This paper aims to present a review of current knowledge on the influence of climate denial on climate education. This is a contentious but important issue that merits wider consideration and discussion within the geoscience education / communication community. There are issues with the paper as it's currently presented, however, and I recommend that these are addressed prior to final publication. In particular the focus on North America, almost to the exclusion of anywhere else, makes me question whether this paper should be re-cast specifically to focus on North America. I did limit my searches to English language articles, and most were found in the U.S.

1) Does the paper address relevant scientific questions within the scope of GC?

Yes. Climate denial and its influence on geoscience education falls clearly within the scope of the journal.

2) Does the paper present novel concepts, ideas, tools, or data?

This is a review paper so does not present new ideas emerging from novel research. It does make a contribution to synthesizing existing knowledge about climate denial in climate / geoscience education, but has some limitations in scope.

3) Are the scientific methods and assumptions valid and clearly outlined?

The methods used to identify, select, and analyse the information used in the review need to be more transparent. Granted this is a review article rather than a research paper, but this is a contentious subject and it's important that the paper does not lay itself open to accusations of using the 'obstructionist tools' associated with climate denial, e.g. cherry-picked data. Demonstrating a rigorous, systematic approach to information gathering should help to deflect such accusations. The recently-published systematic review of counteracting climate denial by Mendy et al. (2024): https://doi.org/10.1177/09636625231223425 provides an exemplar of the kind of approach appropriate for this type of review. The review article was included. The "Method" has been changed to -

A chief task of climate communication is the teaching of the main messages of the science of climate change to the general public and in all levels of education. This review focuses on the most vulnerable sector, the children in primary and secondary levels (K-12 in North America), of education.

The general methodology used in this review was similar to my book, which included:

> This political issue can be emotionally charged. Scholarly research, however, requires an impartial approach, and an examination of climate denialism, therefore, cannot exclude consideration of any positive aspects; in this study, which traces the evolution of climate denialism, none were found, which would not surprise the majority of physical scientists who study the climate. Social scientists would likewise generally agree but have identified psychological and sociological factors to account for the rise of the climate denialism movement. Academic studies, along with my decade-long Twitter experience, have been applied in this extensive study of climate denialism (Kutney, 2024, 4).

References in the peer-reviewed literature were sought on the influence of climate denial organizations and/or the fossil fuel industry in schools, especially those recently published (since 2021), with selected earlier references. A comprehensive summary of such organizations was a major purpose of this review to illustrate the scope of such organizations involved in climate denial in the classroom. Grey literature sources were added for quotes, critical commentary, and up-to-date news media information. Websites for organizations associated with climate education and those for groups promoting climate denial in schools have also been utilized. Generally, the peer-reviewed literature was found using Google Scholar and the grey literature using Google; specific searches included: "petro-pedagogy," "climate denial, schools", "fossil fuel industry, schools", and "petroleum industry, schools", and the names of particular climate-denial organizations in schools listed in this review. Studies picked up by these searches were also examined for other relevant references. Mainly references in the English language were examined.

The term "climate denial" is defined as: "those who deny the accepted science that greenhouse gas emissions must be stopped as soon as possible, as climate change is a present-day threat, is getting worse, and is mainly caused by us (Kutney 2024, p. 17)" and also includes climate denial by omission when teaching about the fossil fuel industry, but neglecting that the burning of fossil fuels are the main contributor to the creation of climate change (especially relevant to petro-pedagogy). Climate change denial is abbreviated in this review to climate denial, as with related terms such as climate change communication to climate communication and climate change education to climate education.

This review sets out to answer a series of questions as follows:

- What is the current state of public knowledge of the science of climate change? To answer this question, recent surveys of public awareness on important messages from the science on climate change were examined.

- What is hindering the public from gaining knowledge about the science of climate change? Again, recent studies were favoured, but more historical information was also included.

- What organizations are attempting to hinder climate education in schools? The peer-reviewed and grey literature supplied direct examples of such organizations. Specific examples of how these organizations operated were found by examining their websites and publications. Peer-reviewed and grey literature commentaries on these organizations were also examined. Greater focus was given to recent information.

In the last section ("Discussion"), conclusions, recommendations and suggestions for future research are offered. These are based mainly on the findings presented in the "Results," but also my decade-long experience challenging climate denial on Twitter (now X) and the research for my book Climate Denial in American Politics: #ClimateBrawl (Kutney, 2024).

4) Are the results sufficient to support the interpretations and conclusions?

A range of survey findings are used to imply the current state of public knowledge of the science of climate change, but I'm not convinced that all of the data presented are a valid representation of knowledge, or that this is a reliable indication of climate education. These data appear to relate to a range of constructs including awareness, perceptions, opinions and beliefs, which are not the same as knowledge. For example, having an awareness (being conscious) of climate change is not the same as having knowledge acquired through learning. It's also important to acknowledge that knowledge does not directly lead to actions. Rather than being 'ignorant of the irrefutable messages of the science of climate change and the scientific consensus' there is likely a much more complex interplay of factors – including education – influencing the gap between knowledge and behaviour (see review paper by Kollmuss & Agyeman (2002): https://doi.org/10.1080/13504620220145401). It's also not clear that the various survey findings reported are measuring the same thing and are therefore comparable. The survey section wording has been amended and less relevant ones removed.

The rationale for prioritising data / information from North America and English-speaking nations, and the limitations of this approach, warrants further discussion. This is particularly true for section 3.4 where the vast majority of examples are from North America. Is this a real effect, i.e. the influence of climate deniers on education really is found mainly in North America, or is this sampling bias? If the former, could / should this review focus specifically on North America as a location? Further, if the aim of this section is to present evidence for 'petro-pedagogy' are all of these examples really necessary, or is there value in presenting representative examples of differing approaches? What criteria are used to identify content as 'climate denial'? While this appears quite blatant / direct in some examples, in others it's much more subtle / indirect. I sought to list climate denial, direct and petro-pedagogy, wherever I could find it in schools. The definition of climate denial used is mentioned in the methodology. I was not deeply concerned with different approaches with the various organizations (though they are usually noted) as the goal is the same: no legislation to hinder the use of fossil fuels. In regards to the focus on English-speaking nations, more literature is available (see, for example, https://www.theguardian.com/environment/blog/2011/nov/11/climate-change-scienceofclimatechange#comment-13244224).

5) Do the authors give proper credit to related work and clearly indicate their own new/original contribution?

All sources are appropriately referenced. The contribution is more of a ‘call to arms’ than presentation of new knowledge.

6) Does the title clearly reflect the contents of the paper?

Not entirely. It should indicate, in some way, that this is not a complete review. Added to the abstract that the review was mainly restricted to English-language sources.

7) Does the abstract provide a concise and complete summary?

It would be helpful to indicate the limitations of the information considered in the review, e.g. geographical extent. See 6

8) Is the overall presentation well structured and clear?

At >12,000 words of body text the paper is too long. Almost half of this content is in Section 3.4. While the journal does not give guidance on manuscript length the aim of a review article should be to ‘summarise the status of knowledge’, and this is not a summary so consider where information could be streamlined, synthesized, tabulated, and / or moved to an appendix of supplementary information. I felt that a compilation of the organizations was the focal point of the review to illustrate the scope.

9) Is the language fluent and precise?

I found the overall tone of the paper to be somewhat confrontational. I suspect this is deliberate and, to be fair, it can be quite effective at hooking the reader’s attention. I do, however, question whether this style of writing is appropriate for an academic journal as it detracts from the narrative, and risks alienating readers who genuinely want to engage with the content. It is deliberate. At this stage, there is no indication that hard-core climate deniers, who lead this movement, wish to honestly engage, and time is running out.

10) Are the number and quality of references appropriate?

The author references an impressive body of information and literature which could be separated into literature informing the main narrative and literature forming the 'results' from the review process. Despite the high number of references there are multiple places in the text where key information is unreferenced. Please share such references, if not mentioned below.

Further comments:

L15: 'Summarise status of knowledge' seems more appropriate than 'draw attention to'. done

L19: How is 'climate education' defined? Is this the same as 'climate change education'? Yes

L29: I disagree that this review is global in extent. It would be more appropriate to indicate from the outset that the information reviewed originates mainly from North America and English-speaking nations.

L45: Another reference for climate denial to consider is Jacques (2012): https://doi.org/10.1162/GLEP_a_00105 The sentence was removed.

L48-49: Please provide a reference for the tobacco industry example. done

L52-57: The phrase 'Activism opposing climate denial has arisen' needs further substantiating. Where dates are provided these are all very recent – there a particular timescale of interest? The paragraph now begins with - Opposition to climate denial generally has arisen, but is only briefly mentioned in this review. Popular (and my favourite) examples of climate activism include

L61: What is the timescale of 'recently'? This sentence was removed.

L63: Provide references for these previous studies. Paragraph replaced with -

Their involvement in schools became more of a concern after climate change was found to be caused by the burning of fossil fuels. A referee of this review explained that the excursion of climate denial into the classroom (in America) was: "basically backlash to the inclusion of climate change in K-12 education, which is probably less than 20 years old in the US, with a surge after the release of the NGSS [Next Generation Science Standards in 2013; see below] (RC1, 2024, 753-754)". For recent reports in America, for example, where the largest number of climate denial organizations in schools were found, see Atkin, 2020; Climate Town, 2023; Damico and Baildon, 2022; Noor and Westervelt, 2023; Reid and Branch, 2023; Strauss, 2017; Waldman, 2023 a-c; Worth, 2021a; and Zou, 2017.

Climate denial in the classroom is the focus of this review, which provides a summary of the climate-denial organizations that are the leading offenders in manipulating climate education in schools. An important general goal of the review is to create awareness of the growing threat in the classroom, so that teachers and parents can protect children in their schools from the anti-science influences of climate denial, and climate education researchers and instructors are aware of this menace. Is climate denial in your school, or your child's school, or in any local school?

L64: See earlier comment – to what extent can public knowledge be considered a reliable indicator of education? What is the evidence for this? Comment removed.

L70-71: Is there a reference for this statement about climate education? See above for new Method.

L72-77: see previous comment about methods. Expanded method section as shown above.

L79-90: I would expect the study questions to appear before the method, i.e. define questions, then state how the info required to address questions will be collected. Findings should not be stated at this point. I had placed the findings into the questions, but these have been removed, as shown above.

L83-85 / L91 / L98: What is recent? What is historical? Timescales need to be more precisely stated. Chose recent to be since 2021, which was added.

L87: "Most cases were found in America" - what was the sampling strategy used to locate examples? Described further in the methods above.

L98-99: "such polls are also indicative of the general state of climate education itself". This needs to be explained and referenced. Personally I disagree, but am open to being convinced. Sentence changed to: Recent surveys (since 2021) have revealed an alarming lack of understanding of the science of climate change by the public.

L99: How many polls were identified? How many have been considered for this review? I chose the polls that I was familiar with, without doing a detailed search, as results were generally consistent among these recent polls.

L109: The statement about climate education is confusing. When would this education take place? Once a politician is in office? This last paragraph was changed to -

The IPCC assessments, for example, demonstrate that the climate scientists know "very well" that climate change is occurring and the causes (2023, 4); the Pew survey shows that less than half of Americans are aware of the scientific consensus on climate change.

L110: Which Pew survey? L103 suggests that there are multiple surveys. The survey above as this section is part of the same paragraph.

L123: "The "alarmed" category matches best with the consensus on the science of climate change". This needs further explanation. On the suggestion of the other reviewer, I added the "Concerned" category. The consensus is mentioned in L109 above.

L134: Is there a reference to validate that these are "common climate denial talking points"? This sentence was removed.

L135: "Many Americans are clearly not familiar with…" Or choose not to believe? Sentence removed.

L139-143 (and other places): Why is US political orientation the only demographic variable discussed? It is a dramatic difference and is the most important factor to get legislation passed on climate change.

L155: Is scepticism the same as denial? The former is about doubt, the latter is more definitive. Sentence was removed.

L157-158: Unclear - 75% of countries, or average 75% of participants? Ditto L163 "77% agreed…" Upon the suggestion of the other reviewer, L153-186 were removed.

L173-178: Unclear how this information is relevant to the preceding info. See above.

L183: What questions were asked to ascertain public perceptions of the climate crisis? See above.

L188: I'm intrigued by the involvement of Meta in global surveys on climate change (just a comment, no response required).

L203: Specify recent climate change (as opposed to over geological time). Added - modern.

L205-209: See previous comment. Added – modern.

L212: If climate education became a treaty obligation in 1992 then we might expect to see the influence of this in Millennials and later generations, but not earlier generations. So how is this captured in the survey data presented in 3.1 (or is it)? Sentence removed.

L237: Successful in what sense? Education changed to - communications.

L290-1: Please provide references. Added - (Oreskes and Conway, 2010, Chapter 6; McCright and Dunlap, 2011; Dunlap and McCright, 2015; Lewandowsky, 2021; Kutney, 2024).

L308-314: This sounds like the value-action gap. See previous reference to Kollmus & Agyeman (2002), also Bushell et al. (2017): https://doi.org/10.1016/j.erss.2017.04.001. The latter reference was added.

L314-22: What are the implications here for climate education? Studies that showed how to deal with climate deal generally.

L323-324: "Climate denial arises from fear of science messages about climate change, especially among conservatives. Political ideology plays a lesser role in climate legislation outside the United States" - but it still plays a role? This feels very dismissive of other locations, and the US-centric theme continues in the next paragraph. As a non-US resident I'm really not sure why I should care about this. This certainly was not my intent, if anything, it was meant as a compliment to those outside the US who had not fallen so deeply for political polarization and for this propaganda movement. The paragraph just illustrates that this problem is worse in the US.

L330: Were the right-wing think tanks studied by McCright and Dunlap all from the US, or a range of locations? Their study focused on the US.

Section 3.4: please refer to the comprehensive comments provided by RC1 – I have nothing further to add to these. Below are my replies to RC1 -

359: What evidence is there for the comparative judgment ("more dire")? More dire in what aspects? In some ways, the situation is less dire, at least in the U.S., as shown by better treatment of climate change in state science standards and better preparation of science teachers between 2012 and the present. Sentence changed to - Over a decade later, the campaigns promoting climate denial in the classroom have escalated, as discussed in this section.

361-372: "softer" in what respect? It's clear enough that the most prevalent forms of climate change denial have been softening -- moving away from denying "it's real" and "it's us" and toward denying "it's bad" (to use Maibach's formulation) -- in general, and there's evidence that this is true of climate change denial campaigns targeting K-12 science education in the U.S. But the groundwork hasn't been laid in this article to discuss this transition here. This paragraph is also hard to follow in the absence of concrete examples. First sentence changed to - Climate denial in the classroom includes “petro-pedagogy”. The term had been used to describe the energy-industrial complex funding energy and climate education programs for K-12 education, especially in STEM (science, technology, engineering, and mathematics) education (Eaton and Day, 2020, 462).

364: Likewise, "traditional conservative climate denial" hasn't been defined, so the contrast here will not be understood except by a reader already familiar with the situation. See above.

364: The groundwork hasn't been laid for the idea that the energy-industrial complex is providing K-12 science educational content (which moreover needs to be distinguished from the content provided by climate change denial organizations such as the Heartland Institute: see comment on 65-66). See above.

374: There are different relations being obscured by the word "sponsor" here: for example, actual fossil fuel companies provide the budget of the Oklahoma Energy Resources Board, but the Heartland Institute hasn't received directly traceable funds from such companies for a long time now, and many of its corporate sponsors made a point of cutting ties with them after the Unabomber billboard fiasco. It's misleading not to distinguish the different relations. Last paragraph changed to - Below is a description of climate-denial organizations and petro-pedagogy organizations promoting climate-denial in the classroom (also see figure 2 for editorial cartoons reflecting conservative climate denial views and liberal views of petro-pedagogy).

374: The parenthetical description doesn't capture the fact that the lefthand cartoon in figure 2 reflects conservative views of climate education while the righthand cartoon reflects liberal views of "petro-pedagogical" efforts. See above.

380-393: (1) What evidence is there that this program is global in actual reach? (Anybody can put material on the internet; that doesn't mean that it's global.) (2) This is under the rubric "Climate Denial in the Classroom" (the title of sec. 3.4); from the description this program is at worst soft denial. Does it make sense to begin or to spend a lot of time with the less pernicious examples? I placed groups globally if that is what they claimed. This group does fit the definition of petro-pedagogy.

394-409: The same comments apply as for 380-393. Also, is there any information on the content of Switch Classroom in particular? I agree that both groups appear to be less known, but they are trying. I wanted to flag as many groups as possible.

430-442: Is there any information on the impact on EU science classrooms? You made this good point above, on what is their impact; and that is a question that I found no answer, but they are a threat as they promote propaganda in schools.

444-472: Is there any information on current impacts? From what's said here, it sounds like these efforts wrapped up about ten years ago (unless the festival was later -- it's hard to tell; it may be a yearly event). Not recently, but I did add dates to the statements.

475-481: This section seems to be trying both to introduce the Canada material and to discuss the Saskatchewan episode; it would be clearer if the latter were moved into its own section (and if the dependence of the Canadian economy on extraction industries was discussed further). This paragraph was intended to be more an introduction to petro-pedagogy and was moved to section 3.4 as an introduction (with suitable modifications).

483-494: Interesting but not a lot of details about the actual content or uptake. Some websites did not provide many details, unless you signed up as a student or a parent.

495-502: The same comments apply as for 483-494. And if the worst aspect is that it promotes only personal action on climate, it's fairly soft denial. Soft yes, but a standard ploy of the fossil fuel industry to place the onus about the climate crisis on us and not them.

503-506: There's so little information here that it's hardly worth including. I wish to include them just to warn readers of this new group.

507-511: The same comment applies as for 503-506. Same as above.

531-534: This shouldn't be in the Ten Peaks section: either in the introductory Canada section or a concluding section on its own. (Or perhaps the blank line 529 is supposed to set it off? Fair if so.) Yes, an extra line was added to separate it, as a short summary.

536-541: (1) Yale has had a series of surveys with this question, with a bit of up and down but generally in the mid-to-high 70s. (2) Other surveys have addressed the issue with different questions, confirming the high level of support but offering further insights that may be worth discussing here, e.g.:

Kamenetz A. 2019, April 22. Most teachers don't teach climate change; 4 in 5 parents wish that they did. National Public Radio.

Pizmony-Levy O, Pallas, A. 2019. Americans endorse climate change education. Teachers College, Columbia University. https://www.tc.columbia.edu/media/centers-amp-labs/the-public-matters/AMERICANS-ENDORSE-CLIMATE-CHANGE-EDUCATION-final-version-posted-v09172019.pdf

Lange J. 2023, December 15. Poll: Americans overwhelmingly want climate change taught in schools. Heatmap. https://heatmap.news/climate/education-climate-trust-teachers-poll#

Your sharing of the references was most kind. I only added the last one, as it was most recent. I was not familiar with Heatmap; it is a nice site.

542-545: There have been multiple attempts to introduce the CCEA in both houses of Congress, most recently S. 4117 and H.R. 7946 (both introduced after the paper was submitted). Reference added, thanks for sharing.

546: Public education in the U.S. is ultimately controlled by the state, but the bulk of decisions on curriculum and instruction are made at the district level -- and there are about 13,500 local school districts -- or below (school, department, classroom). So there's even more decentralization than is revealed here. Role of district level was added.

546-548: (1) This is irrelevant to the decentralization point. (2) At face value, the campaign was deeply misconceived, not taking into consideration the facts that standards are revised on a multiyear schedule and that education policymakers are not likely to be responsive to single-shot petitions. (Of course, the ulterior motive may have been just to harvest addresses from people concerned about climate change education, and in this it may have succeeded.) Interesting, but I left it in to demonstrate that some groups were attempting to promote climate education at the state level.

550: 26 states were involved with (were "Lead State Partners" on) the development of the NGSS; not all adopted them (as correctly implied below). Added

557: the 24 (actually 25 now) states said to be "using [the NGSS] as guides" have actually based their standards on the same National Research Council Framework on which the NGSS are based -- not much difference in practice, but it makes a difference in some contexts. Comment on Pennsylvania added.

557-558: since 2020, PA moved from the non-Framework category to the Framework category, so only five states are neither NGSS nor Framework: TX, FL, OH, VA, and NC. Reference added, thanks.

560: re "not guided by the NGSS," see comment on 557 The change of Pennsylvania was noted.

575-579: More details about what the study sought to understand, and more specific reportage on its results, are needed. The study looked for state-level (i.e. state board of education or state department of education) policies regarding climate change in four contexts -- "1) institutional governance, 2) teaching and learning, 3) facilities and operations, and 4) community partnerships" -- of which only 2 is really relevant here. The new paragraph reads - A study of climate education reviewed: “802 publicly available education policies across the United States” and “used a whole institution approach for data collection and analysis and considered four institutional domains of potential climate change activity: 1) institutional governance, 2) teaching and learning, 3) facilities and operations, and 4) community partnerships (MECCE and NAAEE, 2022, 4-5).” Among their findings were that all states had policies mentioning climate change, but 33 states had very low focus, and 14 states had low focus on climate change content (9-11, 24, 40). States that followed the NGSS were more likely to include climate change content (9, 24-26). When energy was taught, there was little mention of climate change (9, 31-37). The report again highlighted the issue of climate denial: “For decades, political and social will to act on climate change was quickly swept away in a current of denial, avoidance, and political posturing (3; see also 7, 28, 44)”.

592-607: It's surprising not to see any mention of the CO2 Coalition's recent attempt to disseminate its materials at a NSTA conference. See e.g. https://www.washingtonpost.com/climate-environment/2023/04/11/co2-coalition-climate-denial/ Thanks this reference. The following has been added - They describe themselves as: “comprised of more than 100 of the top experts in the world who are skeptical of a theoretical link between increasing CO2 and a pending climate crisis while embracing the positive aspects of modest warming and increasing CO2 (CO2 Coalition, 2023, 1). Among their activities is the development of programs on science education:

In early 2021, a group of CO2 Coalition members decided to act on their concerns about the state of science education in America. They recognized that the teaching of science had strayed from the 400-plus-year-old scientific method and was less inclined to encourage inquisitiveness in students and more prone to require conformity to the opinions of teachers. At present, much of the instruction on climate change resembles an indoctrination into a political agenda rather than the provision of necessary tools for critical thinking (2023, 1).

On March 23, 2023, they issued a booklet attacking the position of the National Science Teaching Association on climate change (CO2 Coalition, 2023), using standard climate-denial talking points. The final conclusions of the booklet were:

As a result, students are undergoing an indoctrination into a dangerous political agenda that ignores the enormous benefits of CO2 – a gas critical to life – and promotes an impossible objective of supporting modern economies without carbon-based energy sources.

We respectfully urge the National Science Teaching Association to seriously consider a rejection of their previous endorsement of scientific censorship and return science education to the foundations of reason, open scientific debate and tolerance for alternative thinking (CO2 Coalition, 2023, 16).

The booklet was released as the National Science Teaching Association was holding a convention, where the CO2 Coalition had a booth and distributed the booklet and a comic book “Simon the Solar-Powered Cat,” depicting carbon dioxide as being good for the planet. An article in the Washington Post about the episode warned that the CO2 Coalition literature could cause teachers to spread propaganda about the science of climate change to their students (Joselow, 2023). The members of the CO2 Coalition were kicked out on the second day of the convention.

612: "yet" is gratuitous Deleted

618-651: Is there any evidence of uptake by teachers? This has not been investigated to my knowledge.

652: It's hard to know how to assess this claim. They certainly have their differences (e.g., CO2 Coalition is single-issue and the others aren't; EverBright Media is for-profit and the others aren't; etc.). Agreed but the propaganda they all share is typical climate denial talking points.

652: Why no mention in this context of PragerU Kids, which isn't an outlier compared to these three and whose climate change denial videos and comics aimed at kids grabbed headlines in 2023 in a number of states, especially FL? See e.g. https://www.politico.com/news/2023/08/09/in-desantis-florida-schools-get-ok-for-climate-denial-videos-ee-00109466 PragerU was added

653-664: It would bear mention that ONEI is the OH equivalent of the OERB. Added to section on the OERB.

665-681: (1) The bill was amended to refer to climate policy rather than climate change, so it was transformed from hard to soft denial. (2) As acknowledged, this bill isn't about K-12 education, so why include it? (3) The bill hasn't passed or been enacted, so why include it, especially when a number of bills that actually sought to undermine K-12 climate change education in various states aren't discussed? Removed

682-695: It would bear mention that OERB was the first of its kind, with ONEI and others inspired by it. Why no mention of e.g. the Illinois Petroleum Resources Board? See e.g. https://www.levernews.com/a-fossil-fuel-miseducation/ Added -

3.4.3.2.4 Illinois Petroleum Resources Board

The goal of the Illinois Petroleum Resources Board is to “improve the image and credibility of the Illinois oil and gas industry”, and this is accomplished through seven objectives, of which the first is “Education: Create an understanding of the Illinois oil and gas industry and good safety practices through programs with schools, organizations and the public at large (Illinois Petroleum Resources Board, undated a)”. They offer a series of professional development programs for middle and high school teachers (Illinois Petroleum Resources Board, undated b). No connections between fossil fuels and climate change were found on their website. Blogs on their website generally defended petroleum, including one titled “Benefits of Fossil Fuels to Humanity Have Far Outweighed Negatives”:

But it is dangerously misleading to focus exclusively on those [environmental] impacts and completely ignore their massive benefits. And using this deeply flawed framing as the basis of campaigns to rapidly eliminate the source of 83 percent of the world’s energy and virtually all our modern products is even more dangerous considering the favored “alternatives” are completely inadequate to replace fossil fuels.

It can’t be emphasized enough that renewable energy – specifically wind and solar – can only generate electricity, and do so only when the sun is shining and the wind is blowing (Whitehead, 2022).

An article criticizing the Illinois Petroleum Resources Board was called “A Fossil Fuel Miseducation”, which stated: “the IPRB doesn’t appear to deny climate change — they mostly seem

to avoid mentioning it at all. Instead, the group focuses on economic arguments about the oil and gas industry, which they claim will be a good source of jobs for decades to come, despite mounting evidence to the contrary (Gopal, 2024)".

698: Not "an education vendor"; rather, the DOE gave its imprimatur to the use of PragerU Kids videos in middle school social studies classes. Importantly, (1) it would be hard to justify the use of its climate change denying videos on those classes, given the lack of climate change content in the corresponding state standards, and (2) the DOE's imprimatur is basically irrelevant, since districts make decisions about instructional material, and some of the bigger districts have already said that they will not allow PragerU Kids materials to be used. Changed "an education vendor" to - allowed in Florida schools.

701: These states took different actions on different PragerU Kids products; it's misleading to lump them together as all approving the use of climate change denial material.

* In MT, the state superintendent of public instruction, Elsie Arntzen, a Republican, signed a textbook license agreement with PragerU. This doesn't have much actual significance, because the only requirement for obtaining such a license is posting a surety bond -- in PragerU's case, for $5000. Having the license doesn't mean that instructional materials will be considered, let alone approved, and the superintendent doesn't make decisions on instructional materials anyhow. But Arntzen expressed her approval of the materials, which might conceivably have some effect on districts' decisions.

* In NH, high school students in New Hampshire now have the opportunity to satisfy their financial literacy graduation requirement with PragerU Kids's Cash Course module online. The commissioner of the state department of education, Frank Edelblut, a Republican, even appeared in a promotion for it. Whatever you think about this, it's not likely to have any effect on climate change education.

* In OK, the state Department of Education under state superintendent of public instruction Ryan Walters, a Republican, announced a "partnership" with PragerU, which seems to take the form of the department endorsing its videos for use in social studies classrooms. While there are opportunities to discuss climate change in social studies classes, Oklahoma's social studies standards don't provide a lot of opportunities for it, so the effect on climate change education will probably be limited. The Oklahoma Education Association reacted to Walters's announcement by reminding districts that they don't have to use the material and parents that they could opt their children out of exposure to them.

* In TX, a PragerU promotion that featured praise from Julie Pickren, a Republican member of the state board of education, claimed that PragerU is an approved education vendor in the state. That was not, and still is not, actually true. Texas has a lot of problems with climate change education, thanks in part to Pickren, but official approval of PragerU for Kids materials is not among them. I changed the wording to - other states expressed interest in the PragerU programs.

703-709: It's surprising not to see mentioned the not-very-hidden analogy Jews in the Warsaw Uprising:Nazis :: climate change deniers:climate change accepters. Not that I disagree, but I prefer to stay away from this comment, as it invites new criticisms from climate deniers.

726: It's actually a lesson plan for grades 3-5, and it has API branding. While it can be read as soft denial, it's intended to be a career lesson, not an environmental science lesson. Changed to - lesson plan for grades 3 to 5.

729: the heading should be "Texas State Board of Education" -- the TEA is basically the TX department of education; it's administrative and doesn't set policy and can't be blamed for the shenanigans discussed in this section Changed as recommended

729-739: (1) This is state action, so it doesn't seem like it belongs in this section. (2) There have been similar episodes elsewhere, with executive and legislative actions aimed at inhibiting climate change education and apparently motivated by climate change denial; why aren't they discussed as well? The Texas case has attracted much attention and has implications for publishers generally.

737-739: (1) This was not "unrelated"; the changes to the board operating rules were made in order to facilitate the later attacks on the textbooks. (2) The textbooks in question were not banned; they were not approved. Districts are still free to use them if they wish; it's just harder and more expensive for them to do so. (3) The textbooks were not climate textbooks but grade 8 science textbooks. Last lines changed to - Textbook censorship in Texas, and other states, are increasing. One local school district in Houston voted to censor chapters on climate change; a local parent feared: “It’s really kind of alarming what this could mean for ideological influence and control over what is taught in schools (Salam, 2024; see also 2023)”.

740-746: This isn't part of section 3.4.3.2.8, and should be set off from it somehow. Shortened and made part of the section 1.

L750: Is ‘misunderstanding’ the right term to describe the Consensus Gap? I think for some people this is a conscious choice. Agreed, the sentence was removed.

L757-758: “Climate education, despite a serious and genuine effort, has failed to teach the world about the causes and risks of the climate crisis”. To what extent can this be generalised to ‘the world’, given that the vast majority of the evidence presented relates to North America? Sentence removed.

L759-65: I’d really like to see these recommendations for IPCC publications focused on climate denial, and aimed at alternative audiences, followed through.

L766-68: I’d be interested to know social scientists’ view on this! I would be as well. As stated, this is my opinion looking at this through the eyes of a climate activist challenging climate denial for the past decade.

L775-7: “Climate education has been relatively successful with liberals but has had no impact on conservatives in some countries for more than a decade”. Please provide evidence / references to support this. This paragraph was removed based on the comments of RC1.