The Digital Media Literacy Gap

How to build widespread resilience to false and misleading information using evidence-based classroom tools
Acknowledgements

CIVIX is a Canadian civic education charity that takes real-life political events and turns them into teachable moments that bring democracy alive in classrooms around the world.

How to Cite this Report


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With Thanks to

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For more information visit civix.ca • ctrl-f.ca or email hello@ctrl-f.ca.
We are experiencing a crisis of informed citizenship. False and misleading information is rampant online, and people lack the skills and motivation to determine what to trust.

To build the next generation of informed citizens, what is required is nothing short of a transformation in the way digital media literacy is taught.
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Executive Summary

CTRL-F: Find the Facts is a verification skills program from CIVIX that teaches students how to evaluate online information with the same 'lateral reading' techniques professional fact-checkers use. This practice involves conducting simple research to locate key context about sources and claims, as opposed to analyzing the information itself. A Canada-wide study of 2,324 students in grades 7 to 12, carried out with external evaluators, looked at the efficacy of the program and found that CTRL-F students were more likely to read laterally and accurately assess the trustworthiness of sources and claims, compared to controls.

KEY FINDINGS

- **CTRL-F improves students’ ability to read laterally.** Students’ use of lateral reading increased sixfold following the CTRL-F program — they applied research strategies 11% of the time at pretest versus 59% at posttest.

- **Lateral reading helps students get the right answer for the right reasons.** Before CTRL-F, students referenced meaningful context just 9% of the time in responses supporting a correct answer. On posttest, this number jumped to 50%.

- **The CTRL-F skills stick.** Six weeks following the end of CTRL-F instruction, a second posttest showed no erosion in students’ use of lateral reading strategies.
CTRL–F Project Overview

KEY POINTS

- Canadian students struggle to evaluate online information. When asked to do so, they overwhelmingly apply outdated close-reading strategies.

- CTRL–F: Find the Facts offers better, web-native techniques students can use to locate critical context.

- CTRL–F helps educators teach contemporary digital media literacy skills, dramatically improving student outcomes, compared to controls.

In the fall of 2020, CIVIX launched a project as ambitious as it was crucial. With external evaluators, we set out to understand how Canadian middle- and high-school students evaluate online information, and to determine the impact of a potentially transformative approach to digital media literacy education.

The Issue

The spread of false and misleading information online has become a crisis in recent years. While a healthy democracy requires an informed and engaged public, our polluted information environment poses serious obstacles to informed citizenship.

Online, people face an endless torrent of information, and it can be difficult to determine its source, quality, or motive. We must make sense of claims and sources, but often lack the will or skills to do what is needed to reach informed trust assessments.
There are significant risks inherent in this situation — information overload can lead to apathy, generalized distrust, and vulnerability to believing and sharing false and misleading information.

**The Role of Education**

Schools are one clear place where this issue can be addressed on the individual level, at a mass scale, yet the source-evaluation techniques favoured in educational contexts are out-of-date, and often fail students.

Common pedagogy relies on the application of close- or “vertical-reading” strategies — a term coined by the Stanford History Education Group in their foundational research into students’ online reasoning skills.

These strategies are frequently packaged into checklists that ask students to seek out the presence or absence of superficial signals — such as contact information, author names or advertising — as proxies for credibility. Checklists can be time-consuming to apply and often yield conflicting signals. They can easily backfire, leading students to incorrect conclusions.

“Lateral reading,” in contrast, involves conducting simple research to locate key context. Skills include targeted keyword searching to verify a claim and using Wikipedia to learn about the reputation of a source. These are the techniques professional fact-checkers use to quickly reach informed conclusions about online information.

**The CTRL-F Curriculum**

CTRL-F is a verification skills program built on the understanding that we require new tools to

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**KEY FINDINGS: PRETEST**

**How Did Students Evaluate Information Prior to CTRL-F?**

This research established a baseline confirming that Canadian students are out of their depth when it comes to evaluating online information. At pretest, students generally applied close-reading strategies, which frequently led them astray.

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**45% rated an international newspaper of record as “untrustworthy” based on superficial signals**

**77% assessed the veracity of a claim by deciding if it “sounded right”**

**53% believed a manipulated photo with a false story attached to be true**

**79% of students reported using at least one vertical-reading strategy to inform their conclusion**
navigate our polluted information environment. CTRL-F is the keyboard shortcut for “find,” and like that shortcut, the program is based on the idea that there are quick and effective ways to locate key context about online information.

The curriculum, designed for middle- and high school students, is centred on three key lateral reading skills: Investigate the Source, Check the Claim, and Trace the Information. The program is packaged to give educators the ability to bring contemporary digital information literacy skills into the classroom, regardless of their level of background knowledge or experience. CTRL-F takes approximately seven hours to complete, and is anchored by short expert-led educational videos and activities that give students supported practice examining current real-life sources and claims.

The CTRL-F Research

Between September 2020 and January 2021, 80 teachers took 2,343 students through the CTRL-F program as part of a study of the curriculum’s impact. CIVIX teamed up with external evaluators to assess not just what students say they do when assessing information, but what they actually do in practice when working with real posts and a live internet connection. This is the first study of its kind in Canada to look at students’ information evaluation skills.

Participating students in grades 7 to 12 completed a pretest assessment of their information evaluation skills before starting the program, and a posttest one week following the end of instruction. Additionally, 1,019 of these students completed a second posttest designed to measure skills retention.

Key Findings: Posttest

What is the Impact of the CTRL-F Curriculum?

Crucially, this research confirmed that lateral reading skills, as taught in the CTRL-F program, dramatically improved student outcomes.

- **CTRL-F improves students’ ability to read laterally.** Students’ use of lateral reading increased sixfold after doing the CTRL-F program. Students read laterally 11% of the time at pretest versus 59% at posttest.

- **CTRL-F helps students locate key context for evaluating sources.** Students were able to identify the agenda of an advocacy group just 6% of the time at pretest. This number rose sixfold to 31% at posttest. On delayed posttest, it increased again to 49%.

- **Lateral reading helps students get the right answer for the right reasons.** Before CTRL-F, students referenced meaningful contextual information 9% of the time to support a correct answer. On post-test, this number jumped to 50%.

- **The CTRL-F program works consistently across age, class size, and method of instruction (in-class, remote, blended).** Mixed effects models showed no meaningful difference in efficacy among categories of analysis.

- **The CTRL-F skills stick.** A delayed posttest delivered six weeks following the end of the CTRL-F curriculum showed no erosion in the use of lateral reading strategies.
Program Evaluation

The CTRL-F program was made available to teachers across Canada, and CIVIX organized 15 virtual hands-on training sessions between August 2020 and March 2021 to support its delivery.

In post-program and post-workshop surveys, educators indicated strong support for CTRL-F:
- 90% agreed that CTRL-F has changed their approach to teaching digital literacy.
- 98% agreed that the CTRL-F teacher training increased their motivation to use CTRL-F with their students.
- 99% said they would recommend the workshop to other teachers.

Takeaways

The CTRL-F research both clearly demonstrates the problems students face in navigating our polluted online information environment, and points the way to solutions. In taking on this challenge, it is CIVIX’s aim to help create a new generation of informed citizens with the capacity to evaluate the political and social information that reaches them through digital channels.

For this to happen, a system-wide adoption of the lateral reading approach is required. It is imperative that these techniques become the default, with students encountering them across grades and subjects — instead of the checklist approaches that currently dominate. Education decision-makers have the opportunity — and responsibility — to participate in transforming the way digital media literacy is taught by adopting evidence-based approaches.
In 2018, the Stanford History Education Group (SHEG) conducted a study that compared the information-evaluation habits of three groups of individuals: PhD historians, Stanford University undergraduate students, and those who work professionally as fact-checkers.4

When asked to investigate a website belonging to an anti-LGBTQ advocacy group, many of the historians and most of the Stanford students spent their allotted time looking closely at the source itself to reach a conclusion. They stayed on the site and analyzed its content. This approach proved time-consuming and ineffective: the majority of participants in both groups were unable to discern the site’s agenda.

In contrast, 100% of the fact-checkers reached an informed conclusion about the site, and they did so quickly. Unlike the historians and students, who tried to puzzle through the material itself, the fact-checkers left the website, opened a new tab, and conducted simple research. In other words, they read ‘laterally’ (across tabs) rather than ‘vertically’ (down the page).

It is not just history PhDs and Stanford students who struggle. A growing body of research suggests that so-called digital natives are overwhelmingly ill-equipped when it comes to navigating our complex information environment to make sound judgments about what is true or trustworthy.5

Foundational studies from SHEG have shown that when middle- and high-school students are asked to evaluate information, they typically show evidence of reading vertically, and not laterally. This is perhaps not surprising given that current pedagogy relies heavily on the use of close-reading techniques. When students learn source evaluation in school, it is common for them to be provided with a checklist of criteria to apply to information, ostensibly to determine its reliability.

Criteria included in evaluation checklists vary, but all
ask students to look for a series of signals. Students may be asked to identify spelling errors, check for the presence of author names and contact information, consult the ‘about’ page, count the number of ads present, check for broken links, look at the URL to see what kind of suffix it has, and so on. Im-
licit in this approach is the mistaken notion that answers to questions of credibility are best found within the source material itself.

The most common of these checklists is the CRAAP test, which is presented as a way to help students filter out ‘crap’ by analyzing content for currency, relevance, authority, accuracy, and purpose.

Applying checklist strategies to web content can be time-consuming and likely to yield conflicting signals, leaving students disoriented and, at worst, susceptible to trusting harmful information.

These checklists were not created with the modern web in mind. Rather, they trace their origins to the 1970s when they were developed to help librarians with limited budgets select print resources.

Scholars have long criticized the application of checklists such as CRAAP to the web, where context is key, but ‘analog’ approaches are still taught in schools, recommended on university library websites, and promoted by media literacy organizations.

There is, however, a better way. Recent research demonstrates that the lateral reading skills professional fact-checkers use can be effectively taught to students. Instead of making judgments based on instinct, personal knowledge, or superficial features of a website, students can be taught to use the web to gain enough context to reach informed conclusions about the information they encounter.

Studies by SHEG and others have shown that increases in students’ ability to read laterally correlate directly to increases in accuracy and in the sophistication of students’ reasoning when assessing online information.
CIVIX developed the CTRL-F curriculum to fill a need for high-quality tools for teaching contemporary digital media literacy skills. Released in the fall of 2020, the program builds on CIVIX’s earlier efforts in creating lateral-reading based verification tools. Developed in consultation with teachers and experts, materials were piloted in classrooms across the country.

The CTRL-F approach represents an adaptation of digital literacy expert Mike Caulfield’s SIFT method, which is used with American university students.10

Designed for students in grades 7 to 12, CTRL-F is built around three key lateral reading skills: Investigate the Source, Check the Claim, and Trace the Information. The program takes approximately seven hours to complete. Each skill has its own lesson, packaged with comprehensive support for classroom delivery. An introductory lesson reviews the problem of “information pollution.”

Over the course of instruction, students learn and practice investigating information using a series of current real-life examples of sources and claims. These are drawn from a range of media, including places where students commonly find information, such as YouTube and TikTok. It is through the process of repeated practice that students come to develop a knowledge of reliable sources, and to build a habit of consulting them.
Teacher Tools
Curriculum support materials include lesson plans, slide decks, and student worksheets.

Videos
Explainers hosted by disinformation expert Jane Lytvynenko introduce students to key concepts, while instructional videos hosted by digital literacy expert Mike Caulfield model how to use core lateral reading skills to investigate information.

Practice Examples
Engaging verification activities guide students through applying the skills to a variety of real-world examples. Solutions are built into the activities so students can check their work once they have tried themselves.

Culminating Activity
A Verification Handbook activity encourages students to reflect on their learning, apply the skills to examples they find on their own, and share the skills with others.

Assessments
Teachers can apply their own pre- and post-CTRL-F assessments to measure student improvement.
Between September 2020 and January 2021, 2,324 students went through the CTRL-F program, completing pre- and post-assessments designed to measure the impact of the curriculum.

**Recruitment**
During the summer of 2020, CIVIX recruited 80 teachers, drawn from our national network. The teachers we approached had previously participated in CIVIX digital literacy activities, registering for a program or attending a professional development event. Participating teachers were located across the country, in urban and rural areas.
Training
Participants were required to attend a two-hour hands-on skills workshop with Mike Caulfield and CIVIX staff. The workshop familiarized teachers with the CTRL-F methodology and curriculum, and provided opportunities to practice lateral reading. Workshops were delivered remotely over Zoom.

Implementation
The CTRL-F curriculum was released in August 2020, and teachers began using it with their students in September. Participating teachers agreed to deliver the CTRL-F learning module in its entirety. They were allowed to begin the program at any point during the data collection period and to deliver it at their own pace.

Data Collection
Before and after receiving the CTRL-F curriculum, students completed an assessment where they were asked to investigate real-world examples of sources and claims. They had a live Internet connection and were instructed to “use any method you usually would to determine an answer, with the exception of asking others directly for help.” Teachers assigned students unique ID codes to allow for anonymous linking of pretest and posttest responses.

Control Group
Seventeen of the teachers in the study completed pre- and posttests with a class not receiving the CTRL-F curriculum, creating a control group of 363 students matched at the teacher level.

Delayed Posttest
Teachers whose class schedules could accommodate it were also asked to complete a second posttest a minimum of four weeks following the first posttest. Ultimately, 1,019 students completed this delayed posttest, designed to measure the staying power of the skills.

Special Circumstances
The CTRL-F evaluation plan was developed prior to the start of the COVID-19 pandemic, and had to be altered as needed to accommodate changing circumstances. Workshops, planned to be held in person, were carried out using Zoom. Due to school closures, many participating teachers had to deliver the CTRL-F material remotely, or in blended learning scenarios. Fewer students than expected completed the delayed posttest, given truncated term structures. Overall, however, the pandemic had less of an impact on this study than expected, given the challenging teaching circumstances in which it was carried out.

About the Sample

Control Group
363 students completed pre- and post-assessments with no curriculum between them.

Matched Curriculum Group
375 students who received the CTRL-F curriculum, matched to the control group at the teacher level. The same teacher taught at least one CTRL-F class, as well as a class that did not receive the curriculum.

Curriculum Group
All students in the study. The pre-test results include the control group (pretest n=2,687). The posttest results exclude the control group (posttest n=2,324). Unless otherwise indicated, the findings referenced in this report refer to the curriculum group.

Delayed Posttest Subsample
Subset of students who completed a delayed posttest (n=1,019).
The Assessments

What do students do when asked to evaluate unfamiliar sources and claims?

To assess the efficacy of the CTRL-F curriculum, we used a pre/posttest design that measured students’ information evaluation skills. Students took a pretest prior to beginning the curriculum and a posttest at least a week following completion of the instruction. A smaller group of students also received a delayed posttest, delivered an average of six weeks following the end of CTRL-F instruction.

Each assessment was structured identically, with four real-world examples, each chosen to yield specific insight into how students evaluate information. The tests contained one prompt for each key CTRL-F skill — Investigate the Source, Check the Claim, and Trace the Information. The fourth prompt asked students to evaluate the trustworthiness of an advocacy group.

Students were asked to review each example and indicate their level of trust in the source or belief in the veracity of the claim using a 5-point Likert scale.

In an open-box response, they were further asked to explain what they did to arrive at their conclusion. Results were then coded for accuracy and for the strategies students described applying.
**International Newspaper of Record** (Investigate the Source)

While it is important to identify unreliable sources, it is equally critical that students are able to recognize reliable sources of information. This prompt assessed students’ ability to locate relevant context to determine the trustworthiness of a major international newspaper.

How trustworthy do you find Dawn as a source of news? Please rate your level of trust, where 1 is NOT Trustworthy and 5 is Trustworthy.

<table>
<thead>
<tr>
<th>Not trustworthy</th>
<th>Trustworthy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

**News Article / True Claim** (Check the Claim)

There is a limit to the application of common sense — implausible sounding claims can be true and vice versa. This prompt assessed students’ ability to verify a claim using a keyword search.

Did Italian farmers install air conditioning for cows?

<table>
<thead>
<tr>
<th>Definitely not</th>
<th>Probably not</th>
<th>Maybe</th>
<th>Probably</th>
<th>Definitely yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
**False Context Photo (Trace the Information)**

Online mis- and disinformation is often visual, as images can easily be used to anchor misleading claims. This prompt assessed students’ ability to trace an image back to its original context using a reverse-image search or claim check.

![False Context Photo](image)

Is this a photo of garbage left behind by climate protesters?

- Definitely not
- Probably not
- Maybe
- Probably
- Definitely yes

1 2 3 4 5

**Advocacy Group (Investigate the Source — Advanced)**

Online information doesn’t always fall into clear true-or-false binaries. Students are often confronted with dubious research from advocacy groups, hyper-partisan punditry, and advertisements that look like organic content. This prompt assessed students’ ability to identify the agenda behind an organization before deciding whether to trust the information on its website.

![Advocacy Group](image)

How trustworthy do you find this site as a source of information about vaccines? Please rate your level of trust, where 1 is NOT Trustworthy and 5 is Trustworthy.

Not trustworthy | Trustworthy
--- | ---
1 2 3 4 5
Canadian students struggle to evaluate online information

### Key Findings

- Only **6%** of students were able to identify the agenda behind a website produced by an advocacy group.

- When asked to evaluate a claim, **77%** of students analyzed the content to see if it ‘sounded right.’

- Close to half of students (**45%**) rated an international newspaper of record as “untrustworthy” based on superficial signals.

- **53%** of students believed a composite image with a false story attached to be reliable.
To determine the extent to which Canadian students are able to contextualize and understand online sources and claims, we looked at the pretest data to see what they do when asked to make judgments about specific examples.

For this analysis, we analyzed the pretests of the matched curriculum and control groups (738 students). The assessments and a coding rubric were developed in consultation with the Stanford History Education Group.

We selected one “claim” and one “source” problem, and manually coded the responses according to strategies indicated by each student. If responses contained more than one, we coded for each technique used.

Analysis of pretest data established a baseline confirming that Canadian students overwhelmingly lack the skills required to reach informed conclusions about online sources and claims.

At pretest students generally applied vertical-reading strategies, with more than three-quarters (79%) reporting use of at least one close-reading strategy to reach a conclusion. Overall, the most commonly used strategies had little bearing on helping students determine the quality of information.

The Prompts

True Claim: “School District Arms Students with Rocks”

This prompt presented students with a link to a true story from 2018 published on Newser.com about a Pennsylvania school district that provided buckets of rocks to fend off potential armed intruders. Students who conducted successful lateral reads learned that the story was broadly reported by numerous professional news media organizations.

Advocacy Group Source: American Academy of Pediatricians

This prompt assessed students’ ability to evaluate the website of an agenda-driven organization, the American College of Pediatricians (ACPeds). On its ‘about’ page, ACPeds describes itself as “a national organization of pediatricians and other healthcare professionals dedicated to the health and well-being of children.” The key context here is that ACPeds was founded to protest the adoption of children by same-sex couples. Students who conduct successful lateral reads discovered that this group has an anti-LGBTQ agenda.
**Students look for signs of authority on the page itself.**

When it comes to assessing information, students’ intentions are good; they know they are looking for authority — the problem is they don’t know how to do this effectively, and so their efforts are misplaced.

When trying to determine the trustworthiness of the American College of Pediatricians, an anti-LGBTQ advocacy group, 61% of students cited superficial signals of authority such as an official logo, links to external sources, copyright symbols, website URL, or indicators of site security, like a padlock icon in the address bar to support their assessment.

“I definitely think that this is a trustworthy website because it is listed as an organization (.org). Also an organization is a non-profit so I know they mean well.”

**Students judge content by its appearance.**

Students may assign their trust to sites that are well-designed and well-organized. When asked to assess the trustworthiness of the American College of Pediatricians, 21% based their judgment of the site on its layout, design, the number of ads, or whether or not they thought it looked “professional.”

“The website has a neat appearance. They’ve provided eye-catching images to capture our focus to read about a certain topic, which are usually common concerns.”

**Students over-rely on their own instincts/experience.**

Students will apply critical thinking, but fall short because they lack key context. When asked to assess the veracity of an article about U.S. students being armed with rocks to potentially fend off school shooters, students overwhelmingly applied a ‘plausibility filter’ to the information.

The vast majority considered whether or not the story conformed to their understanding of the world: 77% of students evaluated the story based on whether it “sounded right.” Of those who used this approach, 70% incorrectly dismissed the story as false.

“It’s just not realistic. It follows the saying don’t bring a knife to a gun fight. Rocks really wouldn’t do anything against a gun so why would they make students carry around rocks to defend themselves?”

**The students who get the right answers for the right reasons read laterally.**

While students rarely left the page on pretest to conduct research of any kind, even here we can see evidence of the power of lateral reading. When assessing the ‘students armed with rocks’ claim, 83% of those who read laterally reached a correct conclusion. This compares to an overall average of just 40% — a huge difference.

“I googled students being armed with rocks and a similar article came up from CNN which is a reliable source.”
Posttest Results — CTRL-F Skills Analysis

CTRL-F students were more likely to read laterally, accurately assess trustworthiness, and identify the agenda behind advocacy groups, compared to controls.

KEY FINDINGS

- Students’ use of lateral reading increased sixfold after doing the CTRL-F program, from 11% at pretest to 59% at posttest.

- A delayed posttest delivered 6 weeks following the end of the CTRL-F curriculum showed no erosion in the use of lateral reading strategies.

To evaluate the impact of the CTRL-F curriculum, we analyzed student responses across four prompts (see page 17) for evidence of lateral reading and accuracy on pretest, posttest, and delayed posttest (where applicable). Responses from the open-box responses of the full curriculum group (n=2,324) and control group (n=363) were coded for lateral reading using an auto-coding strategy. The intervention was planned and analysis conducted by Dr. Patricia Brooks and Jessica Brodsky, educational psychologists from the City University of New York. For the three skills prompts with clear correct
answers, students received an accuracy score based on their responses to a 5-point Likert scale question. Since moderate trust responses are difficult to qualify as accurate or inaccurate, we removed mid-point answers to offer a clearer picture of students’ trust judgments.

For the advocacy group problem, we coded for use of lateral reading strategies and for evidence the student identified the agenda of the group, measured by identifying specific agenda-related keywords in their responses.

The overall results of the CTRL-F study are highly encouraging. The findings demonstrate the power of lateral reading skills to help students arrive at informed conclusions about information, and validate the CTRL-F curriculum as an effective way for educators to teach these skills.

The CTRL-F curriculum effectively teaches lateral reading skills

Students who have not received explicit training in lateral reading rarely seek out context to evaluate the quality of information they encounter. At pretest, when asked to investigate a prompt, students showed evidence of leaving the page just 11% of the time. At posttest, students who received the CTRL-F curriculum were much more likely to read laterally, leaving the page during their investigation 59% of the time — an increase of 48 percentage points. Additionally, three-quarters (76%) of all participating students improved performance between pretest and posttest.16
The CTRL-F program improves student accuracy

Students who received the CTRL-F curriculum were more likely than the control group to accurately assess the reliability of sources, claims, and images. At pretest, students provided an accurate reliability assessment 47% of the time. On posttest that number increased to 75%.

While this is significant, it is important to note that accuracy is not the strongest success metric, as tests of accuracy may come down to luck if there is no distinction made between students who guess correctly and those who base their responses on evidence from research.
How often did students apply lateral reading and reach a correct conclusion? (% across three test prompts)

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>9%</td>
<td>13%</td>
</tr>
<tr>
<td>Curriculum</td>
<td>50%</td>
<td>9%</td>
</tr>
</tbody>
</table>

The CTRL-F program helps students get the right answers for the right reasons

To determine whether a student reached a correct conclusion for the right reasons — research versus superficial analysis — we looked at accuracy scores in conjunction with lateral reading scores. This analysis allows for a distinction to be made between answers supported by valid reasoning in contrast to those using vertical reading strategies, instinct, or pure guessing.

At pretest, students referenced meaningful contextual information 9% of the time to justify correct responses to true/false prompts. On post-test, this number jumped to 50%, representing a dramatic increase in students’ ability to use lateral reading to reach informed conclusions about information.
**Prompt: International Newspaper of Record**

**STUDENT A PRETEST**

“I don’t think this site is completely trustworthy. My main reasoning is that as soon as you open the link, you are attacked with ads asking you to allow notifications, sign up for their newsletter, or just random advertisements getting their screen time.”

**STUDENT A POSTTEST**

“After a Wikipedia search, I found that the Dawn newspaper is the longest running English newspaper in Pakistan.”

**Low trust response**

- The Daily Star, Bangladesh

**High trust response**

- Dawn, Pakistan

**Prompt: News Article / True Claim**

**STUDENT B PRETEST**

“This information did not come from a trusted source and logically this wouldn’t make sense to keep the students safe.”

**STUDENT B POSTTEST**

“When I did a keyword search to see if this story was shared anywhere else, I found that indeed this story was confirmed to be true by two reliable news sources, BBC News and The Guardian.”

**Low trust response**

- “School district arms students with rocks”

**High trust response**

- “Italian cows get air conditioning installed”

**Prompt: False Context Photo**

**STUDENT C PRETEST**

“The letter is addressed to ‘Mr. Einstein,’ signed by a professor (and Dean of Science) and stamped with the stamp of the University of Bern.”

**STUDENT C POSTTEST**

“I Google Searched the image and found a Global News article saying the cause of the mutation was likely fasciation, not radiation.”

**High trust response**

- Einstein ‘rejection letter’

**Low trust response**

- Flowers affected by radiation
CTRL-F helps students locate key context about nuanced information

The CTRL-F assessments asked students to evaluate a website belonging to an advocacy group. For this higher-level reasoning problem, students were marked as “correct” if they succeeded in identifying the agenda of the group behind the site. The pretest asked students to assess the website for the American College of Pediatricians, an anti-LGBTQ group. The comparable posttest prompt was for the Heartland Institute, a think tank working to undermine climate science.

On pretest, just 6% of students were able to identify the ACPeds agenda. This number rose sixfold to 31% for Heartland at posttest. This represents a 25 percentage point increase in the curriculum group, compared with a 3% increase in the control group. On the delayed post-test, completed an average of six weeks following the end of CTRL-F instruction, students showed dramatic improvement on this prompt type in particular. Presented with the anti-vaccine group National Vaccine Information Center (NVIC), which describes itself as “an independent clearinghouse for information on diseases and vaccine science,” 49% of students successfully identified the site’s agenda.

They did not do so by guessing or by engaging with the site itself: 93% of students who determined the organization’s agenda did so by leaving the page and finding contextual information.
Identifying Agenda

Prompt: Advocacy Group

Students were asked to consider the website belonging to an advocacy group and indicate their level of trust in the site as a source of information on a specific topic.

Responses below are all from the same student.17

**PRE-TEST**

“The website isn’t cluttered with advertisements. There is contact information. They have stated their objectives.”

American College of Pediatricians (anti-LGBTQ)

**Trust Assessment: 5/5**

**POST-TEST**

“At first, it seemed like the site was reliable, but after reading the Wikipedia site for a bit I found out that they are a leading promoter of climate change denial and even worked with a tobacco company to discredit the health risks of smoking.”

Heartland Institute (climate change denial)

**Trust Assessment: 1/5**

**DELAYED POSTTEST**

“After reading about the organization on Wikipedia, I found out that it is a source of fearmongering and misinformation about vaccines.”

National Vaccine Information Center (anti-vaccine)

**Trust Assessment: 1/5**
How often did students read laterally?

Students retain the CTRL-F skills over time

To assess longer-term skills retention, teachers administered a second posttest, which was delivered an average of six weeks after completing the curriculum. The results of the delayed posttest showed no erosion of the skills, with students reading laterally 60% of the time across both tests.

The fact that the skills persist well beyond the curriculum period is significant, suggesting that students who learn to read laterally continue to investigate information this way.
After completing the CTRL-F curriculum, teachers indicated how many hours they devoted to instruction, how long they took to complete the CTRL-F program, and whether the instruction was in-class, remote, or blended. Along with average class age, class size, and student demographics, this information was analyzed to identify factors that could predict student performance on posttest problems. None of the course-related factors were statistically significant for predicting posttest performance. This finding demonstrates that the CTRL-F curriculum has the potential to work at scale. With the right tools and some professional development, any educator can implement the program in their classroom and expect to see comparable results.
Program Evaluation

Measuring teacher response to the CTRL-F program and training workshops

KEY FINDINGS: CURRICULUM

• **97%** agree CTRL-F increased their confidence in teaching digital literacy and source evaluation.

• **97%** agree that the program increased their capacity to teach digital literacy and source evaluation.

• **99%** plan to use the CTRL-F materials again.

90% of respondents agree that CTRL-F has changed their approach to teaching digital literacy.

Over the 2020/21 school year, the CTRL-F curriculum and professional development was made available to all teachers in CIVIX’s network, and a broader program evaluation was carried out alongside the CTRL-F research study.

CIVIX contracted Research and Evaluation Consulting, an independent research firm, to gain insights into how teachers used and responded to the CTRL-F program.

Key Questions:
- How does participation in capacity-building events improve teacher knowledge about mis- and disinformation and ability to deliver digital literacy programming?
- How do Canadian teachers deploy the learning materials in their classroom?
- What are teachers’ perceptions of the quality of the CTRL-F resources?
CTRL-F Training Sessions

CIVIX organized 15 virtual hands-on training workshops between August 2021 and March 2022. These were designed to introduce teachers to the CTRL-F program, allowing the opportunity for guided practice working through real-world examples the same way students do in class.

In total, 340 Canadian teachers participated. In post-workshop surveys, teachers indicated their enthusiasm for the professional development session, and underlined its necessity:

“It was fantastic to see real examples and work through the process, just as the students would. This was a real confidence-builder in terms of a concrete approach to a sometimes overwhelming topic.”

“This was so helpful to me personally! I feel so much more informed of where to start to fact check and how to teach my students this incredibly important skill. Thank you!!”

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KEY FINDINGS: TRAININGS

Following participation in a CTRL-F workshop

99% of teachers agreed they learned something that improved their knowledge about verification skills and assessing the reliability of information.

98% agreed the workshop increased their motivation to use CTRL-F with their students.

99% said they would recommend the workshop to other teachers.

Digital literacy expert Mike Caulfield hosts a virtual CTRL-F teacher training workshop.
Teachers were asked to indicate preferred evaluation strategies before and after attending a CTRL-F workshop. Use of vertical reading strategies decreased between pre-training and post-training, while lateral reading strategies increased.

### Vertical Reading

<table>
<thead>
<tr>
<th>Strategy</th>
<th>0%</th>
<th>25%</th>
<th>50%</th>
<th>75%</th>
<th>100%</th>
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<tbody>
<tr>
<td>Check for spelling, grammar and typos</td>
<td></td>
<td></td>
<td>48%</td>
<td></td>
<td>79%</td>
</tr>
<tr>
<td>Check the URL to see if it’s a .com, .org, .edu or other</td>
<td></td>
<td>39%</td>
<td></td>
<td>79%</td>
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</tr>
<tr>
<td>Read the ‘About’ page</td>
<td>39%</td>
<td></td>
<td>58%</td>
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</table>

### Lateral Reading

<table>
<thead>
<tr>
<th>Strategy</th>
<th>0%</th>
<th>25%</th>
<th>50%</th>
<th>75%</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Keyword search a claim to see what other sources say</td>
<td></td>
<td></td>
<td>71%</td>
<td></td>
<td>89%</td>
</tr>
<tr>
<td>Locate the original source of a claim</td>
<td></td>
<td></td>
<td>58%</td>
<td></td>
<td>88%</td>
</tr>
<tr>
<td>Consult Wikipedia to learn about the source’s reputation</td>
<td>50%</td>
<td></td>
<td></td>
<td>90%</td>
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</tbody>
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**Changing Pedagogy**

Responses from CTRL-F workshop participants suggest that even one intervention can have a significant impact on updating the way educators think about digital information literacy.

Prior to attending, teachers were given a list of source evaluation strategies and asked to indicate which ones they use.

The most common responses aligned with CRAAP and other checklist approaches. A key lateral reading strategy, “consult Wikipedia to learn about a source’s reputation,” was the lowest-ranked option, selected by 50% of respondents.

Following the training, the top selected strategies flipped, with teachers prioritizing lateral reading techniques and deprioritizing checklist items.

All educators who registered to teach CTRL-F during the 2020/21 school year were surveyed in March 2021 about their experiences using the resources and tools. They were asked to rate the quality of the resources and reflect on how the program affected their teaching of digital literacy.

Nearly all survey respondents — 90% — agreed that CTRL-F has changed their approach to teaching digital literacy, demonstrating the potential of this curriculum to transform the way these skills are taught.
The CTRL-F study clearly demonstrates the problems students face in navigating our online information environment and points the way to solutions. Here are key takeaways.

**Education decision-makers need to ensure evidence-based approaches to digital media literacy are adopted as broadly as possible.**

The CTRL-F study demonstrates that the overall skill level of Canadian students is not suited to an online information environment where mis- and dis-information is rampant. Students’ consistent failures in evaluating sources and claims can be in large part attributed to their application of commonly taught techniques. Vertical or close-reading strategies have been shown to be ineffective, yet they are still common in curriculum. Change will require buy-in from decision-makers at every level to ensure the verification skills we teach students are appropriate to the context in which they are being applied.

**Lateral reading must become the standard verification approach, widely adopted across grade levels and subjects.**

Like any life skill, the ability to evaluate online information requires repeated practice, and consistency. For this to happen, lateral reading needs to be adopted as standard across grades and subjects. As encouraging as the CTRL-F skills study results are, we still see confusion and mixing of strategies. Students who receive CTRL-F instruction in one class, for example, may be told in another to never use Wikipedia. For students to succeed, lateral reading instruction should be repeated and consistent.

**Professional development opportunities for teachers and librarians will be required to change the practice.**

Teachers are essential to the system changes that are needed. While many educators are equipped with outdated resources that reflect inefficient, or even counterproductive, approaches to understanding online information, the CTRL-F study has demonstrated that they are open to teaching contemporary methods and value the tools to do so. Introducing educators to evidence-based best practices changes how they teach, and empowers them to influence colleagues as well.
CTRL-F provides a means for educators across the country to access contemporary, free, flexible, and scalable curricula.

A system-wide change to address the digital media literacy gap is ambitious but possible, with commitment. The CTRL-F intervention demonstrates the potential for these tools to scale. For this study, participating teachers were provided two hours of training and off-the-shelf resources to deliver approximately seven classroom hours of digital media literacy instruction. These teachers were drawn from across the country, used various modes of instruction (in-class, remote, blended), and moved through the materials at their own pace. The substantial effect of the CTRL-F intervention held in all conditions, suggesting the program has the potential to scale up such that it could reach every student in Canada, contributing in a real and substantial way to building the next generation of informed citizens.
CIVIX is a non-partisan, Canadian charitable organization dedicated to building the skills and habits of citizenship among school-aged youth. For close to two decades, we have collaborated with educators to bring democracy alive in the classroom through meaningful learning opportunities.

We believe the best way to learn the skills of citizenship is through hands-on experience. Instead of telling students what they should do, CIVIX creates opportunities for students to practice the skills firsthand, applying them to events in real-time.

Our signature program, Student Vote, is a parallel election for students under the voting age, coinciding with general elections. It is now the largest civic education program in Canada. 

CIVIX also offers initiatives between elections, including government budget consultations for youth where students learn about public finance and discuss public policy issues (Student Budget Consultation), meetings between students and their elected representatives to help them better understand and appreciate our democratic institutions (Rep Day), and an initiative designed to enhance civil discourse (PoliTalks).

To support the delivery of CIVIX programming, we coordinate professional development opportunities for teachers to enhance their instructional capacity and commitment to civics and citizenship education (Democracy Bootcamp).

The CTRL-F: Find the Facts program helps students build the habits and skills required to support informed citizenship.

For more information about CTRL-F, please contact hello@ctrl-f.ca.
1 Sam Wineburg, Joel Breakstone, Nadav Ziv, & Mark Smith, “Educating for misunderstanding: how approaches to teaching digital literacy make students susceptible to scammers, rogues, bad actors, and hate mongers” (Working Paper A-21322, Stanford History Education Group, Stanford University, Stanford, CA, 2020).

2 Wineburg, Sam, and Sarah McGrew. "Lateral reading and the nature of expertise: Reading less and learning more when evaluating digital information." Teachers College Record 121, no. 11 (2019): 1-40. Throughout this document, we use “close-reading,” “vertical reading, and “content analysis” more or less interchangeably.

3 Ibid.

4 Ibid.


11 These teachers were provided a one-hour version of the curriculum to use with control classes following completion of the posttest, if they wished.

12 As we were only looking at skill retention for this cohort, there was no corresponding control group.

13 Seventeen teachers provided control classes. When possible, teachers used a control class that was the same grade and/or subject as the curriculum class, but this wasn’t possible in all cases. On average, students in the curriculum group were younger than students in the control group.


15 [https://acpeds.org/](https://acpeds.org/)

16 The assessments each provided four opportunities for lateral reading. At posttest, 76% of students read laterally on one or more problems than at pretest.

17 We did not take students’ trust assessments into account when scoring these questions. If students locate relevant context about this website and still choose to trust it, they are free to do so. The reason we include trust assessments here is to demonstrate how students are investing high degrees of trust in sources without demonstrating a full understanding of the site’s context. In this case, the student rates ACPeds highly, but, given their rationale’s emphasis on superficial elements of the site, we have no way of knowing if that trust assessment reflects the student’s true thoughts.