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Short circuits in the information cycle: Addressing information breakdowns using the information literacy framework

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In this article we outline a theory of one kind of failure in information cycles: information “short circuits.” Information short circuits, as we define them, occur when safeguards to insure accurate and responsible transmission of information through information cycles are circumvented, often due to confirmation bias or moral panics. In instruction, we argue that such short circuits in the information cycle can be best engaged with at a “middle distance,” using cases that are not so distant from students’ lived experience that they seem irrelevant, but not so close that students can’t gain a critical distance, and we illustrate this framework with three such cases that concern moral panics about new technologies. Through this analysis, we hope to enrich a theoretical understanding of information literacy while also providing practical suggestions for application that will help learners critically assess sources while retaining a strong but realistic appreciation for procedural supports for epistemic responsibility, such as academic peer review and balanced journalism.

Keywords: information literacy, information cycle, moral panics, technological determinism, peer-review

Information literacy is a multidisciplinary area of study and is taught in a variety of ways in higher education, primarily through general education and academic library programming. The Association of College & Research Libraries (ACRL) has been a long-time shaper of how information literacy is taught in higher education in the United States, first with the Information Literacy Competency Standards for Higher Education (ACRL, 2000) and more recently the Framework for Information Literacy for Higher Education (ACRL, 2016). The original standards and the recent framework have guided how information literacy is taught to undergraduate students. In this article we will draw upon the ACRL

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Framework and develop a new theorization of patterns of information transmission to enrich the Framework, presenting a novel theory of “short circuits” and demonstrating how it can be used in a variety of disciplines and contexts to teach undergraduate students how to navigate and comprehend the ever-changing *information cycle*; the way that information about a topic moves through different formats with different audiences over time, typically beginning with online information such as social media, moving to media coverage, and progressing to scholarly articles and books (Burkhardt et al., 2010).

There are three frames in the ACRL Framework that align especially well when considering the information cycle. *Authority is Constructed and Contextual* focuses on the idea that information sources are a reflection of the author’s expertise in that area and emphasize that context of expertise and of use is an important consideration. *Scholarship as Conversation* acknowledges that the scholarly discourse is cyclical and changes over time and that not all questions have one single correct answer. This frame also encourages students to see themselves as contributors to conversations and their role in critiquing information. *Information Creation as a Process* recognizes that information differs according to its format in regard to creation, authorship, review process, and context of use while acknowledging that an expert researcher focuses more on content and context than on format (ACRL, 2016).

Oftentimes when using the ACRL Framework to teach students about the information cycle it is common for instructors to focus on format and order of or time to creation, beginning with social media or news and then move on to formats such as scholarly articles and books. For example, Goodman (2015) introduced a lesson plan entitled “Tracing Information Over Time” which uses the information cycle to connect to the threshold concept Authority is Constructed and Contextual. Jenemann (2018) draws upon the framework’s Scholarship as Conversation to teach a lesson that asks students to place cards representing various formats of information such as Tweet, scholarly article, or book, in order of creation to demonstrate that information production occurs in a chronological order (Jenemann, 2018). Kirker (2018) uses an activity that asks students to present resources in chronological order by time to creation and maps it to the frame Information Creation as a Process, focusing on how the type of source indicates the type of information it conveys and how the time it takes to publish in various formats can impact scholarly conversation.

Focusing on the orderly transfer of information in ideal circumstances is valuable in showcasing intended functions and effects of information practices but does not always teach students how to deal with information in real-world circumstances. Similarly, providing students with checklists like the CRAAP test (Blakeslee, 2004) that allow them to determine

whether or not a resource is reliable can be useful to introduce simple concepts of information literacy, but doesn't provide a view to why and how things go wrong in the information cycle. We can help students more successfully and more critically engage their information environment by not only looking at the normative process of how the creation and dissemination of information ought to work, but also looking at breakdowns and failures where inaccurate information is passed on, where partial information is passed on poorly, or when information changes over time, rendering a credible source inaccurate. Looking at failures in the information cycle can provide access to a broader and more critical understanding. Finding the right kind of cases, however, can be difficult.

The 2016 United States presidential election, with the awareness it brought to news bias (Tsukayama, 2016; Isaac, 2016), the filter bubble (Pariser, 2011), and “fake news” provides a timely and accessible example of breakdowns in information cycles, as well as an urgency to make this a priority in information literacy education. However, as motivating as the example may be for educators, its use in instruction can be problematic: inflamed passions and ideological commitments may distract students from study of information transfer and divert attention to political positioning. There are similar problems with other prominent and otherwise excellent examples of failures in information cycles, like the anti-vaxxer movement, 9/11 “Truthers,” and climate change denial. These cases may be too close to some students' lived experience to be seen with clarity. Other cases, like Holocaust denial or racist justification of slavery, may be too distant—the majority of students may not be willing or able to see that the distorted interpretation and repetition of “data” and “evidence” at work in these cases is relevant to potential problems in their own information access and assessment.

When the case is too close, some students feel attacked and conversation shuts down (Wang & Hickerson, 2016); when the case is too distant, failures in assessment and transmission of information look like problems for other people rather than an everyday issue that students must be aware of and guard against. We recommend use of “middle-distance” cases: close enough to the students' views and lived experiences that they can see how information literacy is a problem for them personally, but not so close that students are unable to find enough critical distance from the issue itself to think about information transfer and construction of authority.

We have developed a theory of “information short circuits” to describe breakdowns in the information cycle and have tested the practical value of this theory through instruction using “middle-distance” cases. In the following section we will offer a theoretical articulation of information short

circuits and describe how we have found excellent middle-distance cases at the intersection of moral panics, NEST (new and emerging science and technology), and technological determinism. Following this, we will present three examples which will serve as illustrations of the theory, but, we hope, may also be pedagogically useful to information literacy instruction in a variety of contexts.

Information short circuits and the intersection of moral panics, NEST, and technological determinism

There are a wide variety of possible errors in information cycles, ranging from innocuous and trivial (e.g. typos resulting in minor misquotes or misattributions) to wide-ranging in both scale and importance (e.g. purchase of Facebook advertisements that spread disinformation about political candidates). While a wide variety of such errors illustrate important points about the use and abuse of the information cycle, ideal cases for information literacy will effectively illustrate how the information cycle *is supposed to preserve and transmit* factual information through different formats, from research to reporting to public debate, by highlighting points of systematic human error in the transfer of information. We call these points of systematic human error “short circuits” in the information cycle.

A literal short circuit is a dangerous accidental pathway for an electrical current that circumvents impeding functions that the circuit was designed to serve—for example, a short circuit might present a less resistant pathway for electrical current by routing around an LED or heating element. Information short circuits, as with all metaphors, only resemble their namesake in some ways. We mean “information short circuits” to refer to cases where appropriate and intended functions of critical assessment, contextualization, and fact-checking are left out of the information cycle through information transfer pathways that follow an unintended route of less resistance. Information short circuits easily go unnoticed, unlike literal short circuits, which often cause a noticeable failure of the function of the circuit: the light remains dark, or the heating element cold; an electrical fire may even break out! It is by contrast very easy to fail to notice that the information cycle’s function as a reliable transmitter of factual information has been circumvented, and that information has found a shorter (but unsafe) route around these intended impedances.

In the examples we will present, the bridge that allows the short circuit that avoids these intended functions of the information cycle is provided through *confirmation bias* created by *moral panics*. We will define each of these terms and then provide examples of their connection.

Confirmation bias—when we seek to reinforce what we already believe and avoid the cognitive load and emotional risk of questioning our beliefs and assumptions—is a well-established epistemic problem (Nickerson, 1998). Good research combats confirmation bias through the use of study design elements like control groups and statistical analysis, and norms of balanced reporting and responsible sourcing play a similar role in good journalism. However, even well-intended, well-trained, and responsible researchers and journalists sometimes fail to place these safeguards in the right spots to prevent short circuits, especially when they hold unjustified assumptions that appear to them so vital or so common-sense that they seem to be beyond questioning. This happens with particular frequency when large information landscapes are organized around and take place entirely within the context of a set of commonly shared assumptions, as is the case in the midst of a *moral panic*, which Cohen (1972) influentially defined as when “[a] condition, episode, person or group of persons emerges to become defined as a threat to societal values and interests.” Classic examples of moral panics in the US context include the Salem witch trials, the War on Drugs, the “Satanic Panic” of the 1980s, or perennial fears that videogames cause violent behavior.

Pedagogical use of information short circuits that take place in the context of current moral panics allows students to feel the pull of their confirmation bias and to experience the recognition that they have failed to critically assess their background assumptions. However, students will be able to experience this recognition if they cannot escape from the moral panic in order to assess its influence. Finding middle-distance cases is thus paramount to creating an authentic learning experience (Herrington & Herrington, 2005) of information short circuits.

Ideal middle-distance cases can be found in cases where students are subject to moral panics that disengage their critical faculties through confirmation bias, but where their personal commitment to maintaining their beliefs is not so extreme that they will refuse to reconsider those assumptions. In our practical work with these cases in *Philosophy of Digital Culture*, an information literacy course at Old Dominion University (see Appendix for further details), we found that moral panics having to do with technology struck an excellent balance. These cases were part of the students’ everyday lived experience, were subject to moral panics, but were not beyond reassessment.

Another reason why these cases are at a good “middle distance” for students is that they draw on our common tendency toward technological determinism in our thought about new and emerging science and technology (NEST) (Swierstra & Rip, 2007). Although *technological determinism*—the idea that the nature of a technology or medium fully

determines how people will act with or through it—is not taken seriously among contemporary philosophers of technology, technological determinism often lingers in writers' background assumptions in public debate, and not infrequently even in academic research and debate (Swierstra & Rip, 2007). For example, we see a kind of technological determinism in much of the discussion of the Arab Spring, where Twitter and Facebook are given undue credit for pro-democratic activism and reform, failing to recognize years of organizing on the ground (Gerbaudo, 2012; Comunello & Anzera, 2012). It is possible for the technology to be relevant without being determining or responsible, but public debate tends to attribute excessive responsibility to technology, especially in the context of moral panics.

We will now turn to three examples of information short circuits that take place at this productive “middle-distant” intersection of *moral panic*, *technological determinism*, and *NEST*. The first proceeds from moral panic about selfies and a supposed rise in narcissism; the second from moral panic about cellphones and a supposed loss of empathy; the third from moral panic about social media and a supposed rise in unhappiness.

Example one: Selfies cause mental illness

In *Philosophy of Digital Culture*, there is a module on selfies that begins with students reading Senft & Baym's journal article, “What does the selfie say?” (2015), which presents, in our terminology, a short circuit in the information cycle that takes place in the context of moral panics about selfies, following from a technological determinist interpretation of NEST. The authors call attention to how news reporting on selfies emphasizes narratives of narcissism, body image, teenage girls, and low self-esteem, despite significant problems in making these connections responsibly—e.g. that narcissism is a psychological condition not clearly connected to selfies. These narratives provide a context where readers, reporters, and even researchers are subject to confirmation bias, where the view that frequent selfie-taking is unhealthy behavior based in low self-esteem is an unquestioned background assumption. In fact, empirical research suggests that high self-esteem, not low self-esteem, is more strongly associated with selfies and sexting (Hasinoff, 2015).

As students complete the reading, they are asked to trace the citations in the article. In *Philosophy of Digital Culture*, this article is referred to and discussed throughout a weeks-long unit, and students revisit their original ideas or conclusions about the article. Senft and Baym (2015) analyze what they call a “media circularity” about “selfie addiction,” in which an *Adweek* article (Barakat, 2014) discusses a case brought to prominence through a *Mirror* article (Aldridge & Harden, 2014) and cites a *Time* article

(Grossman, 2014) to substantiate its claim that “selfie addiction” is a real disorder. The *Time* article is substantiated only by the same prior *Mirror* article and (supposedly) by an unpublished academic article in the field of business—that, however, does not contain the word “addict” or “addiction” (Houghton, Joinson, Caldwell, & Marder, 2013). This series of self-reinforcing journalistic pieces, through their interconnections, create the mirage of a foundation in research.

Having students look further into the sources mentioned by Senft and Baym (2015) shows them other problems in information cycles and construction of authority. The articles report on a young man who attempted suicide. He had been diagnosed with obsessive-compulsive disorder and body dysmorphic disorder, which manifested in part in obsessive selfie-taking. The articles introduce technological determinism by indicting the technology rather than treating his behavior as a symptom of his diagnosed mental illness. The *Mirror* article states that “Danny is not some bizarre one-off case in a world where smartphone and social media is spiraling upwards” (Aldridge & Hardin, 2014, n.p.). Aldridge and Hardin go on to claim that “The top psychiatrist at the clinic where Danny was treated revealed addiction to taking selfies is becoming so widespread it is now is [sic] a recognised mental illness” (n.p.). Neither of the world-standard classifications of mental illnesses, the Diagnostic and Statistical Manual of Mental Disorders or the International Classification of Diseases, contain the word “selfie,” and all reporting we found about “selfie addiction” could be traced back to this particular psychiatrist, Dr. David Veale.

Students are prompted to participate in a conversation about one particular quote that stood out as problematic. The *Adweek* article heavily depends on Veale’s comments in the *Mirror* article for scientific legitimacy, but also includes a claim not found there: “Veale said that since the rise of camera phones, two out of three of his patients suffer from Body Dysmorphic Disorder and compulsively take selfies” (Barakat, 2014, n.p.) This quote without further context presents what sounds like a troubling fact: two thirds of his patients have this disorder! Of course, we are not told what his practice is. If it is a practice that focuses on Body Dysmorphic Disorder, this number might be surprisingly low.

The *Adweek* article provides no source for this quote, but a Google search finds numerous sources (the original source is unclear) that contain a slightly different quote from Veale: “Two out of three of all the patients who come to see me *with Body Dysmorphic Disorder* since the rise of camera phones have a compulsion to repeatedly take selfies” (emphasis added). This seems much less troubling: we might reasonably expect that many patients with Body Dysmorphic Disorder might have a compulsion to take selfies, given the nature of their mental illness. It’s also worth noting that

Adweek rearranged the quote not only to make the claim more dire, but also to support technological determinism. The fuller quote says, approximately, ‘66% of this group with BDD have symptoms involving selfies’, while the *Adweek* paraphrase seems to say, approximately, ‘cellphones became common and now 66% of my patients have BDD’—a *post hoc ergo propter hoc* logical fallacy.

The *Adweek* article also quotes Pamela Rutledge saying that “Selfies frequently trigger perceptions of self-indulgence or attention-seeking social dependence that raises the damned-if-you-do and damned-if-you-don’t specter of either narcissism or low self-esteem,” (2013, n.p.) but it isn’t noted that Rutledge is merely reporting on the social judgments that selfie-takers are subjected to. The conclusions Rutledge (2013) actually draw are that selfies “allow us to play, to have fun and to poke at ourselves” and that while “there are some unfortunate uses of selfies . . . that doesn’t mean the act of taking a selfie is a bad thing” (n.p.).

The *Adweek* headline, “Science Links Selfies to Narcissism, Addiction & Low Self Esteem,” suggests that the report is based on scientific research, however the only report mentioned in the article is a non-peer-reviewed discussion paper published in one author’s institutional repository (Houghton et al., 2013) that concluded that Facebook users can better maintain personal relationships by sharing photographs in great volume only with closer friends and family—a conclusion that has only a tenuous connection to the assertion of the article’s headline. All other sources are not research articles, leaving little grounding for the headline invocation of the authority of “science,” even putting aside the misinterpretations and mischaracterizations discussed above. Through these articles we see how a moral panic about NEST provides a context in which journalists and readers mistake reciprocally reinforcing confirmation bias for meaningful consensus, and in which confirmation bias allows selective reading, uneven reporting, and transformative and inaccurate paraphrasing.

While in *Philosophy of Digital Culture* the Senft and Baym (2015) article is read and discussed in the context of a several-week-long investigation of moral panics and NEST. This case could also be presented as a stand-alone example by having students reconstruct the information cycle.

Example two: Screens make us bad at relating to people

Our second example takes place amidst the moral panic about how the rising use of mobile phones allegedly leads to a loss of personal connection with others and a decline in relationship skills. Davis (2014) called attention to this case in her critique of Uhls et al. (2014) a study caught up in this moral panic, simplified and widely reported on by mass

media, and used in Turkle's prominent and widely-reviewed (Penguin Random House, n.d.) book, *Reclaiming Conversation* (2015).

Davis (2014) demonstrates that questionable experimental design led Uhls et al. (2014) to misreport results. Uhls et al. studied whether cellphone use affected preteen users' ability to correctly interpret emotional cues through facial expressions. During a five-day summer camp, their experiment group did not use cellphones; the control group was allowed to use regularly use cell phones. Both groups were given empathy-perception tests both before and after their summer camps. Uhls et al. found that the experiment (no-cellphone) group saw a greater success rate in recognition of non-verbal emotional cues in comparison to their pre-experiment baseline and concluded that abstaining from cellphone use had increased subjects' recognition of emotion cues.

Davis (2014) points out, however, that the *post*-experiment testing results *did not differ* to a statistically significant degree between experiment and control groups. Instead, the pre- and post-testing differential in the control and experiment groups was primarily due to a significant variation in *pre-testing* results, which took place under different social circumstances, introducing an ignored explanatory variable. Specifically: the control group took their pretest at school, before leaving for camp, and the experiment group took theirs upon arriving at camp. As Davis reasonably puts her critique, "I would argue that kids in a new environment, distracted by the excitement and nervousness of a week in the woods, would not score as well as those taking the test in a comfortable and familiar environment" (Davis, 2014, n.p.).

How did this study pass peer review without having this methodological concern raised by reviewers? The results reported confirm existing bias connected to moral panics and narratives of disconnection concerning digital media use, and this could reasonably be expected to have lowered reviewers' guard against failing to critically assess information and the way conclusions are drawn from that information. This tendency is also seen in the uncritical reporting on the study found in mainstream news outlets (e.g. Summers, 2014, Wolpert, 2014).

This example could be used for teaching in different ways, depending on context. When working with students in a research-methods course, students could read the study and talk through what it demonstrates and how. Large-group discussion and/or individual small-stakes writing on the exercise could then reflect on what factors may have been at work in allowing this to pass through peer-review and editorial review without the authors, reviewers, or editor noting the apparent problem or deciding to take action on it.

In other contexts, such as during a library instruction session, students could be presented with the study and the critique, and then use Google in small groups to trace how this study influenced ongoing conversations and public debate about screen use—at the time of writing, a search for “UHls,” “phones,” and “camp” results in retrieval of reporting from *The LA Times*, *The Huffington Post*, and *Time* in the first page of results. Adding other keywords, such as “children,” could help to get at different or more focused ways in which this article has influenced ongoing conversations. Students can compare how various kinds of media outlets used the study differently, and which were more or less responsible, and draw conclusions for themselves about their future approach to thinking and writing about topics subject to moral panics.

Students can also use Google Scholar to search for scholarly work citing this study, and to trace distortions introduced into Scholarship as Conversation, but our final example may be better suited to this application, as it has been of broader influence within ongoing scholarship.

Example Three: Social Media Makes Us Lonely and Sad

Our last example relates to the moral panic about personal relationships online, specifically, the idea that online relationships aren't *real* relationships, and that being social online rather than offline is making our lives worse. It is of special interest due to how influential the flawed study has been, not in popular press and public debate, but within further scholarship.

Kross et al. (2013) published a study on Facebook and self-reported subjective well-being that was widely reported as demonstrating that increased social media use results in decreased happiness. The study required participants to reply to five text-messaged survey questions: (1) “How do you feel right now,” (2) “How worried are you right now,” (3) “How lonely do you feel right now,” (4) “How much have you used Facebook since the last time we asked,” and (5) “How much have you interacted with other people “directly” since the last time we asked?” These five questions were asked five times every day over a two-week period.

These questions included two prompts for negative assessments (“How worried are you right now;” “How lonely do you feel right now?”) but no prompts for positive assessments (e.g. “How connected to others do you feel right now?”). This ensured that negative rather than positive assessments would result merely through the constrained metric. Furthermore, we would expect that if someone were asked only questions 1–3 they would report more negative self-assessments, due to the well-documented effect of psychological priming. To make this concrete,

students are asked to consider how they would feel if they had to document how worried and lonely they felt five times a day for two weeks. If not for the ethical issues in conducting a study so transparently likely to cause psychological harm to participants, this would have been a way of introducing a control group. (No control group was included in the experiment design.)

The negative categories of assessment and the priming of negative-toned questions could be expected to produce a baseline of negativity. This does not itself strongly call the study into question, since, even though it may skew assessments toward negativity, there still might be a statistically significant correlation over the two-week study between participants' degree of negative self-assessment and amount of time spent on Facebook. To really invalidate the study's conclusions, the study design would have to *also* prime participants to associate feelings of anxiety and loneliness with their frequency of Facebook use, or encourage participants to feel like there is something wrong or questionable about Facebook use. The study does exactly this through the remaining two questions.

In question 4, participants are primed to associate feelings of anxiety and loneliness with frequency of Facebook use. Participants were not told why researchers asked about loneliness *and also* about Facebook use, but they are likely to think that these researchers are studying a connection between the two. Furthermore, based on our cultural assumptions and the moral panic about digital media, it is unlikely that study participants will think that the researchers are concerned that face-to-face interactions might be more likely to make us lonely and anxious. Given this cultural context, the hypothesis that this question projected to study participants, five times daily, is that Facebook use makes you lonely and anxious.

In question 5, participants are encouraged to feel like there is something wrong or questionable about Facebook use by asking about "direct" communication, which was defined to participants as "face-to-face or phone interactions" (Kross et al. 2013). It is unclear that participants would have otherwise defined Facebook communication as not "direct," or that participants would have thought about Facebook interactions as importantly distinct from telephonic or face-to-face interaction, especially as these often take place closely alongside one another in multimodal communications with the same person, sometimes through the same device. This definition primes participants to see Facebook interaction as separate and unequal through the use of the word "directly," even though placed in scare-quotes. This poisons the well, implicitly communicating to study participants that the view that Facebook communication may itself be "direct," or may not be distinct from other forms of interaction, is unacceptable to the researchers and falls outside of the constraints within which participants are to analyze and report their experiences.

The study does not account for the impact of having asked participants these push-poll questions 600 times over two weeks, or how the existing moral panic and media hype cycle, as well as our technologically deterministic suspicions about human impacts of NEST, may have produced the results reported in part or in whole. All these critiques, however, do not mean that it is false that Facebook use is correlated with feelings of anxiety and loneliness. They mean only that, even if the reality is *precisely the opposite* of the conclusion drawn from this study, this experiment design could still be expected to produce these results.

A glance at the titles of mass-media articles that mention the study shows uncritical reporting of these deeply questionable results, and a sample of the first 20 results of the 1158 citations of the Kross et al. study identified by Google Scholar at time of writing, including use in both scholarly articles and in college textbooks, shows that academic use of this study is often similarly uncritical, showing how questionable research is propagated in academic research, instruction, and journalistic reporting when results accord with moral panics, NEST, and technological determinism (Bell, 2013; Konnikova, 2013).

Given this study's social impact through journalistic reporting (Plos One, n.d.), and given the relevance of this moral panic to the lives of nearly anyone entering our classrooms and learning environments, this example provides an excellent basis for the exercises about influence in public debate presented above with the second case. Students could conduct Google searches in small groups to track and compare different kinds of reporting from different kinds of sources, and to see how far the influence of the study extends, then reflecting on what they take away from this case for their own future thought, reading, and reasoning.

This example is particularly well-suited to tracing influence through Scholarship as Conversation, since it has been so widely cited in further scholarship. Students could trace the influence of Kross et al. in Scholarship as Conversation, and look at how the study is addressed, to what degree it is questioned, and to what degree the authority of peer-reviewed publication is allowed, on its own, to prefigure future research or justify otherwise questionable claims.

With this example, students can also consider confirmation bias, moral panics, technological determinism, and the trustworthiness of peer review. For example, if students have not read the article before class, they could be split into A and B groups, with one group given the study's questions to answer, and the other being given alternate, less biased questions (e.g. (1) "How do you feel right now," (2) "How connected to others do you feel right now," (3) "How disconnected from others do you feel right now," (4)

“How much have you interacted with others through digital technology since the last time we asked,” and (5) “How much have you interacted with others without digital technology since the last time we asked?”). Students could then be briefed on priming and some of the other problems discussed above, A and B groups could compare their experience answering the questions, and then the study itself could be introduced, described, and critiqued.

A class could group themselves based on how many times a day they look at Facebook and discuss their critique of the article and whether or not they believe that the information presented in the study is relevant or true in their own day to day experiences. After some discussion, groups will be given a mainstream media online article that simplistically interprets the Kross et al. study to discuss. They will be asked to compare the information presented in the mainstream media article to the Kross et al. study.

Lastly, groups could be challenged to search using Google to find a mainstream media article that questions or rebuts the Kross et al. study, which will be challenging but not impossible. This will give students the opportunity to consider algorithmic bias based on their findings. Since the students are split into groups based on their reported use of Facebook, they could be prompted to discuss how their own biases may have influenced the way that they searched for a rebuttal article, and even what may have shown up in their Google search results. In more heavily methods-centered and social-scientific settings, this case offers an excellent opportunity for students to think about how prejudices—technologically deterministic in this case, but often having to do with race or gender—can enter into the scholarly record through bias, and then can come to frame research and debate in Scholarship as Conversation for another entire generation of scholars, or longer. Students can reflect on how Scholarship as Conversation and the information cycle can be used to *fix* short circuits like this one, after they have entered into and become ensconced within the scholarly record as “settled knowledge,” and what positive role they could personally play either as researchers or simply as consumers of information.

Conclusion

Examples of information short circuits can effectively demonstrate how the information cycle is intended to function, and how breakdowns in that cycle occur and are propagated. They also demonstrate that, to be fully responsible, a reader must critically assess sources, and must even trace them back throughout the information cycle, and critically assess their basis in research. The burden of training students how to do this is far too

much for one-shot library instruction to bear—too much even for a semester-long information literacy course. We can still contribute to this effort by instruction in the information cycle and Scholarship as Conversation, including, as we have done in these examples, through the use of critique and social-critical research from the humanities; areas such as philosophy, women’s studies, and science and technology studies.

In this process, and across different courses and in library instruction, it is not enough to focus on developing critical, well-informed, information literate skills in assessment and evaluation of information. Even the most responsible readers can’t be expected to dig down to original research on every topic they have to be informed on and make decisions about, and even if they tried, closed-access publication often renders this impossible. We need trusted systems that can bear some of the cognitive load—systems like journalistic standards and peer review—and corrective systems for those trusted systems, like open access publication, open data sets, and critique from the humanities. Consideration of information short circuits demonstrates that epistemic responsibility cannot be laid at the foot of the reader but is a matter of social and institutional responsibility as well. The “take away” from information literacy instruction should not be that individual readers are responsible for critically assessing information, but that it is our collective responsibility to establish and maintain best practices at every stage of the information cycle to reduce or eliminate distortions and short-circuits.

In our instruction we must also take care in critiquing these trusted systems, lest we inadvertently encourage students to give up on trusting experts altogether, especially in our age of anti-science conspiracy theories. Simply insisting on the authority of experts or on the “gold standard” of peer review is no solution, though: uncritical and idealized faith is brittle. Looking at when and how these systems fail can provide a critical and nuanced understanding that recognizes why these are good systems, deserving of trust, even though they are imperfect, and can even provide insight on when we may need to switch over from a trusting attitude to critical assessment of claims and sources.

Using example that present breakdowns in the information cycle, and combining those case studies with creative lesson planning that allows students to experience and relate to both the content and the experience of the cycle can help students grasp the concept that research and is an iterative, ongoing, and cyclical process and that the information cycle is not perfect or linear. Students are used to a world in which finding and sharing information is easy, but looking at and examining the information cycle as a whole and incorporating it into their own current practices and future professional roles in creating and sharing information is the next, more crucial step that we can teach students to take through looking at

information critically and being able to identify the processes by which it was created and distributed.

Appendix

As a research article, the primary concern of this article is to present the theory of information short circuits, and the secondary concern is to promote this approach to information literacy instruction. To this end, this article has focused on theory and on a variety of applications and has provided only scant detail about the course in which we have personally used these cases. This specific context may however be of use or interest to some readers.

Philosophy of Digital Culture at Old Dominion University is a course offered in the Department of Philosophy and Religious Studies. At the time of initial writing of this article, it was one of only seven courses offered across the university that satisfied the information literacy general education requirement and was open to students of any major. For this reason, students enrolled in the course came from a wide variety of majors, although majors in the humanities and social sciences were most common, with majors in education, the natural sciences, and health sciences being common as well. Students in engineering majors and in political science were rarely or never enrolled in the course, as these majors contain a required major-specific information literacy course. The course was in demand and always reached its 35-student per section capacity. Of these, no more than one or two students would be Philosophy majors.

The course was offered at the 200-level because the information literacy requirement is meant to be taken after the required 100-level composition course and before the 300- or 400-level required in-major writing-intensive course. This sequence, however, is not enforced by any formal mechanism, and the course always contained students ranging from first-semester students to graduating seniors.

Old Dominion University is an MSI (Minority Serving Institution) with 26% African American students, 8% Hispanic students, and 5% Asian students. Student demographics tend older than many American universities, with many military veteran and degree completion students. 45% of students are 26 or older, 52% of students are parents or guardians, and 82% work 20 hours per week or more.

Over the course, students completed two short research papers that required use of both academic and general-audience sources, with all additional assignments either supporting and contributing to those papers

or reflecting upon them. Those assignments were (1) Proposal abstract, (2) Information Needs Assessment, (3) Reflection on reverse-engineered research questions, (4) Annotated bibliography, (5) First paper, (6) Second paper plan, (7) Self-assessment of research, writing, reviewing, revising, and editing habits, (8) Reflection on scholarly values, (9) Reflection on course content, (10) Reflection on course process training, and (11) Second paper. Through these assignments, students were engaged in practical training relevant to information literacy general education competency requirements.

The course readings and discussion topics were also largely focused on information literacy, so that students addressed information literacy requirements by learning information literate skills while conducting research-based writing on topics within information literacy. The first paper was required to take one of the readings from the first five course modules as its primary theoretical basis; the second paper was required to take one of the readings from the second five course modules as its primary theoretical basis. The course modules were (1) Digital nativity, (2) Search engine culture, (3) The personalized web, (4) Political economies of digital culture, (5) Intellectual property rights, (6) Friendship and identity on Facebook, (7) Selfies, (8) Race online, (9) Augmented reality, and (10) Information warfare.

Student Learning Objectives stated that

[b]y the end of the course, students will be able to:

1. Determine the nature and extent of the information needed for research;
2. Access information effectively and efficiently;
3. Critically evaluate information and information sources, such as library databases, collections, or websites appropriate to their own fields of research;
4. Use information effectively to accomplish a specific purpose and to complete a written research project;
5. Understand the economic, social, legal, and ethical issues surrounding the access and use of information;
6. Use information ethically and lawfully

Our examples of information short circuits have been presented as taking place at a productive “middle-distant” intersection of *moral panic*, *technological determinism*, and *NEST*. In the context of the course, discussions of moral panics, technological determinism, and their connection to NEST were explicitly addressed, at length, early in the course. This is due to the nature of the course as a philosophy course, and its instructor, a philosopher of technology, and we do not think this is necessary for the effective use of these cases.

As noted in the main body of this paper, the Senft & Baym paper was an assigned reading, in module 7, on selfies. Students could also use the Senft & Baym paper as a primary basis or *passim* in their second papers, and have done so. The specifics of the use of the other two articles in the course are not given in the main body of this paper since they were deeply embedded within course conversations that develop related themes over many weeks, using numerous readings. These details are provided here in case they should be of interest to the reader, although the particulars of their use in this course are by no means requisite to effective use of our examples.

The Uhls et al. article was introduced in class to illustrate confirmation bias in study design and peer-review processes, within the already-established context of moral panics, technological determinism, and NEST. Students did not read the article in advance, but it was put up in the projector in class, and sections of it were read together. Students were led in a discussion of concerns about the study, and, in the context of previous discussion of confirmation bias and moral panics, regularly succeeded in independently identifying the concerning fact that the difference between the experiment and control groups relates to pre-testing rather than post-testing.

The Kross et al. article was introduced in class to demonstrate how distortions in the information cycle can introduce false information in the scholarly record, which citational practices and academic Construction of Authority can easily uncritically promote and promulgate, especially in the already-established context of moral panics, technological determinism, and NEST. This helped to establish an ongoing argument through the course that Scholarship as Conversation needs to be a normative, critical process in order to correct distortions of bias, racism, and sexism within the scholarly record.

As with Uhls et al., the Kross et al. article was put up on the projector in class, and talked through in interactive lecture. Students were invited to consider their feelings if they were asked “are you lonely” five times a day for two weeks, and then led in a student-centered discussion about biases in the study design. Google Scholar was then used to look at a sampling of articles citing the flawed study in an interactive discussion about uncritical reception of information in Scholarship as Conversation that is distorted by confirmation bias, moral panics, technological determinism, and NEST.

The overall, course-length case that was made using these examples was that peer review and science reporting are important parts of the information cycle, and are important to our society, and that it is vital to the

proper functioning of these processes that we take seriously how confirmation bias, moral panics, and technological determinism can distort information reception and transmission, especially in the context of NEST.

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