A Report on Quantitative and Qualitative Assessment of YouTube Channels Working on Climate Change and Sustainable Development

● **Introduction**

Throughout the world, concerns about the changing climate and deteriorating environment are gaining momentum. Climate change is a global challenge that affects the whole of humanity. National solutions alone will not be able to deal adequately with the resulting global problems. Not just political parties, NGOs and corporates but also citizens of different backgrounds need to be enrolled in a global public debate about climate change to find practical solutions for social, political, economic, and environmental consequences.

The public and political debate on climate change are known to be heavily influenced and often biased and distorted when it comes to the "scientific facts" of climate change. Media coverage shapes discourse the actions on climate change (e.g., Boykoff and Roberts, 2007) and climate engineering (Buck, 2013). While the coverage in journalistic media is overseen by various types of editors (e.g., Schäfer and Schlichting, 2014) there are no gatekeepers in social online media so that misinformation and incivility can also be found in social mass media communications about climate change and climate engineering (e.g., Brossard, 2013; Brossard and Scheufele, 2013). It has been reported that the use of online videos and particularly the online video-portal YouTube is on the top as global communication and information channel on contemporary issues and that it might potentially be replacing conventional journalistic news channels at some point (e.g., Kalogeropolous et al., 2016; Haarkötter and Wergen, 2019).

Online videos have become an important global information source, for environmental and scientific issues and topics (León and Bourk, 2018). However, very little is known about the science and environmental information via YouTube and how topics relating to climate change and climate engineering are represented there. The research presented in this contribution has the aim to shed some light on the question about the content that users find on YouTube when they are searching for information on climate change and sustainable development will adhere to or contradict scientific views on this issue.

● **The wind of change in learning**

In today's world, the online video-sharing website YouTube is extremely popular globally, also as a tool for information on science and environmental topics. However, only little is known about the kind of information users find when they are searching for information about climate science, climate change, and sustainable development on YouTube. In today's world technology has entered every walk of our lives. In most of the revolutionized classrooms of today, one can observe smartboards, or at least projectors and computers becoming indispensable. Moreover, teaching and learning are not limited to physical schools today. We are in the century where smartphones are the source of either information directly, or guidance when needed for our digitally-oriented young adult students all over the world. This being the case, in this digital era, it is not surprising that the learning has repeatedly focused on the motivational effects of the uses of online technology, as well as the practical solutions

or progress. Among these tools, videos play a major role in the learning process. The use of videos became popular in the beginnings of the 21st century as people started spending more time with audio-visuals than with printed material. To supply videos, YouTube was and is the most used website ever, since the spread of the internet in the 1990s. In this context, the use of videos in the learning process has long been the focus of many research projects. Advancements in information and communication technology have revolutionized the notion of learning in terms of strategies, context, and methods.

- **Why Educational YouTube Channels are a Good Idea?**

One popular study technique is known as the 50/10 study sessions, which means that people tend to study for 50 minutes and then take a 10-minute break. Another thing that's great about many YouTube channels is that they ensure that each lesson is fun, short, and informative. This makes it easier to stay focused and concentrated without getting distracted. Also, YouTube videos are engaging, and not distracting like study groups might be. While it may be fun to study with friends at home, it can be easy to drift off in conversation and talk about things that have nothing to do with studying. Most YouTube channels also have organized playlists. This means that each lesson is given in the correct order of how you should learn the subject. Finally, some learners simply find it much easier to study using visual or audio methods. YouTube videos provide both visual and audio assistance, which makes them easier and more exciting to learn from than textbooks.

So without further ado, let's take a look at some of the best YouTube learning channels out there working on climate change and sustainable development!

1. PBS's Hot Mess (United States):

HOT MESS with 92.8k subscribers is dedicated to growing online communities that are interested in exchanging dialogue about environmental science, at its core, it is rooted in science education, and we are lucky to have such intelligent, passionate hosts bring their varied experiences and perspectives to the series. This is a show about how climate change impacts all of us, and about how we can create a better future for our planet and ourselves. With nearly 350 member stations, offers all Americans the opportunity to explore new ideas and new worlds through digital content. Every month, Hot Mess reaches nearly 28 million people online, inviting them to experience the worlds of science, history, nature, and public affairs; to hear diverse viewpoints.

2. Zentouro (United Kingdom):

With 9.38k subscribers, this is one of the longest-running sustainability channels on YouTube. It has an exceptional ability to unpack complex sustainability concepts and present them in a way that is conversational with the viewer. This channel is over 10 years old focusing mostly on climate change and activism. This channel talks about climate change, the environment, and how what we do every day impacts the entire world in great detail.

3. **Climate Adam (United Kingdom)**:

CLIMATE ADAM with 7.15k subscribers is a channel by Dr. Adam Levy, who is a doctor in atmospheric physics now focussed on communicating complex scientific ideas with engaging multimedia stories. This channel focusses on communicating complex scientific ideas with engaging multimedia and produce scientific podcasts and videos for several platforms. This channel has an exceptional ability to unpack complex sustainability concepts and present them in a way that is conversational with the viewer.

4. Just Have a Think (United Kingdom):

With 117k subscribers and 6.4 million views, Just think, seeks to understand the issues that face our civilization in the 21st Century and focusses on the potential solutions that will save lives and hopefully bring about a greater level of equality in the world. The channel is not a debating forum about whether Human-Induced Climate Change is a real phenomenon or not, but instead finding solutions to save the resources and motivate the world to do the same.

5. Our Changing Climate(United States):

This channel has a very consistent and appealing aesthetic, which, coupled with its well-researched explanations, has garnered over 240k subscribers. Our Changing Climate is a weekly video essay series that establish humanity's relationship to the natural world. It also has its news playlist where they make videos on international environmental activists. It doesn't work solely on climate change, it also emphasizes topics like sustainable development and sustainability.

6. Shelbizle (United States):

This channel is among the most popular channels with 240k subscribers. Shelbi and Christie are likely two sustainability YouTubers. This channel creates videos related to intentional living, wellness, low-waste life hacks, veganism, and eco-minimalism. This channel's mission is to create a community where the average person can make a difference by following the videos on sustainable living. Living a sustainable lifestyle can be a daunting task, but the videos can help the audience to break it down step by step by exploring the best tips & tricks of eco-minimalism.

7. Facing the Future (United States):

In FacingFuture.TV, Stuart Scott, and his team give voice to the scientists & social scientists, historians & futurists, economists & philosophers, journalists & activists, thought leaders from many disciplines, and even 'undisciplined' people with significant points of view. They are a piece of news and discussion forum to understand the current scenario and what are the activities that could help the world to bring the change.

8. Climate State (United States):

This channel teaches how to act on climate change. And they simply suggest that by stop emitting large amounts of heat-trapping gases. The best and easy solutions are to stop driving fossil fuel-driven vehicles, eating less meat, only using recyclable containers and packaging, getting electricity from renewable sources, buying local, taking the train instead of traveling by plane, and voting people into office who act on climate.

- **Ranking of YouTube channels based on their performance on YouTube**

The above-listed channels are being analyzed and as well as ranked here on **Quantitive and Qualitative basis,** that is (I) **Quantitative** - Based on their performance on YouTube - engagement rate day (%), engagement rate post (%), engagement rate view (%), love rate (%), and talk rate (%). (II) **Qualitative** - content, language, structure, coherence, delivery skills, sound, and visual effects, etc.,

A. Quantitative Analysis:

Daily Engagement Rate (%): It helps to know if your followers engage with the contents you put out daily. It could help you decide whether to reduce daily posts or increase it. To calculate using this formula, divide the total engagement in a day by the number of followers and multiply by 100.

Engagement Rate Post (%): This is calculated through a special YouTube Engagement Rate formula for the given day. The total number of Likes, Dislikes, and Comments to all the videos in the channel are added up and divided by the total number of the channel subscribers (in the selected time range).

Engagement Rate View (%): This formula requires you to divide the total engagements on the video post by the full video views then divide by 100.

Love Rate is the ratio of likes count to audience size (total of all likes/count of followers *100 %).

Talk Rate is the ratio of comments count to audience size (total of all comments/count followers * 100 %).

The average engagement rate (daily, view, and post), love rate, and talk rate is calculated to rank the channels. Which channel has a higher rating would have a low rank. Below is the table of the ranking of these channels based on the above parameters:

Table: Ranking of YouTube Channels based on their performance in different parameters.

Parameters / Channels	Total Likes	Total Comments	Total Views	Followers	Average Likes	Average Comments	Average Views	Average Dislikes	Engagement Rate, Day %	Engagement Rate, Post %	Engagement Rate, View %	Love Rate (%)	Talk Rate (%)	Average (ER+LR+TR)	Oevrall Rank
Hot Mess	133,241	17743	2,820,113	92900	3 099	413	65584	141	0.201%	3.931%	7.714%	3.335%	0.444%	**3.12%**	**1**
Climate Adam	9,907	3402	339,385	7150	130	49	4466	12	0.0091%	2.622%	6.969%	1.823%	0.626%	**2.40%**	**4**
Grist	71,801	15464	8.630,553	27700	182	39	21850	15	0.076%	0.852%	0.968%	0.656%	0.141%	**0.53%**	**9**
Our Changing Climate	3,738	453	47,540	240000	1869	227	23770	37	0.127%	0.889%	9.592%	0.779%	0.094%	**2.29%**	**5**
Shelbizleee	15,965	2481	261,587	241000	2661	414	43598	25	0.351%	1.286%	7.938%	1.104%	0.172%	**2.17%**	**6**
Zentouro	11894	2611	227,258	9380	195	43	3,726	12	0.048%	2.66%	8.42%	2.07%	0.45%	**2.72%**	**3**
Facing Future	56,547	7148	2,321,564	5889	345	44	14,156	36	0.217%	2.720%	4.249%	2.210%	0.279%	**1.93%**	**7**
Climate State	19,510	7432	1,185,474	28600	321	122	19,434	34	0.073%	1.662%	4.939%	1.118%	0.426%	**1.64%**	**8**
Just Have A Think	312,015	88,397	6,427,529	118000	2.667	756	54,936	138	0.414%	3.017%	8.887%	2.260%	0.640%	**3.04%**	**2**

B. Qualitative Analysis:

The qualitative analysis for above listed YouTube channels is undertaken by analysis their videos based on following parameters: Objective of the channel, forms of appeal (ethos, pthos & logos), content, language (technical/specialized/professional), audience engagement, delivery skills and techniques, and visual effects (Transition, graphics, animation). First, let's talk about these parameters in brief to understand the construct of the same.

1. Objective:

It is very crucial to understand the objective of the channel. It is critical to analyzing the channel's work, and should certainly influence how you study it.
- What is the channel's goal? Is it to educate, to motivate, to persuade, or to entertain?
- What is the primary message being delivered?
- Was the objective achieved through the channel or videos?

2. Content:

The content of the vieos should be selected and organized to achieve the primary objective of the organization. Focus is important — extraneous information can weaken an otherwise effective argument.
- Was the video focused? i.e. Did all arguments, stories, anecdotes relate back to the primary objective?
- Were examples or statistics provided to support the arguments?
- Were metaphors and symbolism use to improve understanding?
- Was the topics organganized logically?
- Was it easy to follow or understand?
- Did the narrator or host transition smoothly from one part of the presentation to the next?

3. Forms of Appeal:

- Ethos: is an appeal to the authority or credibility of the presenter. It is how well the presenter convinces the audience that the presenter is qualified to speak on the subject.

- Pathos: is an appeal to the audience's emotions. The terms sympathy, pathetic, and empathy are derived from it. It can be in the form of metaphor, simile, a passionate delivery, or even a simple claim that a matter is unjust. Pathos is most effective when the author or speaker demonstrates agreement with an underlying value of the listener.
In addition, the speaker may use pathos and fear to sway the audience. Pathos may also include appeals to audience imagination and hopes; done when the speaker paints a scenario of positive future results of following the course of action proposed.

- Logos: is logical appeal or the simulation of it, and the term logic is derived from it. It is normally used to describe facts and figures that support the speaker's claims or thesis. Having a logos appeal also enhances ethos because information makes the speaker look knowledgeable and prepared to his or her audience.

However, the data can be confusing and thus confuse the audience. Logos can also be misleading or inaccurate, however meaningful it may seem to the subject at hand.

- Was there an appeal of credibility or authority of the speaker?
- Was there an emotional appeal to the audience?
- Was there a logical appeal to the content?

4. Language

- Was the language appropriate for the audience?
- Did the speaker articulate clearly?
- Were sentences short and easy to understand?
- Was technical jargon or unnecessarily complex language used?
- Was the speaker technical/specialized/professional?

5. Delivery Skills and Techniques:

Delivery skills are like a gigantic toolbox — the best speakers know precisely when to use every tool and for what purpose.

Enthusiasm and Connection to the Audience

- Was the speaker enthusiastic? How can you tell?
- Was the video interactive and effective?
- Was the message you– and we-focused, or was it I- and me-focused?

Humor

- Was humor used?
- Was it safe and appropriate given the audience?
- Were appropriate pauses used before and after the punch lines, phrases, or words?
- Was it relevant to the speech?

Vocal Variety

- Was the speaker easy to hear?
- Were voice modulations used appropriately?
- Was the speaking pace varied? Was it slow enough overall to be understandable?
- Were pauses used to aid understanding, heighten excitement, or provide drama?

6. Visual Effect

- Were the video designed effectively?
- Did the graphics and animation complement speech arguments?
- Was the use of visual effects timed well with the speaker's words?
- Did they add energy to the video or remove it?
- Were they simple and easy to understand?
- Were they easy to see? e.g. large enough?
- Would an additional visual effect help to convey the message?

Table: Qualitative analysis of YouTube channels based on the objective, content, language, delivery skills and techniques, and visual effects.

Channels/ Parameters	Hot Mess	Climate Adam	Grist	Our Changing Climate	Shelbizlee	Zentouro	Facing Future	Climate State	Just Have a Think
1. Objectives of the channel What is the channel's goal? Is it to educate, to motivate, to inform, or to entertain?	To educate people about climate change and motivate them to create a better future.	To educate people about climate change current scenario.	To educate and motivate people to action on issues like climate change by drawing connections to daily life.	To educate people about impact of human activities on environment.	To motivate people to make a difference by following the videos on sustainable living.	To educate about climate change and its impact on humans.	To inform people about the current climate change scenario and global warming.	To inform people about how people should act on climate change.	To inform and motivate people about the possible solutions to save them from the threat.
- What is the primary message being delivered?	Impact of climate change on humans and how we can work for the betterment of the people.	It aims at communicating complex scientific ideas with engaging multimedia videos.	It aims at reporting environmental news with clarity, candor, and humor.	It investigates humanity's relationship to the natural world.	Exploring the best tips & tricks of eco-minimalism to live sustainable life.	To talk about climate change, the environment, and how what we do everyday impacts the entire world.	To give voice to leaders from many disciplines, and even 'undisciplined' people with significant points of view.	To teach how to act on climate change. and they simply suggest that by stop emitting large amounts of heat trapping gases.	To understand the issues that face byr civilisation in the 21st Century and focusses on the potential solutions
Was the objective achieved through the channel or videos?	To an extent	Agree	To an extent	To an extent	Strongly Agree	Agree	Somewhat	Disagree	Agree
2. Content: Were examples or statistics provided to support the arguments?	Strongly Agree	Strongly Agree	Strongly Agree	Agree	Strongly Agree	Strongly Agree	Agree	Agree	Strongly Agree
Were metaphors and symbolism use to improve understanding?	Disagree	Strongly Agree	Strongly Disagree	Strongly Agree	Agree	Strongly Agree	Strongly Disagree	Strongly Disagree	Strongly Disagree
Was the topics organganized logically?	Strongly Agree	Strongly Agree	Agree	Agree	Strongly Agree	Strongly Agree	Diagree	Agree	Agree
Was it easy to follow or understand?	Strongly Agree	Strongly Agree	Strongly Agree	Agree	Strongly Agree	Strongly Agree	Agree	Agree	Strongly Agree

Did the narrator or host transition smoothly from one part of the presentation to the next	Strong Agree	Strongly Agree	Somewhat	Agree	Strong Agree	Strongly Agree	Somewhat	Somewhat	Somewhat
3. Forms of Appeal:									
Was there an appeal of credibility or authority of the speaker?	Strong Agree	Strongly Agree	Strongly Agree	Agree	Strong Agree	Strongly Agree	Agree	Agree	Strongly Agree
Was there an emotional appeal to the audience?	Agree	Strongly Agree	Disagree	Disagree	Agree	Strongly Agree	Strongly Agree	Strongly Agree	Disagree
Was there a logical appeal to the content?	Strong Agree	Strongly Agree	Strongly Agree	Agree	Strong Agree	Strongly Agree	Agree	Agree	Strongly Agree
4. Language									
Was the language appropriate for the audience?	Strong Agree	Strong Agree	Strongly Agree	Strongly Agree	Strong Agree	Strong Agree	Strongly Agree	Strongly Agree	Strongly Agree
Did the speaker articulated clearly?	Strong Agree	Strong Agree	Agree	Agree	Strong Agree	Strong Agree	Agree	Agree	Agree
Were sentences short and easy to understand?	Strong Agree	Strong Agree	Strong Agree	Strong Agree	Strong Agree	Strong Agree	Strong Agree	Strong Agree	Strong Agree
Was technical jargon or unnecessarily complex language used?	Strong disgree	Strong disgree	Strong disgree	Strong disgree	Strong disgree	Strong disgree	Strong disgree	Strong disgree	Strong disgree
Was the speaker technical/specialised/professional?	Professional	Technical or experimental	Technical	Professional	Technical	Technical or experimental	Professional	Technical and Experimental	Technical
5. Delivery Skills and Techniques: **Enthusiasm and Connection to the Audience:**									
- Was the speaker enthusiastic?	Strong Agree	Strong Agree	Agree	Strongly Disgree	Strong Agree	Strong Agree	Agree	Agree	Agree
- Was the video interactive and effective?	Strong Agree	Strong Agree	Agree	Disagree	Strong Agree	Strong Agree	Agree	Agree	Agree
- Was the message you– and we-focused, or was	you– and we-focused	you– and we-focused	you– and we-focuse	you– and we-focus	you– and we-focuse	you– and we-focuse	you– and we-focuse	you– and we-focuse	you– and we-focuse

it I- and me-focused?				e	d	d			
Humor									
-Was humor used?	Strongly Agree	Strongly Agree	Disagree	Strongly Disagree	Strongly Agree	Strongly Agree	Disagree	Disagree	Disagree
-Was it safe and appropriate given the audience?	Strongly Agree	Strongly Agree	Agree	Agree	Strongly Agree	Strongly Agree	Agree	Agree	Agree
-Were appropriate pauses used before and after the punch lines, phrases, or words?	Strongly Agree	Strongly Agree	Agree	Agree	Strongly Agree	Strongly Agree	Agree	Agree	Agree
- Was it relevant to the speech?	Strongly Agree	Strongly Agree	Agree	Agree	Strongly Agree	Strongly Agree	Agree	Agree	Agree
Vocal Variety									
- Was the speaker easy to hear?	Strongly Agree	Strongly Agree	Agree	Agree	Strongly Agree	Strongly Agree	Agree	Agree	Agree
- Were voice modulations used appropriately?	Strongly Agree	Strongly Agree	Agree	Agree	Strongly Agree	Strongly Agree	Agree	Agree	Agree
- Was the speaking pace varied?	Strongly Agree	Strongly Agree	Agree	Agree	Strongly Agree	Strongly Agree	Agree	Agree	Agree
-Was it slow enough overall to be understandable?	Strongly Agree	Strongly Agree	Agree	Agree	Strongly Agree	Strongly Agree	Agree	Agree	Agree
- Were pauses used to aid understanding, heighten excitement, or provide drama?	Strongly Disgree	Strongly Disgree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Disgree	Strongly Agree	Strongly Agree	Strongly Agree
6. Visual Effect									
Were the video designed effectively?	Strongly Agree	Strongly Agree	Agree	Somewhat	Strongly Agree	Strongly Agree	Disgree	Disgree	Agree
Did the graphics and animation complement speech arguments?	Strongly Agree	Strongly Agree	Agree	Agree	Strongly Agree	Strongly Agree	Disgree	Disgree	Agree

Was the use of visual effects timed well with the speaker's words?	Strongly Agree	Strongly Agree	Agree	Agree	Strongly Agree	Strongly Agree	Somewhat	Somewhat	Agree
Did they add energy to the video or remove it?	Strongly Agree	Strongly Agree	Agree	Somewhat	Strongly Agree	Strongly Agree	Somewhat	Somewhat	Agree
Were they simple and easy to understand?	Strongly Agree	Strongly Agree	Agree	Agree	Strongly Agree	Strongly Agree	Agree	Agree	Agree
Were they easy to see? e.g. large enough	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Agree	Agree	Strongly Agree
Overall Rating	**A++**	**A++**	**A**	**B++**	**A++**	**A+**	**B+**	**B+**	**A**

s

- **Conclusion and Recommendations:**

In the end, I would like to conclude that based on my quantitative and qualitative analysis of all the youtube channels and videos closely. Hot Mess, Climate Adam, Shelibzlee, and Zontour are the best channels working on the issue of climate change and sustainability in terms of content, appeal, delivery skills, and techniques and visual effects. They have gained an edge in the qualitative analysis because of the following parameters:

1. Humour:

Humor is a valuable and effective tool for communicating just about anything because humor breaks down barriers. Carefully disguised as fun, humor can smuggle new ideas into people's hearts. It is an essential component of learning for young and old alike! To teach, you must have your audience's attention. Humor allows us to approach threatening subjects in a non-threatening way. Additionally, it shows that when people laugh together, they not only enjoy themselves, but they are more receptive to new ideas.

2. Day to day examples:

The best way to present the information to the audience is by relating it to a basic example of any day to day activity and then joining the dots and form a bigger picture out of that small example, that may mean nothing to people but, it will force them to realize how small actions by them can impact the environment. That is our main motive to influence those who have a basic understanding.

3. Explaining through graphics and animation:

People tend to pay more attention to a moving picture than a still one. They can grasp more when something is explained by animation. The current educational use of animation suggests two main roles in learning. The first purpose of animation in academics is to fulfill a cognitive function. In this role, animations are intended to support peoples' cognitive processes that ultimately result in them understanding the subject matter. The best way to present your content is either by making it funny and humorous through 2-D motion graphics or by videotaping the real picture and making intense and triggering videos for an emotional appeal.

4. Sound Effects:

Sound is important because it engages audiences: it helps deliver information, it increases the production value, it evokes emotional responses, it emphasizes what's on the screen and is used to indicate mood. Much of this sound would have to be added later to make it as effective and clear as it is in the video.

5. Real-life experiments:

We tend to remember things that we have seen or practically performed. As people are becoming more aware of the science behind everything. Performing experiments

on daily life activities are the best way to explain a condition or a concept. People of all ages find experiments very interesting and fascinating.

6. Edutainment:

Experts sessions should not be just about speeches, these should also be interactive and participatory to gauge the audience's attention. Most of the channels have videos on big conferences and lectures. But, in today's world, nobody likes to hear long speeches about a concept. Most people like the videos to be short humorous, interactive, and funny that can entertain them as well as can educate them.