was particularly true for students who felt their area of research was both meaningful to them and notably absent from Wikipedia.

Example quotes from focus groups

> " What is cool about it for me that changed the way I thought about it was, we were talking about the public aspect of it, that people can change what you're doing. But that's a really interesting way to look at it because *usually when you do research and you write a paper, if it's not going to be published, which most of the time for just a class, it's not going to be, you do all this work, you submit it and then it just disappears. With this project, the idea is you put your work out there, you put the information out there and then other people can add to it and it's like existing in a conversation.*

> " *It makes you want to work harder, I guess. For me, at least, because it's going to have an impact.* For an essay, it's just for the grade and then you're going to throw it away. So, there's not that much motivation. I mean, it is. It's fun to write papers and put your opinion and stuff, *but with this article, it's like you're actually making a change.*

> " You get one grade in the end for the entire class, so you can't really just do this for a grade. *You kind of need to find your own motivation in it, which I agree. It's fun to just write something that's important. It's something that other people will read, it's not just you and the professor.*

> " I found it like less daunting, like when the professor assigns me a ten page research paper or something. I have trouble getting myself to do it sometimes just because I'm like, "Why?" But this, *I was like I'm contributing to something bigger and it's public. So, I felt more motivation to go in and edit it* and whatever.

Learning skills

The third significant finding from the focus group data is around the skills students expressed learning through the Wikipedia assignment. Along with information and digital literacy, which was demonstrated throughout, students expressed and demonstrated learning researching and writing skills through being editors for Wikipedia. While some students expressed positively about this experience of developing writing and researching skills others were more mixed in their feelings about the learning, yet there was consistent signaling of the ways in which the assignment pushed them to develop these skills.

Example quotes from focus groups

> I would say it was helpful, especially in terms of seeing your own bias and the flaws in your writing, because the writing style is so painstaking, that at a certain point that comes pretty quickly, you've looked at the words for so long and the same sources for so long ... *This happens with all projects that you work on for a long time, where you get numb to your own writing, but I think it happened especially quickly because you had to be so careful about what you were saying.* It was good at the end to have somebody come in at the end and say, "This sentence doesn't make sense," or "You don't need to say this." Or, "It's biased."

> I guess it helped to look at a concept in a more generalistic, main idea way, so that it's more accessible to people. In class we're expected to be much more detailed in our methodology and what we write about, but *here it's like really getting the overall sense of the concept, and being able to translate that into easy language I think is a pretty good takeaway from this experience.*

> *It's a resume worthy skill at this point.*
>
> People want you to be able to use Facebook, Twitter. *I feel like the direct skill, being trained and editing Wikipedia specifically is a valuable skill.*

> Like I said before, we're finally, or at least me personally, finally gaining the practice of writing just to commute. I mean, just to communicate. Again, because before writing was just kind of for different things. But *Wikipedia is really for getting the idea across and that's why I think it's really valuable. Especially in the business world because people are not going to care how fancy of a wording you use.* They're going to care about the content you put in and the easier they can understand it, the better it is.

Information literacy

Finally, students' responses mapped overwhelmingly positively to the Association of College Research Libraries' (ACRL) Information Literacy Framework (http://www.ala.org/acrl/standards/ilframework). In particular, students reflected at length on subjects mapping to "Authority Is Constructed and Contextual," "Information Creation as a Process," "Information Has Value," and "Scholarship as Conversation." Students' understanding of the complexities of systemic biases, hierarchy of information value, and the interplay of different voices within scholarly conversation illustrated deep learning from this exercise. More data is available in the focus group summary, along with preliminary analysis tags.

Example quotes from focus groups

> "One thing I realized is, a lot of *the stuff that we're writing about is very interconnected*... I would try to link stuff and then it wouldn't work - there would be no page... *it's not random, the information that's missing from Wikipedia.* It's a history of the knowledge of the events that have been documented and historicized in the world, and that's what's on Wikipedia right now.

> "It raises an awareness of what is good information, what is bad information, so obviously in learning how to correct something that has good information. If you're looking at an article you're conscious, "Oh wait, that's not quite right. This source is honestly not very valid. Like, do I believe this information?" I think you're a lot more ... *you have much more of a questioning mentality and you're a lot more conscious of the validity of the information that you read.*

> "I think I was more critical of the sources I was using. . . because when you're writing an academic paper, you go on JSTOR... and you find your articles, you read them, you analyze them, but you don't have to ... but it was finding reliable sources that weren't academic because no one had written about it in an academic context. . . Because in academic sources, when you go on JSTOR, you know they're reliable, right?. . . But now you're assessing their reliability.

> "I always thought of research as a very solitary thing, like someone in a library basement looking through books and stuff. So, *knowing that Wikipedia has this whole community of people who are researching and adding to things just changes how I think about it,* I think. I never really thought of it as a collaborative endeavor and now I know that it can be, it's kind of interesting to see it that way.

Conclusions

There are innumerable ways to study student learning, each with their advantages, costs, and drawbacks. With hundreds of classes across a wide range of subjects, this study required flexibility, adaptability, and the ability to gather information on a largely heterogenous population of learners. To approach this complex population we employed both qualitative and quantitative methods, attempting to "triangulate" understandings of student learning outcomes by addressing multiple types of data at once. We hope to illustrate a clearer picture of the student experience with using Wikipedia-based assignments.

Since there was such a large variety of courses, class "learning outcomes" would be as numerous as the courses themselves. To help make sense of this we decided early on to try to compare the benefits or "value" of the Wikipedia assignment across this disparate population. Running an A/B comparison would be virtually impossible with this population. Instead we focused less on traditional student metrics (as is often employed for large scale studies, especially in K-12) and attempted to understand the deeper student learning by honing in on the value of the Wikipedia assignment, and how that value is expressed by student work and feedback.

Preliminary quantitative analysis from this study was incredibly positive, as both students and instructors appeared to value the Wikipedia based assignment overwhelmingly over a "traditional" paper assignment in *every category* queried.

Moreover, students found themselves motivated, more satisfied, and were generally very positive about the Wikipedia assignment. The focus group data helped contextualize the conditions for positive reactions (which were well addressed with the descriptive statistics), in addition to identifying what the valuation, motivation, and general positivity actually produced among student learners. While the survey data offered a lot of clues on what is happening, focus groups allowed us to dig deeper into actual student learning through Wikipedia-based assignments in lieu of traditional assignments.

A variety of students identified Wikipedia assignments as motivating due to a perception that their work was contributing to conversations outside of the classroom and filling gaps of information that were useful for a public audience. Students seemed to employ that motivation to engage in deeper understanding of Wikipedia, knowledge production, and a variety of information literacy skills.

Focus group responses also suggest that students directly engaged concepts outlined in the ACRL framework for information literacy, particularly when engaging understandings of systemic biases, construction of information, and value of information.

Triangulating focus group responses and quantitative survey responses demonstrated mastery in these skills as well.

Although additional research and analysis is required, we believe that there is ample evidence to support students using Wikipedia-based assignments. Not only do students seem more motivated, report higher value, and higher satisfaction with their assignments, but they also actively demonstrate deeper learning in a variety of skills, particuarly complex information literacy skills.

Future analysis

Currently, we are working on three major research questions, with a potential for a few more, focusing on contexts, skills transfer, and digital literacy. There is ample data to analyze in regards to how student contexts correlate with their attitudes about Wikipedia, the assignment, and perceived value of the assignment.

One of our main areas of focus is analyzing what contextual and demographic factors predict higher attitudes and perceptions of value, with the assumption these create a more robust learning experience. Preliminary results are incredibly positive and suggest strong correlations between some major contextual factors.

We are also interested in the skills students learn and transfer using Wikipedia-based assignments. Evidence suggests that students find the assignments more valuable in developing particular skills, but further analysis will be conducted to triangulate how they understand and apply those skills.

Finally, from preliminary analysis strongly suggests that there is a positive increase in digital literacy when engaging with Wikipedia-based assignments. Although students and instructors overwhelmingly noted finding these assignments more valuable, we have had mixed results with the assessment responses —there were too many variables to verify the data. Instead, like with skills, we plan on digging deeper into the focus group data to better triangulate how students understand source reliability and verifiability of information.

Future research

Perhaps one of the most valuable takeaways from this research is how it can help frame future research on Wikipedia-based assignments. We believe there is ample opportunity to expand this research to better understand demographic correlation, information literacy, deeper learning, and deeper understanding of new editor experience on Wikipedia. More data gathered across multiple semesters will help to explore correlations between racial, social, and gender characteristics to understand value across underrepresented groups. Redesigning interview and survey questions can help pinpoint adoption of particular information literacy skills using the ACRL framework, as well as querying students about deeper learning competencies. Finally, this data could be more valuable for trying to understand college-aged users of Wikipedia if some questions were approached from a more general perspective.

Software used

Preliminary statistical analysis was performed in STATA 13 for Mac. Qualitative analysis was performed in NVIVO 10 for Mac.

Data visualization and graphics were created using Tableau 10 under an academic research license.

Surveys were administered using Wiki Education's Dashboard Course Management Software, available on GitHub as WikiEduDashboard.

Acknowledgments

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