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Research Article

Exploring Climate Change Misinformation Using the CRAAP Technique: Input for Framework Development

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ABSTRACT

Climate change misinformation continues to influence how individuals understand climate issues and respond to their impacts, with its spread amplified by the increased accessibility of digital platforms. While frameworks like the CRAAP model provide general guidance for evaluating information, they were not tailored for climate change misinformation, and some criteria, particularly Relevance and Purpose, have been found to confuse students. This study examined how students identify climate change misinformation using the CRAAP framework as an analytical basis to support the development of a more student-focused, climate-specific evaluation tool. A qualitative study with a developmental component was employed. Semi-structured interviews were conducted to 10 junior and senior high school students from Cabitan National High School purposely chosen. Data were analyzed through thematic analysis. Findings revealed that students rely on strategies such as source evaluation, cross-verification, social validation, plausibility assessment, content quality, and timeliness. These approaches align with CRAAP's Currency, Authority, and Accuracy, while Relevance and Purpose were rarely applied. Based on these insights, the study introduces the ITRACE framework (Intention, Timeliness, Reliability, Appearance, Content Quality, Evidence), designed to provide clearer and more accessible criteria for evaluating climate misinformation. Overall, while some student strategies aligned with CRAAP, others were weak or inconsistent, highlighting gaps in understanding. ITRACE was developed to address these limitations by offering a more practical, student-friendly approach. However, its validity was not tested in this study, and further research is recommended to evaluate its effectiveness and generalizability.

Keywords*: Climate change, CRAAP, ITRACE, Literacy, Misinformation*

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Introduction

Climate change has been a serious issue globally and nationally. It is an undeniable reality that continues to shape the world today. The World Health Organization (2023) asserted that climate change presents a fundamental threat to human health, affecting both natural and human systems—including social and economic conditions. Aside from health, climate change also impacts other aspects of the life of an individual. However, the magnitude or rate of climate change and the risks associated with it depend on the near-term mitigation and adaptation actions (IPCC, 2021). Mitigation is described as the reduction of climate change by also reducing the flow of greenhouse gases that trap heat in the atmosphere, while adaptation is the mechanism of adapting to life or the involvement of actual or expected future climate (Cermak, 2024). This means that the impacts or the risks associated with climate change depend on the climate action or response, the mitigation and adaptation, taken by the people or the community.

However, that could be affected or is dependent on how people perceive or understand the issue. When a community does not take climate change as a serious concern, the people also tend not to care about the risks and the impacts that the phenomenon can bring. The people, especially young individuals, who are the crucial part of a community, tend to be misinformed about climate change due to the fast-paced spread of information on digital platforms. Tornberg (2024) believed that climate change misinformation has been increasingly spread through various media content. Similarly, Tomassi et al. (2025) claimed that "the rise of social networks and rapid digital communication has exponentially increased the reach and speed of misinformation spread, making false claims on scientific issues more globally pervasive than ever." (pp.2). Studies also revealed that there has been a rapid increase in the number of people engaging in social media platforms. This means that more people are also at risk of becoming misinformed about various societal and global issues, including climate change. Young people, especially secondary school students, are more vulnerable to such influences and are more often misled, as they spend more time on social media than other age groups. In addition, this age group tends to have limited media literacy and critical thinking skills. Media literacy skills, as described by Laaninen (2025), are "the skills, knowledge, and understanding that allow people to use media effectively and safely." Critical thinking skills "require judgment, reflection, analysis, synthesis, and attention to context." Both skills are important in combating the possible misinformation that everyone may encounter online or offline. Machete and Turpin (2020) argued that critical thinking, as a form of information literacy, could provide a means to become critically engaged with the online content by looking into the evidence of the claims and evaluating the information. The results from the study of Alfonso et al. (2025) revealed that Grades 7, 9, and 10 junior high school students of a certain school are among the learners with moderate to limited literacy or still have uncertainty in discerning reliable climate change sources. This indicates that the majority of the junior high school learners are not strongly literate and capable of discerning misinformation from credible information. Although students could gain knowledge about climate change in school, it is also important that they possess skills in evaluating and analyzing the different information they encounter. Hence, Rabe & Paz (2025) claimed that educators should additionally help their students to evaluate critically climate change misinformation since learners these days are living in an information ecosystem where they may be exposed to mis- and disinformation. Moreover, providing the students with learning opportunities to develop these skills could be a factor in encouraging the students to engage more in climate-related activities. Their lack of engagement and limited participation in climate change activities could be because they need skills to counter misleading information. According to UNESCO (2023), "understanding the basic science of climate, one's influence on the climate, and the climate's influence on society at large requires information, media, and technological competencies, especially in the digital age." Moreover, Fajardo's (2023) findings indicate that there is a need to strengthen Filipino students' information or media literacy across

educational levels and that students residing in the Masbate province consistently registered lower mean scores for author and fact-checking.

The CRAAP technique, developed by Sarah Blakeslee (2004), is a structured approach designed to counter misinformation. It helps students develop skills in observing, analyzing, reflecting, communicating, and synthesizing information. Beyond teaching scientific knowledge, the framework emphasizes the importance of critical thinking, particularly in digital environments, where misinformation spreads rapidly.

The CRAAP provides a guide to help students detect hidden intentions behind misinformation, check the credibility of the author, guide them to focus on scientifically valid and related topics to the data rather than emotional distractions, remind them that scientific understanding evolves, ask about the accuracy of outdated information, and check whether claims are supported by peer-reviewed research or are recognized by scientific institutions. However, the framework has limitations, especially in an era shaped by rapid advancements in artificial intelligence and the growing prevalence of climate change misinformation. These challenges highlight the need for modern educational approaches that equip students with practical tools to distinguish between credible information and false claims. In response, this study aims to develop a student-centered strategy specifically designed to help learners identify and evaluate climate change misinformation more effectively.

Statement of the Problem

The digital age provides unlimited access to information, making young individuals vulnerable to misinformation about climate change. This study aims to provide them with a new consensus, a synthesized technique of discerning facts from misinformation based on the learners' own strategies.

It aims to answer how do the students' knowledge of discerning misinformation guides the development of a climate change misinformation technique. Specifically, it seeks to answer the following research questions:

1. How do students identify misinformation in climate change?
2. How do students employ the CRAAP technique to identify misinformation in climate change?
3. What output for discerning misinformation in climate change can be developed based on the results of the study?

Theoretical Framework

This study is grounded in several theories or perspectives in education, including those that are related to discerning misinformation, information literacy, and evaluation of sources. Individuals evaluate information on their own basis, but their judgment is based on personal beliefs, cognitive biases, and their prior knowledge. Hence, Blakeslee (2004) developed a framework which aimed to help individuals distinguish between fact and misinformation by basically looking into the currency, relevance, authority, accuracy, and purpose of information or any content. Such techniques are useful for young learners, especially because they are exposed to a lot of information online. This is supported by Information Literacy Theory, Dual-Process or Cognitive Processing Theory, Inoculation Theory, and the Constructivist Learning Theory.

The theory of Information Literacy (Zurkowski, 1974) is a concept that holds that individuals should develop the ability to evaluate, locate, recognize, and use information effectively. This study aims to develop a method that could help students develop their information literacy, specifically regarding climate change, and develop as well their sense of being responsible citizens who are not just merely knowledgeable of this global concern but also take part in the responses and actions taken to counter the impacts and be able to adapt to the effects of climate change. One idea in the information literacy theory, as expressed by Zurkowski, is that the essence of information literacy is that an individual who knows how to handle information can use it effectively to solve problems (Badke, 2010). Moreover, Taylor and DiGiacomo (2023) emphasized that the 21st-century information landscape demands that students are prepared to be responsible

users and creators of information, which requires information literacy (IL). The theory of information literacy guides the understanding of how students identify reliable and unreliable climate information in the age of digitalization. Most importantly, because digital platforms have made it easier for misinformation to spread. This intense manipulation and disinformation, especially through social media, requires a new means of developing a culture of communication and ethical competencies in society (Novitskyi et al., 2025). Developing a method, such as the CRAAP, could be incorporated in the teaching-learning process and could help the learners develop digital and information literacy. Jones-Jang, Mortensen, and Liu (2021) found that information literacy can significantly increase an individual's likelihood of identifying fake information. This supports the focus of this study which is being able to evaluate information or content credibility using a specific method, technique, or criteria like CRAAP.

When individuals are information literate, they develop their own understanding and method for evaluating information. The Cognitive or dual-processing theory, as described by Bellini-Leite (2022), is categorized into two types: autonomous Type 1 processes, which are fast and intuitive, and working memory-dependent Type 2 processes that support hypothetical thinking, and are also slow and reflective. It explains reasoning, judgment, and decision-making tasks, emphasizing the distinction between these two processes. The cognitive dual-processing theory, in this study, explains how individuals process, evaluate, and even misjudge climate change misinformation. Moreover, Sowden, Pringle, and Gabora (2019) explained the distinction between the two classifications as those involved in the generation of ideas and those involved with their refinement, evaluation, and/or selection. The type 1 process may be responsible for climate change misinformation among students, especially when they are exposed to the digital ecosystem, since misinformation frequently appeals to emotions, familiarity, and confirmation biases that make it appealing and persuasive to fast, memory-dependent, and intuitive thinking. Whereas the type 2 cognitive process relates to how students can identify misinformation as they think slowly, deliberately, and logically. Hence, type 2 cognitive processes should be developed among them, transitioning from type 1 cognitive processes.

One way it could be done is to expose individuals, or learners in this context, to weakened examples of misinformation to build their resistance to persuasion of such information types. This is called the Inoculation Theory, also known as the Misinformation Resistance Theory (McGuire, 1964). This has been a commonly used method for promoting critical thinking among people and for avoiding misinformation in various contexts, such as COVID-19 vaccines, cigarette smoking, and other serious concerns. In this study, the theory supports the understanding of how to evaluate misinformation samples to strengthen the students' ability to detect false climate change claims. Inoculation works the same as the body's immune system, and that of how the vaccines work in the body, wherein immunization to viruses is done by initially injecting weakened viruses into the body, and the body reacts to these injected viruses, which thus protects the body from the possibility of getting future attacks from stronger versions of the virus. In this theory, learners could be exposed to misinformation samples, allowing them to evaluate the content using their own method and with the use of the CRAAP technique. The theory of inoculation includes two important components: the threat and refutational preemption (Breen & Matusitz, 2009). Threat serves as a catalyst or a motivating factor for a protective response, as it allows the recipient of a message to realize that their current stance on a matter is susceptible (McGuire, 1964). The second component, refutational preemption, "provides specific content that receivers can employ to strengthen attitudes against subsequent change" (Pfau et al., 1997). Hence, most inoculation messages begin with a warning about the anticipated persuasive attempt or giving forewarning, and then provide counterarguments to that persuasion or the phase of refutation. This could be done by evaluating the information or content they are exposed to, studying, or seeking the important elements that should be present in reliable or credible

information. The counterarguments, in this sense, that the learners can use are those of the significant components that should be present in the content or information for it to be considered reliable. The inoculation theory, in this case, justifies the importance of developing a technique, based on a structured framework—CRAAP, that will help young learners to have that immunization against climate change misinformation.

The active engagement and evaluation of information empower learners to build an understanding of important concepts or issues, in this case, the global concern about climate change. This is a constructivist learning perspective. The constructivist learning theory, popularized by Jean Piaget and Lev Vygotsky, is an educational perspective that explains learning through guided exploration. Bhattacharjee (2015) stated that constructivism explains how people know what they know. This is because the theory emphasizes that individuals construct their own knowledge through experiences, the reflections they have on those experiences, and either make changes to what they already know or disregard the new information. This was emphasized in Piaget's version of constructivism, "first wave constructivism" or "solo constructivism", which discusses the knowledge of an individual, and in which assimilation, accommodation, and equilibrium are the essential elements (Nesrine, 2018). Kouicem (2020) further explained that what distinguishes constructivism from other educational theories is that knowledge is constructed based on a variety of past experiences. In this case, the learners' experiences of discerning misinformation from factual information allow them to develop that protection against misinformation using a new method. Their experience can lead to the development of a new technique for distinguishing more confusing information. The constructivist learning principle was also emphasized in Vygotsky's version of constructivism, "social constructivism" or "second wave constructivism," which views learning as socialization rather than merely cognition (Ghaour, 2018). Moreover, Vygotsky's theory of social constructivism emphasizes the "Zone of Proximal Development", mediation, and scaffolding, which happens with the help of a "More Knowledgeable Other/Peer". In this sense, the teacher acts as a provider of scaffolding to the learners. Taber (2018) said that teachers who wish to scaffold learning should design learning activities and support materials that place students in their Zone of Proximal Development (ZPD). This is possible by developing students' ability to discern climate change misinformation, which is rampant on social media sites.

Overall, these theories collectively support the aim of this study, which is to develop a method or strategy to help students distinguish climate change misinformation online. Information literacy theory underscores the need for learners to acquire strong evaluation and critical thinking skills, particularly in the digital age, where information is abundant and often unverified. This is especially important for young individuals, who are more vulnerable to misinformation due to frequent exposure to online content and social media platforms.

In addition, inoculation theory explains that students' ability to detect misinformation can be strengthened through guided exposure to weakened or misleading claims, enabling them to recognize manipulation techniques and build cognitive resistance. This process is reinforced by constructivist theory, which emphasizes that learning occurs through experience, reflection, and active engagement. By encountering and analyzing misinformation, students build a deeper understanding and develop more effective evaluation strategies.

Furthermore, constructivism supports the use of evaluative tools such as the CRAAP technique and similar frameworks, as these encourage learners to actively assess the credibility, accuracy, and purpose of information. Cognitive dual-processing theory also contributes to this framework by explaining how both intuitive and analytical thinking influence the students' interpretation and judgment of information, highlighting the importance of strengthening deliberate, critical evaluation.

Together, these theories strengthen the study's objectives, which are to analyze how learners evaluate online climate misinformation, examine how they apply the CRAAP technique, and develop an improved, student-centered framework for misinformation

detection that addresses both existing student practices and the identified limitations of CRAAP.

The figure that follows illustrates the interaction of these theories, showing how information literacy, constructivism, inoculation, and cognitive dual-processing collectively shape students' strategies in identifying misinformation.

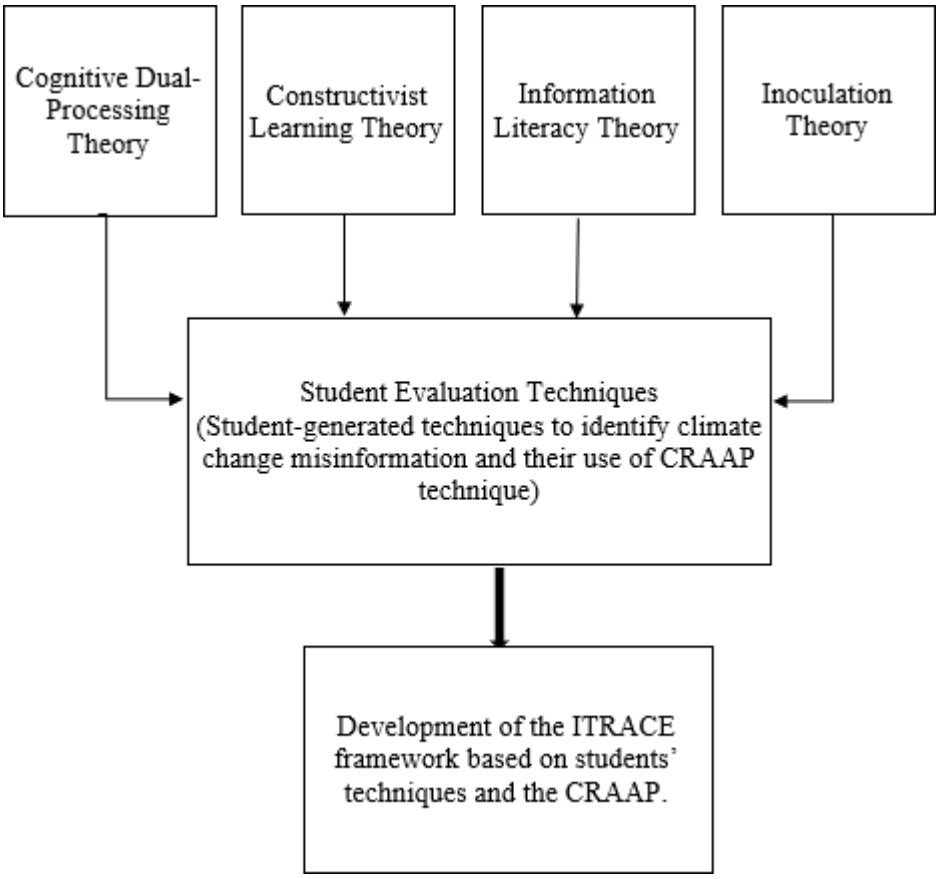

Figure 1. Theoretical Paradigm

Figure 1 presents the study's theoretical paradigm. The paradigm illustrates the integration of various theories, including constructivist learning theory, cognitive dual processing theory, information literacy theory, and inoculation theory. These theories play an important role in explaining how learners evaluate climate change information and develop resistance to misinformation. Constructivist theory explains how students build understanding through tasks, a student-centered approach. Meanwhile, the cognitive dual-processing theory explains how students vary in their evaluation and identification strategies of misinformation. It emphasizes two ways by which individuals cognitively process information. Firstly, intuitive, fast, automatic, and requires minimal effort or cognitive resources. The second type is reflective, slow, effortful, and controlled, and is characterized by a heavy working memory load and conscious reasoning. Information literacy theory, on the other hand, explains the students' need to effectively identify, evaluate, and use information and misinformation. Finally, the theory of inoculation explains that students' exposure to misinformation can reduce their susceptibility and rather enhance their resistance to misinformation.

These theories support students' process of evaluating misinformation, where they employ their own techniques and use the CRAAP framework. These theories explain the students' basis for identifying misinformation. The students' evaluation using their own techniques and a structured framework leads to an

understanding of the limitations of both their strategies and the CRAAP. This leads to the development of a new framework, at the bottom of the paradigm, representing the product of the study, which shall guide the students in identifying misinformation about climate change online.

Conceptual Framework

This section of the study is anchored on the different variables implied through the research questions, including how the students identify climate change misinformation without using any structured or developed techniques or frameworks that can guide them with such things, and how the students discern misinformation with the use of a structured framework, which is the CRAAP technique. Most importantly, it is also anchored in the aim of developing a more up-to-date and suitable technique for evaluating the credibility and reliability of information that can guide the students in becoming more critical thinkers, especially online.

The students are the center of this study as they are the source of the data to be analyzed. Three key elements surround and interact with the students: the climate change concern this study is centered on, the students' techniques in identifying misinformation, and their use of the CRAAP technique in identifying misinformation.

Climate change is a global concern the study seeks to help address it through students' responses. The responses gathered from the students are their techniques in identifying misinformation on climate change and their application of the CRAAP. The data involved students' existing ability to identify climate change misinformation without a structured framework. Their responses were analyzed and compared to the way they identify misinformation in climate change, as they employ a structured framework, specifically the CRAAP. Their responses to these elements were analyzed, including the types of climate-related misinformation they commonly encounter and the challenges or gaps they encountered when evaluating climate change misinformation.

In addition, it aligns with how the students employed the CRAAP technique to identify climate change misinformation. The students assessed the information based on its currency, relevance, authority, accuracy, and purpose as introduced by Blakeslee (2004). The results of the assessment activity, including the analyzed techniques, the misinterpretations or the errors in the evaluation, and the difficulties encountered in the evaluation and identification process, helped the researcher determine the limitations of the CRAAP as well as the students' own techniques. These factors served as the basis for the researcher's development of a new and improved framework for discerning climate change misinformation.

The output in this study involves the features needed for a new and improved framework. The new and improved climate change misinformation evaluation technique will be based on the common errors identified from the students' evaluation and identification process, the strengths and weaknesses of the CRAAP technique, and the learners' own techniques for identifying climate change misinformation. This led the researcher to the ITRACE framework, which is a mnemonic for its component criteria: Intentions, Timeliness, Reliability, Appearance, Content Quality, and Evidence.

Materials and Methods

This chapter presents the methods, instruments, and procedures used in the study, which aims to develop a new or improved method that can help students discern climate change misinformation through the lens of the CRAAP framework.

Research Design

This study employed a qualitative research design with a developmental component. This was appropriate for exploring how the students identify climate change misinformation, how they use the CRAAP framework to evaluate climate change information, and how these inputs can be used and be integrated into the new and improved evaluation framework for climate change misinformation.

The qualitative approach, was specifically conducted through individual oral interviews of students, aimed to capture how they evaluate information, their reasoning patterns, and

decision-making strategies when they encounter online climate change misinformation. While the developmental component was utilized to support the third research question, which sought to develop a framework for discerning climate change misinformation from factual information, that was grounded from empirical findings and previous frameworks.

Participants

The participants of the study were composed of Junior High School and Senior High School students enrolled in Cabitan National High School, in the school year 2025-2026. The participants were chosen through purposive sampling based on the criterion that they should be regular users of digital media and are familiar with evaluation tasks. The number of participants depended on the responses acquired by the researcher. The principle of data saturation was applied in the study, wherein data collection stops when the researcher could not yield new themes, insights, or observations from new interviews. The researcher gathered data from 10 participants, who gave responses appropriate for the study. Confidentiality of the participants was ensured by giving them pseudonyms, which were used to represent each of their responses throughout this study.

Sample and Sampling Techniques

In this study, the researcher used a purposive sampling method in choosing students who became part of the data gathering. Purposive sampling method, specifically criterion sampling, ensured that the students who participated were regular users of digital media, were exposed to online climate change misinformation, and were familiar with research or evaluation tasks.

Research Instrument Used

This study utilized the following instruments to ensure the validity and reliability of the results. First, a climate change information evaluation material, which was a set of online climate change texts, images, and posts, which include scientifically accurate information and climate change misinformation.

Second, a CRAAP-based evaluation guide, which was adapted from the CRAAP framework developed by S. Blakeslee (2004). The questions were used by the researcher to ask the students how they employ each of the components of the framework to assess the information. Lastly, a semi-structured interview approach was used to gain an in-depth understanding of how students identified misinformation about climate change, how they applied the CRAAP technique, and the limitations or difficulties participants have encountered during the evaluation process. Ruslin et al. (2022) described semi-structured interviews as more powerful than other types of interviews for qualitative study, and that they allow flexibility and adaptability for researchers to hold their tracks as compared to unstructured interviews. Semi-structured interviews allow researchers to acquire deeper information and evidence from the respondents.

Data Gathering Procedure

The study followed the following steps for a valid and reliable collection of data from the participants.

Clearance and Approval. The researcher sought clearance to proceed from the panelist and research adviser before seeking permission from the Schools Division Superintendent. The researcher proceeded, finally, to seek the approval of the School Head to conduct a study involving the students of Cabitan National High School.

Orientation and Initial Evaluation. The respondents oriented the participants on the purpose of the study, as well as its ethical considerations. Along with this, they also evaluated the climate change materials without the CRAAP technique. Their responses and strategies on how they identified misinformation will be documented or recorded.

Application of the CRAAP Technique. The CRAAP was introduced and explained to the respondents. Afterwards, they evaluated the climate change materials again using the CRAAP criteria. Using the CRAAP questionnaire that the students were allowed to read, they shared their ideas on how they identified climate change misinformation presented to them.

Synthesis and Framework Development. The researcher conducted a semi-structured interview approach with the respondents to gather and have a deeper understanding of their responses. Afterwards, the data gathered were analyzed through thematic analysis, which led to the identification of students' techniques, the limitations of the CRAAP, and the development of the new framework.

Data Analysis

The study employed thematic analysis to analyze the written responses and transcripts. The data were coded to identify the strategies used by the students to identify climate change misinformation, how they employed the CRAAP criteria in the evaluation process, and the limitations they encountered while using the CRAAP criteria to evaluate the climate change content. The results of the data analysis was synthesized to help the researcher develop a new and improved framework for evaluating climate change misinformation.

Ethical Considerations

To ensure ethical standards in both the instruments and data collection, the researcher adapted and modified interview guide questions from published studies and used climate change content aligned with the Department of Education's learning competencies. Informed consent was obtained from all participants, outlining the study's purpose, procedures, risks, benefits, and confidentiality. Participants were also debriefed after the interview and informed that the materials used were solely for research purposes and not intended to promote any presented information or misinformation.

Limitations of the Study

The study utilized a qualitative design to develop the ITRACE framework based on the experiences of learners with digital media. Its limitations include its scope and validity. The study focused on one school, which restricted the generalizability to a broader student population and other educational contexts. The gathered information was limited, and thus were the results, since other learners from different schools or districts could have information that was unrepresented in this study. Additionally, the validity and effectiveness of the framework were not tested empirically in this study. Its potential impacts, especially on the students' critical thinking skills and other cognition-related skills, or its effects compared to other known frameworks and established strategies, were not explored further nor verified.

Conclusion

The conclusion of this study is based on the findings, addressing the research questions. The conclusions are as follows:

1. This demonstrates that students use a range of strategies in identifying climate change-related misinformation. Students tend to combine these techniques, from source evaluation and cross-verification to social verification and personal knowledge. This demonstrates the students' critical engagement with information rather than passive consumption. Such practices suggest that the students possess a functional level of digital information literacy, evident in their awareness of the common indicators of credibility and verification techniques. However, the students' reliance on certain heuristics, such as the comment section and popularity metrics, also suggests they may remain susceptible to socially reinforced misinformation, underscoring the need to strengthen their critical evaluation skills and deepen their scientific understanding to support their judgment.
2. It is revealed, in general, that the CRAAP components align with the students' techniques used when identifying climate change misinformation. These associations indicate that the students intuitively possess misinformation evaluation strategies, particularly for authority, currency, and accuracy. However, their limited use of the information's purpose and relevance in the CRAAP suggests a gap in their evaluation process, as they are less attentive to important elements like the hidden intent and contextual applications of the information.
3. The ITRACE framework represents a logical advancement from students' existing evaluative methods, addressing gaps in

their use of the CRAAP, especially in applying 'purpose' and 'relevance'. It provides a student-centered approach to misinformation detection. Its components, including Intention and Content Quality, also make evaluation criteria more understandable. This alignment improves consistency and accuracy in evaluating climate change information while reinforcing digital media and climate literacy.

Recommendations

Based on the finding and conclusions of the study, the following recommendations are formulated:

1. The conclusions suggest that the students possess a functional level of media and information literacy, but show limitations in their method of relying on certain heuristics. The study therefore recommends that students strengthen their media and information literacy by using structured frameworks for climate change misinformation, such as ITRACE.
2. The students have an intuitive strategy for evaluating misinformation. However, their limited consideration of the information's purpose and relevance reveals a gap in their techniques. This suggests that their critical evaluation strategies, though functional, remain incomplete. Therefore, the researcher recommends that teachers and curriculum developers strengthen students' understanding and application of purpose and relevance by using climate-specific and student-appropriate frameworks, like ITRACE.
3. The ITRACE was grounded in the students' existing techniques and use of CRAAP for climate change misinformation detection. Despite the improvements developed from these strategies and their limitations, the framework may lack validity if its applications are not studied further. Therefore, the researcher recommends that future research be conducted to study and strengthen the evidence for the new framework developed through this study and explore its broader pedagogical and practical applications.
4. The study has limited respondents and scope. Therefore, the researcher recommends that the ITRACE be validated across a more diverse and larger student population, including different regions, grade levels, socioeconomic contexts, and school types, to establish its generalizability and strength.
5. Quasi-experimental or mixed-method studies can also be conducted, comparing the ITRACE-based instruction with another method, such as traditional digital and information literacy lessons, through pre- and post-tests.

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