

## Background

Popular information "gatekeeping" websites, such as Facebook and Google, use multiple algorithms to select what information Internet users see.<sup>1</sup> Algorithms are not passive mechanisms; rather, they directly influence online information consumption. Personalization algorithms have been criticized for creating "filter bubbles."<sup>2</sup> However, traditional media literacy instruction does not foster algorithm understanding in students.<sup>3</sup> Media literacy instruction should be expanded to teach students to think critically about the ever-changing, personalized media environment created by algorithms.<sup>4</sup>

## Objectives

- To explore the impact of a brief instructional video on college students' understanding of algorithms.
- To examine relationships between students' general media literacy knowledge and their algorithm awareness for online shopping and searches.

## Participants

Participants were  $N = 244$  college students ( $M_{age} 19.7$  years,  $SD 2.6$ , 18- to 34 years old, 60.3% female)

## Method

Participants completed an online survey via Qualtrics in which they:

- Responded to three open-ended questions about how algorithms customize online shopping (Table 1)
- Watched one of two instructional videos (Fig. 1 and 2)
- Completed the General Media Literacy Scale
- Responded to two open-ended questions about how algorithms customize search results (Table 2)

We adopted a keyword approach to code responses to questions about online shopping and searches.

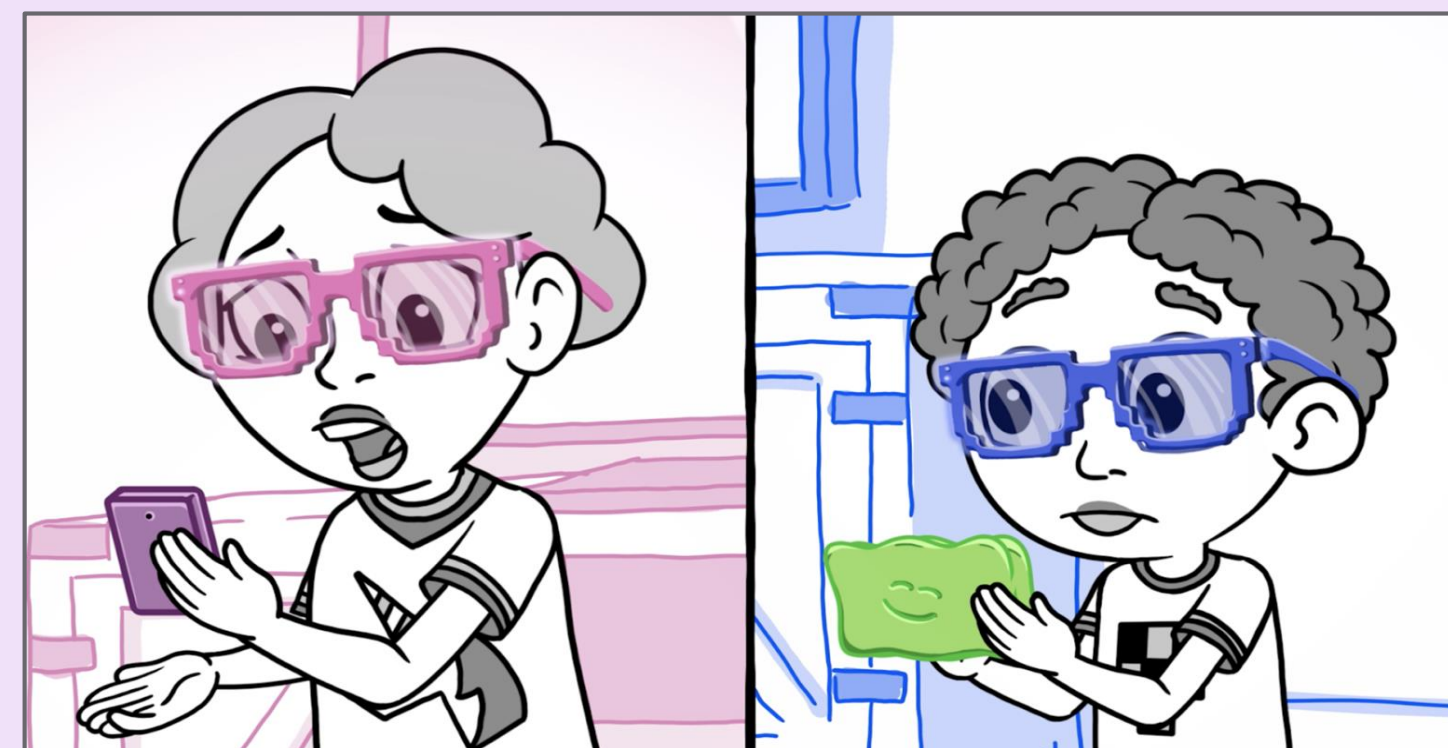
## General Media Literacy Scale

18 items (6 reversed) ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*), recoded as 0 (*Incorrect*) and 1 (*Correct*)

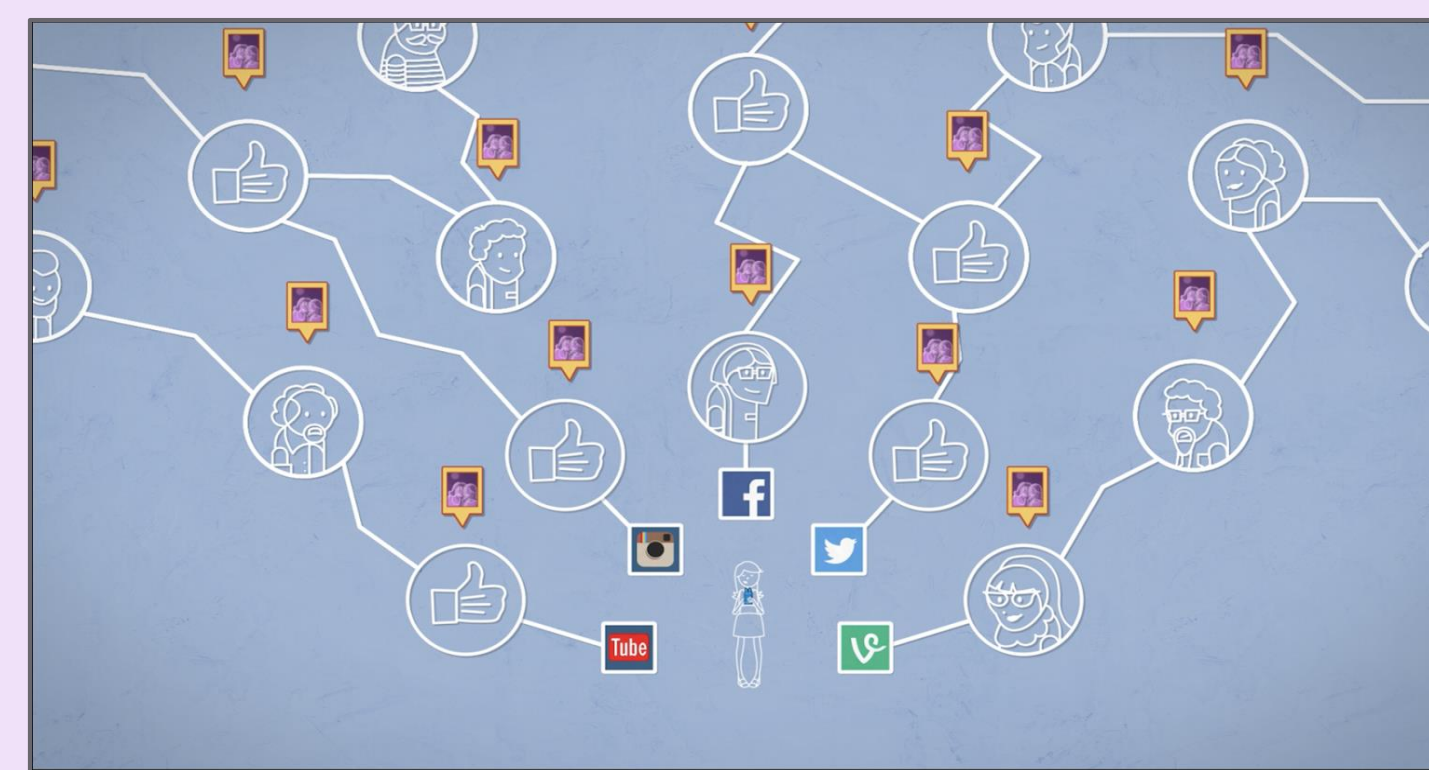
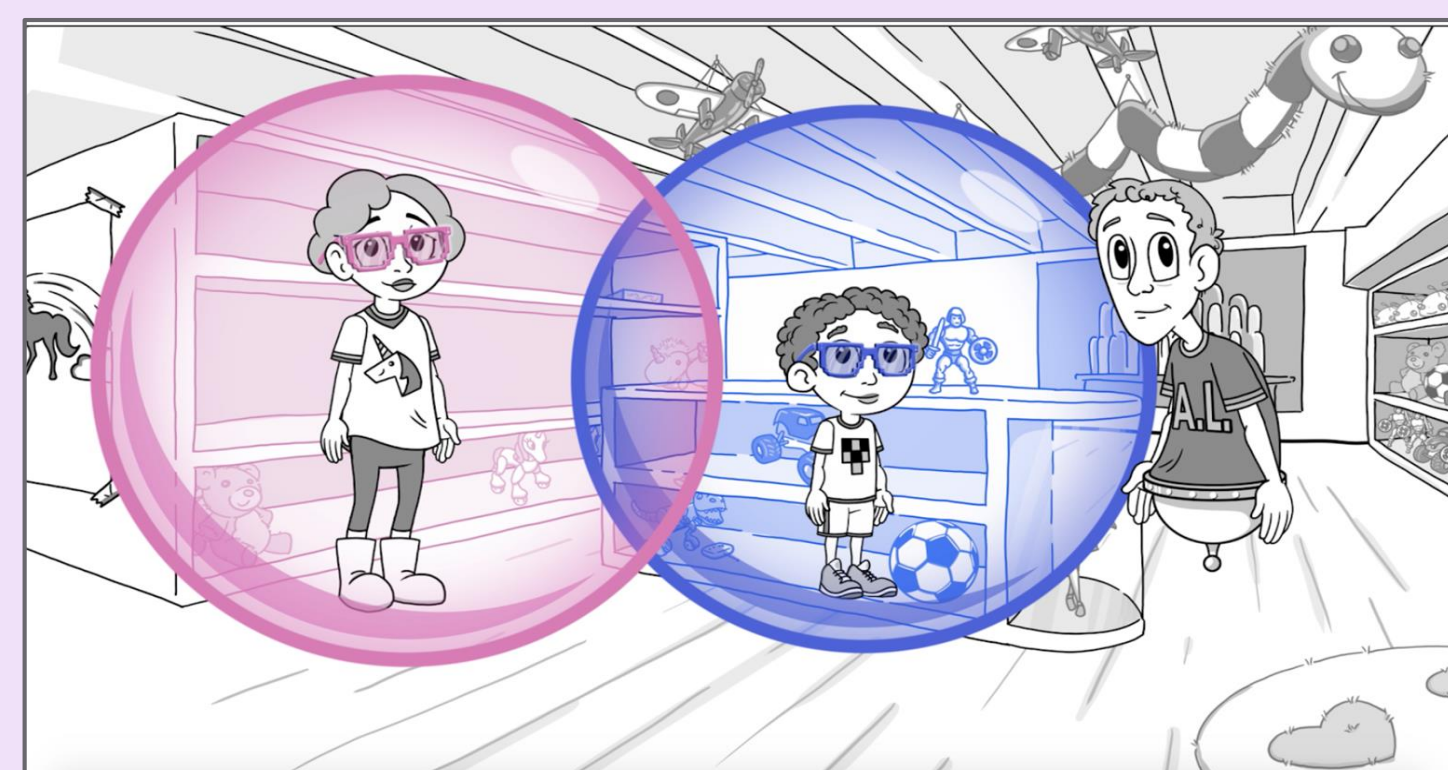
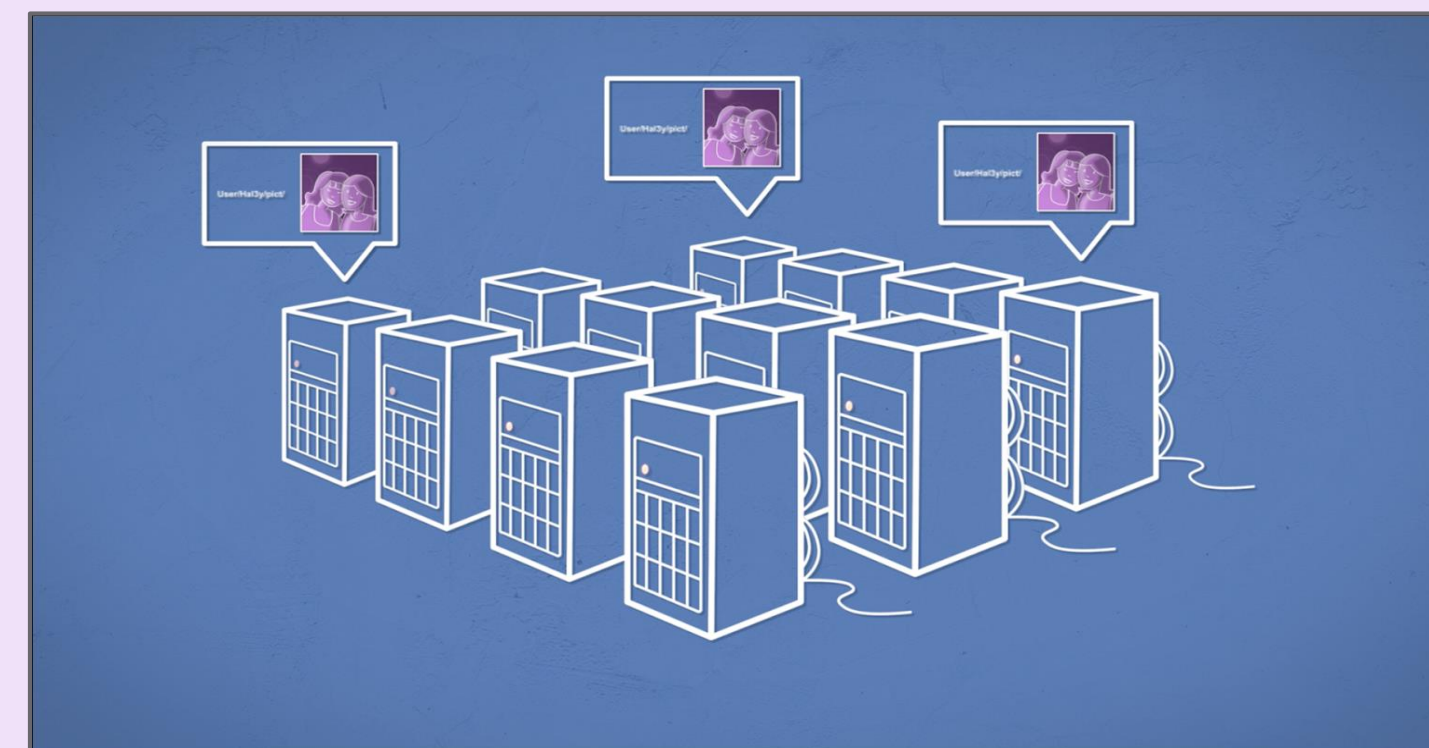
- Advertisements usually leave out a lot of important information.
- Advertisers think very carefully about the people they want to buy their product.
- When you see something on the Internet, you look at the source before deciding if it is trustworthy.

## Video Intervention (Random Assignment)

**Fig 1. How do algorithms help you search the Internet?**



**Fig 2. How does the Internet work?**



**Table 1. Keywords for Scoring Online Shopping and Online Search Questions and Sample Responses**

Keywords	Examples for Online Shopping Questions	Examples for Online Search Questions
search*; history; past; previous; track; collect; cache; save; store; cookie	"The internet uses its own search engines and cookies to develop an idea and history of the kind of shopping habits one develops. Shopping habits are possible to keep track of as they can be broken down into patterns."	"Due to history and past searches it knows what to show you and what most people have searched"
algorithm; filter	"They have algorithms to that suggest products similar to products you've looked up or bought."	"The internet uses an algorithm that tracks your interest and shows you what they think you want to see"
location	"The internet can limit products we see through features like our location and demographics."	"By checking where your location is, determining your potential net worth, political affiliation, etc."
interest	"The internet follows what you like and don't like. They know interests from what you search up."	"The internet is made to share the same types of content to the same types of people, so if you are interested in cars, the internet is set up so that you come into contact with people and posts that include cars and every-thing to do with them."

\* "Search" was not used as a keyword for online search questions because the keyword appeared in the prompt.

**Table 2. Percentage of Students Demonstrating Algorithm Awareness**

Question	Control (N = 127)	Treatment (N = 117)	X <sup>2</sup> (df = 1)
<b>Online Shopping</b>			
1. After shopping online, you might see an ad for the product you bought somewhere else on the Internet, like on your social networking site or on YouTube. How does the Internet know what you have been shopping for?	83.5%	85.5%	0.19
2. How does the Internet figure out what products to recommend to you?	90.6%	91.5%	0.06
3. How does the Internet limit what products you see online?	48.8%	52.1%	0.27
<b>Online Searches</b>			
4. How does the Internet help you find information you need?	12.7%	27.6%	8.42**
5. When you search for information, how does the Internet decide what results to show you first?	30.6%	60.0%	20.79***

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$

## Results

Most students demonstrated awareness that the Internet tracks what they have been shopping for and manipulates users' information to recommend products (see Questions 1 and 2 in Table 2). Students in the treatment group were more likely to indicate algorithm awareness for shopping (Questions 1 and 2 in Table 2) than for either question about search results ( $p < .001$ ).

For questions related to online searches, students who watched the video about algorithms were more likely to demonstrate algorithm awareness than students in the control group (see Questions 3 and 4 in Table 2).

Overall, college students demonstrated high general media literacy knowledge ( $M_{agreement} 3.99$  out of 5,  $SD 0.40$ );  $M_{accuracy} 78.7\%$ ,  $SD 17.3$ ). Algorithm-aware students demonstrated more accurate media literacy knowledge than algorithm-unaware students on shopping-related questions. However, media literacy knowledge was unrelated to algorithm awareness for online searches.

## Conclusions

These findings suggest that students may already be familiar with algorithms due to targeted product advertisements that follow them across platforms.<sup>5</sup> While students who watched the video about algorithms did make gains in their algorithms awareness for online searches, more extensive formal instruction is needed in how the Internet personalizes search results. Since the relevance of general media literacy knowledge for algorithm awareness varied by context, algorithm understanding should be more explicitly targeted as part of media literacy.

<sup>1</sup>Bozdag, E. (2013). Bias in algorithmic filtering and personalization. *Ethics and Information Technology*, 15(3), 209-227. <sup>2</sup>Pariser, E. (2011). *The filter bubble: How the new personalized web is changing what we read and how we think*. New York: Penguin. <sup>3</sup>Hobbs, R. (2010). Digital and media literacy: A plan of action. Washington, D.C.: The Aspen Institute. <sup>4</sup>Cohen, J.N. (2018). Exploring echo-systems: How algorithms shape immersive media environments. *Journal of Media Literacy Education*, 10(2), 139-151. <sup>5</sup>Head, A.J., Fister, B., & MacMillan, M. (2020). Information literacy in the age of algorithms: Student experiences with news and information, and the need for change. Project Information Research Institute.