

# Rhetorical Analysis Research and White Paper

Look at rhetorical strategies and their uses

## EXIGENCE

"In spite of numerous studies, reports, and recommendations we have seen little change in the representation of women in computer science (CS)—consider that only 17.9% of bachelor's degrees in computer science were awarded to women in 2016 according to the annual Taulbee Survey."

[How Computer Science at CMU Is Attracting and Retaining Women: Carnegie Mel...: EBSCOhost](#)

This use of exigence clearly lays out the issue of women being underrepresented in computer science with the usage of statistics from a reliable source. It makes clear the issue that is the reason that this paper is being written.

"There is movement at the federal level that is attempting to make the two content areas closer: the first was in 2015, when the U.S. Congress passed the STEM Education Act of 2015, which officially made computer science a part of STEM. The second was in January 2016, when President Obama announced his Computer Science for All initiative, setting a goal that every student who wants to learn computer science should be able to do so (Guzdial & Morrison, 2016). This initiative has set many states in motion to include computer science courses in their school systems as an elective."

[is computer science compatible with technological literacy?: EBSCOhost](#)

This outlines how the fields of computer science and technological literacy are merging with one another, and shows the legislation that is causing this. This demonstrates the reasons that this paper is being written, and is successful.

"25). Along with trying by Chris Buckler, Kevin Koperski, and Thomas R. Loveland, DTE Figure 3. Kelly Eby's chromatherapy lamp. There should be a place to include computational thinking knowledge and skills in technology and engineering education without wholesale substitution of our content. is computer science technological literacy? compatible with 16 technology and engineering teacher December/January 2018 2-liter bottle light. to develop standards, there are many schools and districts using different versions of computer science, even though they may not be teaching the same content; titles of courses are labeled differently, and there is no consistency. This is the reason why The College Board worked with Code.org and Project Lead the Way and its AP Computer Science Principles courses to be able to offer consistent content, a framework, and benchmark goals for the students (Guzdial & Thompson, 2015)."

[is computer science compatible with technological literacy?: EBSCOhost](#)

This shows how there are issues in trying to incorporate computer science with technological literacy, successfully demonstrating the reason this paper is written.

"Computer science, as a field, already recognizes that some ethics education is essential; the Accreditation Board for Engineering and Technology (<http://www.abet.org/>), one of the largest U.S.-based accreditors of engineering and technology programs, requires instruction on professional ethics. Indeed, some in computer science have gone so far as to require students in undergraduate courses to perform ethics consultations for local industry. 24 However, educating students to engage ethical challenges is often left to the cross-disciplinary portions of university curricula, especially in the U.S."

[How to Teach Computer Ethics through Science Fiction.: EBSCOhost](#)

Shows why computer ethics education is needed, and the requirements that are being placed that necessitate it. This introduces the environment of the computer science field and gives the reason the author is writing this paper, to provide a solution.

"It is essential that open ethical de-bates between well-informed practitio-ners take place. Computer science does not take place in a vacuum; to an ever-increasing degree, the IT systems and platforms, from search engines to smartphones, that are built by comput-er scientists and engineers are creating and redefining the social, political, and individual contexts in which human be-ings understand themselves. 21"

#### [How to Teach Computer Ethics through Science Fiction.: EBSCOhost](#)

This presents the issue that needs to be addressed, which in this article is teaching computer ethics, as this demonstrates the impacts on society this area is having. This use of exigence is a successful one.

"Ethics education is a notable challenge for two reasons. First, in the absence of any ideal universal ethics program, students must be taught how to approach problems as distinct from being led to particular pre-ordained con-clusions that might narrow their vision and exclude important elements of a given problem. Second is how to achieve this goal while overcoming the biases students often bring to the classroom."

#### [How to Teach Computer Ethics through Science Fiction.: EBSCOhost](#)

This also demonstrates a problem that is faced in this topic, which shows a need for a solution when it comes to the challenges of teaching ethics, a successful strategy that further shows the need for this article to be presented.

## LOGOS

"The percentage of women en-rolling and graduating in CS at CMU has exceeded national averages for many years (see the accompanying figure and table). Indeed, the school gained attention when 48% (of the total 166 students), 49+% women (of the total 205 students), and just shy of 50% when 105 women (out of 211 students) entered the CS major in 2016, 2017, and 2018 respectively."

[How Computer Science at CMU Is Attracting and Retaining Women: Carnegie Mel...: EBSCOhost](#)

This lays out the facts that demonstrate the success of attempts to include women in computer science. This straightforward approach provides successful reasoning.

"In 1999, CMU dropped the program-ming/CS background requirement from the admissions criteria and add-ed leadership potential while keeping high SAT scores, particularly in math and science. Dropping this requirement was prompted by a valuable finding from the 1995–1999 research studies.<sup>11</sup> Various entry levels into the first-year courses were created for students with little to no background. Other major contributing factors included: CMU Dean Raj Reddy's vision to produce leaders in the field that also brought institutional support for change; Lenore Blum joined the CS faculty bringing long-standing expertise and advocacy for women in science and math; and the development of Women@SCS, an organization of faculty and students (mostly, but not all, women) led by a Student Advisory Committee, working to ensure that the professional experiences and social opportunities for women reflect the implicit opportunities for those in the majority (see <https://www.women.cs.cmu.edu/>). These changes brought in many more women, and more students— both male and female—with a

broader range of characteristics and interests. We started to see a more balanced student body, balanced in terms of gender, of student characteristics, and balanced in terms of leveling-the-playing-field opportunities for women through Women@SCS."

[How Computer Science at CMU Is Attracting and Retaining Women: Carnegie Mel...: EBSCOhost](#)

good reasoning on how to increase women attending while not favoring women over men, logical fact based approach does not show bias and will help convince logically thinking readers that the author's argument is correct.

"Gender difference approaches often argue that there are strong gender differences in the way girls and boys, or men and women, relate to the field; gender differences that work in favor of men and against women. To solve this problem and increase women's participation in CS it is suggested that we need to pay more attention to women's interests and attitudes and change CS accordingly. But approaches that recommend accommodating differences—without recognizing that such differences can change according to the culture and environment—risk perpetuating the gender divide."

[How Computer Science at CMU Is Attracting and Retaining Women: Carnegie Mel...: EBSCOhost](#)

more fact-based arguments on how to address the issue of the gender gap in computer science, providing a step by step solution that clearly and successfully presents solutions.

"But the gender difference mind-set—epitomized by the bestseller *Men Are from Mars, Women Are from Venus 10*—has a strong hold on public thinking in the U.S. and many parts of the Western world. For example, "... anonymous, aggregate data from Google searches suggests that con-temporary American parents are far more likely to want their

boys smart and their girls skinny.” 13 The belief that men are innately better at coding than women, is a case in point. This mind-set, fed by stereotypes, is relentlessly perpetuated. In turn stereotypes feed our unconscious biases, which, if left unchecked, can often lead to negative consequences for women in computing, and ultimately for the field itself.”

[How Computer Science at CMU Is Attracting and Retaining Women: Carnegie Mel...: EBSCOhost](#)

more logical fact-based reasoning, which references outside sources which partly ties into ethos as well. It successfully demonstrates different ways that men and women are stereotyped, which clearly demonstrates a need for new approaches to encourage women into computer science.

"A memo written by then-MCPS superintendent Joshua Starr cited concerns from students who argued that the 2005 revisions to COMAR were “too narrow,” and that the new requirements “may have a negative effect of limiting students’ pursuit of computer science study” (Starr, 2012)."

[is computer science compatible with technological literacy?: EBSCOhost](#)

more fact-based support on the incompatibility of the current frame for technological literacy and computer science.

"The findings are an indicator that computer science courses are not in complete alignment with technology and engineering education, so action should begin at the state level to ensure that the courses are equivalent. At the present time, a student could take Code.org’s Computer Science Principles in a Maryland high school and earn his or her required technology education credit without being taught any of the steps in the engineering design process or learning how to properly evaluate a product based on criteria and constraints. These are key elements that have made up technology and engineering education classes, and computer science just does not address them. Another finding was that poorly written course objectives and

benchmarks make it difficult to know exactly what is being taught and how it matches to state objectives."

### [is computer science compatible with technological literacy?: EBSCOhost](#)

breaking down the fact-based evidence supporting the argument that computer science and technology education aren't fully compatible, and looks at the key elements, making it easy for the reader to understand

"Fiction allows educators to reframe recognizable human situations and problems in terms of unfamiliar settings and technology. Hence, any fiction, and especially science fiction in the case of technology, can be an ideal medium for raising and exploring ethical concerns. By presenting a familiar problem (such as conflicts between different social groups or the invasion of privacy in unfamiliar terms and settings), a work of science fiction can mitigate a reader's tendency to defend, reflexively, their own previously held views."

### [How to Teach Computer Ethics through Science Fiction.: EBSCOhost](#)

This example uses logos by presenting facts on how fiction functions in ethics classes. This strategy is straightforward and logical and gives the reader information that is easy to process, strengthening the author's argument.

"Most significantly these changes led from women feeling out of place and small in number to being well represented, being an integral part of the CS culture, contributing to the culture, and being successful in the field alongside their male peers. Indeed, men and women graduate at the same rate. This success occurred without compromises to academic integrity, without changing the curriculum to suit women, nor by accommodating what are perceived to be "women's" learning styles and attitudes to CS."

## [How Computer Science at CMU Is Attracting and Retaining Women: Carnegie Mel...: EBSCOhost](#)

This clearly shows the benefits of using the strategies that encourage women in computer science, and lays out the facts that show how these approaches do not compromise the integrity of the education system and does not favor women over men.

### **PURPOSE**

"We hope the CMU story can help challenge the gender divide in CS, show that women can master this field successfully, and inspire others to think more broadly about intellectual and academic expectations."

## [How Computer Science at CMU Is Attracting and Retaining Women: Carnegie Mel...: EBSCOhost](#)

clearly lays out how the writer hopes to encourage a lessening in the gender divide that is present in computer science, and what the author is hoping to change in the trains of thought currently found in education fields. It makes it clear to the reader what the author is hoping to do.

"We believe sustained student leadership, with women at the helm, has been critical for building a more inclusive community at CMU, and for enhancing the academic and social life of the entire community. At the same time, cultural change requires serious institutional support and cannot be left to chance, especially in a stubbornly male-dominated field like CS."



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more reason for this article to go out, lays out what the author is encouraging in the field of computer science and makes it clear to the reader what this article is aiming for.

"In our experience teaching ethics courses under the auspices of computer science departments, we find that students are often drawn first to utilitarianism, perhaps because it seems more computational than the alternatives. One of the most important aspects of the course is to broaden their experience to help them see past the non-rigorous version of utilitarianism to which they were previously exposed."

## [How to Teach Computer Ethics through Science Fiction.: EBSCOhost](#)

Outlines what this writer author is trying to accomplish, in this case endorsing ethics teaching practices that aim towards what is described here. This makes it clear to the reader what the author is intending to do here.

## **ETHOS**

"Over half the country's schools allow a computer science course to qualify as some type of graduation credit (Guzdial, 2016)."

## [is computer science compatible with technological literacy?: EBSCOhost](#)

lots of citations presented in this certain piece, providing credibility to the author's statements about the current state of technological education by giving sources of his information.

"Scholars of ethics have, in the past several decades, embraced fiction as an ideal way to think about and teach ethics, because, as philosopher Martha Nussbaum<sup>32</sup> writes, fiction " ... frequently places us in a position that is both like and unlike the position we occupy in life; like, in that we are emotionally in-volved with the characters, active with them, and aware of our incompleteness; unlike, in that we are free of the sources of distortion that frequently impede our real-life deliberations."

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Provides expert insight that supports what the author is arguing, which is using examples in fiction to have effective teaching. This goes to show the reader how it is reasonable to use examples in fiction for teaching in ethics.

"As Alec Nevala-Lee<sup>31</sup> says, "Science fiction has been closely entwined with military and technological development from the very beginning. The first true science fiction pulp magazine, *Amazing Stories*, was founded by editor Hugo Gernsback expressly as a vehicle for educating its readers about future technology."

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Some more expert referencing, this time for an example that specifically ties into computer ethics in particular and provides readers with a seemingly reliable outside source of information.

## **ANALYSIS**

"Teaching this way will, we hope, lead to an openness and exchange of ideas about both core values and best practices."

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The writer analyzes what the teaching process of using examples of science fiction in computer science will do, in that it will hopefully benefit teaching this area of ethics, showing the reader the author's take on the situation.