

AN ANALYSIS OF THE RELEVANCE OF SCIENCE WRITING, LEVEL OF SCIENCE POPULARIZATION, AND PREFERENCES IN SCIENCE ISSUES AND MEDIA: BASIS FOR INSTITUTIONALIZATION OF SCIENCE COMMUNICATION IN USTP

John David O Moncada,* Angeli Pizarro-Monsanto

University of Science and Technology of Southern Philippines

C.M. Recto Avenue, Lapasan, Cagayan de Oro City, Philippines

*Correspondence: E-mail address: johndavid.moncada@ustp.edu.ph | +639177708674

ABSTRACT. Science communication is communicating scientific knowledge in a manner that is understandable, accessible, and usable to the non-expert. Communicating its importance in the university can be a challenge. This research study establishes the relevance of science writing as a form of science communication to USTP, assesses the level of science popularization based on science-related articles written and published by USTP; and looks into the preferences of students in science issues, media, and format. This descriptive research study used a proportional stratified random sampling technique. It used a validated, researcher-made survey questionnaire. Data analysis was done using descriptive statistics. Results showed that science writing is relevant to USTP as a research and innovation-oriented university. Science is popular based on science-related articles previously written and published by USTP. The articles are perceived to be incomplete in information and are not easily accessible though. Students are most interested to read about climate change and prefer social media as a platform and video as a format for science communication. The pieces of evidence gathered provide awareness for the policy-makers in the university of the relevance of science communication, underscore the need to improve science writing in the university and provide ideas in terms of issues and media preferences for better engagement with students. A similar study may be conducted that is aimed at looking into science communication activities, especially on social media, of researchers and scientists in USTP, and at gauging their competency in science writing.

Keywords: Science communication, science writing, institutionalization, media and technology, descriptive research

1. INTRODUCTION:

Science communication is the popularization of science in a manner that is understandable, accessible, and usable to non-experts [1] [2] [3]. Science communication approach is diverse [4]. One of the forms of science communication is science writing. Science communication belongs to and is an important enterprise for educational institutions [5] [6]. Faculty members are mandated to communicate science [7].

The 3rd quarter cluster coordination meeting where USTP was a participant last August 4, 2022, initiated by the Northern Mindanao Consortium for Agriculture, Aquatic, and Natural Resources Research and Development underscored the need to institutionalize science communication.

But influencing policy-makers in the academe, such as USTP, about the importance of the practice of science communication like science writing can be a challenge [8]. Science-related write-ups in the form of science articles are being published but not regularly. These are written by the Strategic Communication Office and by The Trailblazer student publication of USTP whose mandate does not include communication of science.

Against this background, this research study was conducted to create awareness of the relevance of science writing as a form of science communication to USTP; to evaluate the level of science popularization in the university based on the written science-related articles published by the university; and to know the preferences of the students who are the university's primary stakeholders in terms of science issues, media, and media format. This investigation was conducted in the light of Space For Science that the researcher would like to propose to be the institutional unit in charge of science writing as a form of science communication in USTP. This was presented by the researcher during his participation in the 2021 Study of the US Institute for Scholars in Journalism, Technology, and Democracy.

To institutionalize science writing through Space For Science in USTP means that science communication will become an integral and sustainable part of, and standard practice [10] in the university. It will streamline and consolidate the writing and publishing of science-related articles and will drive improvement of the science-writing skills of scientists and researchers in USTP, which may then attract more research funding [11].

2. METHODOLOGY:

2.1 Research Design

The research design of this study was descriptive. It used a quantitative method to describe the relevance of science writing as a form of science communication to the University of Science and Technology of Southern Philippines (USTP) and to developing its culture of research and innovation; the level of science popularization based on the written science-related articles the respondents have read which were written and published by USTP; and the preferences of the respondents in terms of science issue, media, and media format.

2.2 Research Setting

The research study was conducted on USTP Cagayan de Oro (CDO) campus. It is one of the two major campuses of the university. The other one is USTP Claveria. USTP has five satellite campuses, namely USTP Balubal, Jasaan, Oroquieta, Panaon, and Villanueva. Its major campus is located in Alubijid.

The Republic Act 10919 established USTP on August 16, 2016. Its vision is to be a nationally recognized science and technology university providing the vital link between education and the economy. Its mission includes bringing the world of work into the actual higher education and training of students; offering entrepreneurs the opportunity to maximize their business potentials through a gamut of services from product conceptualization to commercialization; and

contributing significantly to the National Development Goals of food security and safety, and energy sufficiency and security through technology solutions.

In its commitment to nurturing science, USTP ranked 29th among the universities in the Philippines for 2022 based on the Alper-Doger Scientific Index. The index is a ranking and analysis system that is based on scientific performance and the added value of the scientific productivity of scientists. The President of the USTP System himself, Dr. Ambrosio Cultura, II during the conduct of this research study, is one of the recognized researchers and scientists of the university.

2.3 Respondents

The respondents of the research study, table 1, were

undergraduate students of the USTP CDO campus enrolled in the second semester of the Academic Year 2021-2022. 335 students participated in this research study. As stated in the Quality Policy of USTP, the students are the primary customers of the university. Students are considered full citizens, and not merely budding citizens. Like adults for that matter, students acquire the capacity for reflection, critical thinking, and decision-making, and foster moral and ethical development through opportunities to become involved as active citizens [12]. Students are more convinced of the need to take part in policy-making, believing that decisions should not be monopolized by experts and political actors [9]. Allowing students to participate in decision-making is a testament to good development [10].

Table 1. Distribution of Respondents Per Program Per College

Course/Program	Frequency	Percent
College of Engineering and Architecture		
BS in Architecture	18	5.4
BS in Civil Engineering	21	6.3
BS in Electronics Engineering	9	2.7
BS in Electrical Engineering	8	2.4
BS in Computer Engineering	30	9.0
BS in Mechanical Engineering	5	1.5
Total	91	27.3
College of Information Technology and Computing		
BS in Data Science	4	1.2
BS in TCM	60	17.9
BS in IT	41	12.2
Total	105	31.3
College of Technology		
BS in Electronics Technology (ES, MST, TN)		45
BS in Energy Systems Management (EMCM, PSDE)	1	0.3
BS in Autotronics	5	1.5
BS in Electro-Mechanical Technology MR	1.	0.3
Total	52..	15.5
College of Science and Mathematics		
BS in Environmental Science (EMT, NRM)	11.	3.3
BS in Chemistry	10	3
BS in Applied Mathematics	6..	1.8
Total	27	8.1
College of Science and Technology Education		
BS in Secondary Education (Math, Science)	29	8.7
Bachelor in Technology and Livelihood Education (HE, Industrial Arts)	31..	9.3
Total	60	18
Overall Total	335	100.0

2.4 Instrumentation

This research study used a researcher-made questionnaire to answer the research questions. This instrument was duly validated by experts in the field of environmental communication, media, and research.

To create awareness among the policy-makers in the university of the relevance of science writing as a form of science communication in the light of institutionalizing it, the respondents were asked in the survey questionnaire of their perception of how relevant science writing is as a form of science communication to USTP, and as well as its relevance to developing a culture of research and innovation in the university. To plant the idea of evidence that will drive improvement of science writing as a form of science communication in USTP, the respondents were asked if they have read or not a science-related article written by USTP and published on any of its platforms; their reasons for reading and not reading; and their general assessment of the level of science popularization through the articles they have read. Lastly, the respondents were asked about their preferences in terms of a science issue, media, and media format.

A scoring of 1, 2, 3, 4, and 5 was assigned for the Likert scale Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree, respectively, for survey questions that address research questions 5, 6, and 7.

2.5 Sampling Technique

This research study used the proportional stratified random sampling technique. In the proportionate stratified method, the sample size of each stratum is proportionate to the population size of the stratum. The stratum in this research study is the undergraduate course programs in each of the five colleges on the USTP CDO campus. There are 31 Bachelor of Science programs on the USTP CDO campus. The total population size is 11,571.

With a confidence level of 95% and a margin error of 5%, the researcher has to obtain a total sample size of 372 USTP CDO undergraduate students. The proportionate stratified random sample is obtained using the formula: *Sample size / Population Size X Stratum Size*. After the strata sample size was known, the researcher performed simple random sampling in each stratum to select the survey participants.

Getting the response of the students to this study which was undertaken during the pandemic was a challenge. And because of time constraints, adjustments to the number of respondents per program per college and its distribution were made. This was done in consultation with the data analyst from the College of Science and Mathematics on the USTP CDO campus. In the end, 335 students participated as respondents in this study.

2.6 Data Gathering Procedure

For an efficient gathering of data, the researcher sought endorsement from the office of the Vice Chancellor for Academic Affairs (VCAA). The approval was then cascaded to the deans of the colleges, and the chairpersons of the programs under each college. After securing endorsement, the researcher surveyed online using Google Forms. The form was channeled through each of the chairpersons of the course program. Later on, in the interest of time, the link to the form was sent to members of the faculty per department, and student organizations through the Office of Student Affairs. The form was also posted on Facebook public groups linked to the university. The researcher surveyed from March to June 2022. A focus group discussion was conducted to triangulate the results of the survey.

2.7 Data Analysis

Questionnaire data analysis using descriptive statistics was used to analyze the students’ responses to the questions. To answer research question 3, a thematic analysis was conducted based on the answers of the participants during the focus group discussion.

Statistical Treatment

The data collected was analyzed using descriptive statistics which includes frequency, percentage, and mean to identify the relevance of science writing as a form of science communication to USTP and to developing its culture of research and innovation; the level of science popularization based on the written science-related articles the respondents have read which were written and published by USTP; and the preferences of the respondents in terms of a science issue, media, and media format.

3. RESULTS AND DISCUSSION

In this study, 335 students from the USTP CDO campus participated as respondents. These students were enrolled across the five colleges on the said campus during the second semester of AY 2021-22. Most of the respondents are from the College of Information Technology and Computing (31.3%), in their first year of college (34.9%), females (67.5%), and 21 years old and above in age (47.5%).

Problem 1 *How relevant is science communication in the form of science writing to*

- a) *USTP?*
- b) *Developing a culture of research and innovation in USTP?*

table 2

Table 2. Level of Relevance of Science Writing As A Form of Science Communication To USTP

Mean	Standard Deviation	Descriptive Equivalent	Interpretation
1.92	1.002	Agree	Relevant

With a mean of 1.92, science writing as a form of science communication is relevant to USTP is relevant, table 3. The fact that the research study was conducted at the time of the pandemic COVID-19 could have affected the perception of the students as to the importance of communicating science. The pandemic has called for science, technology, and innovation (STI) to provide solutions [13]. The general public wants to

know how new scientific findings may impact their lives [14]. A participant in the focus group discussion (FGD) said that science writing informs students like her about important science issues, such as climate change (Janelle May N. Salar, 4th Year, COT). In addition, another participant said that science writing is relevant to USTP because science is the focus of the university; it is its identity. Science

communication in the university may do the institution good in terms of bringing the scientists closer to the students, especially since there is less interest in interacting with them [15], and in encouraging the students to pursue a career related to science [16].

Table 3. Level Of Relevance Of Science Writing As A Form Of Science Communication To Developing A Culture Of Research And Innovation In USTP

Indicator	Mean	Standard Deviation	Descriptive Equivalent	Interpretation
Developing empathy in me	2.21	0.830	Agree	Relevant
Finding a research problem I could investigate on	2.04	0.814	Agree	Relevant
Inspiring me to take a risk in my academic and future career endeavors	2.05	0.876	Agree	Relevant
Making me observant of my surroundings	1.84	0.843	Agree	Relevant
Making me an innovative person	1.90	0.846	Agree	Relevant
Making me a resilient person	2.01	0.841	Agree	Relevant
Turning myself to become a reflective and curious person	1.93	0.848	Agree	Relevant
Making me a prudent person	2.15	0.849	Agree	Relevant
Developing in me a high tolerance for healthy criticism	1.93	0.790	Agree	Relevant
Developing intellectual honesty in me	1.89	0.791	Agree	Relevant
Overall	1.99	0.840	Agree	Relevant

With a mean of 1.99, the respondents agreed that science writing as a form of science communication is relevant to developing a culture of research and innovation in USTP, Table 3. Science has a social value [17] and its communication of it inspires solutions to social problems. The communication of science creates conversations that could lead to knowledge creation [18]. This was pointed out by one of the participants of the FGD when he said that science writing can provide interaction between students and professors for the exchange of ideas about solutions (Monty Sevilla, 3rd Year, CITC). This is especially true in the academe context. Science writing creates an environment that influences students to become researchers and innovators. It makes them observant which is an important characteristic of a researcher and an innovator. Another participant in the FGD said that researchers in the university can maximize the space given to them by sharing their findings, which may then be a helpful reference for

students (Janelle May N. Salar, 4th Year, COT). It may prompt students to do further research. In addition, writing about scientific research studies may foster cross-sector collaboration in research. And from the point of view of a participant in the FGD, science writing benefits stakeholders of research and innovation (Mary Angelyn T Miguel, 3rd Year, CSM). It is also interesting to note that students agreed that science communication develops in them intellectual honesty. This refers to the commitment to search for the truth by examining evidence and thinking rationally. Countering the lie as an aim is very true, especially for male science communicators [16].

Problem 2 *To what extent is the USTP student population engaged in reading science-related articles written and published by USTP on any of its platforms?*
table4

Table 4. Number of Students Who Have Read And Have Not Read Science-Related Articles Written And Published By USTP

Response	Frequency	Percent
Yes	108	32.2
Not Sure	0	0.0
No	227	67.8
Total	335	100.0

The majority of the respondents (67.8%) have not read a science-related article written and published by USTP. Only 32% of them have read a science-related article written and published by USTP. This may imply among the majority of the respondents that they either lack interest to read science-related articles or they lack access to the media platform, such

as social media on the Internet, where these articles can be found. This was agreed on by several participants to the FGD (Apphole Kyrl Engaño Pepania, 4th Year, CITC; Kathleen Andrea T. Igtos, 3rd Year, CSM). Although there was an increase in the use of social media during the pandemic [19], slow internet connectivity could have hampered interest to

read science-related articles on the Internet. It could also be that these respondents do not know that USTP writes and publish science-related articles. This was attested by participants to the FGD (Janelle May N. Salar, 4th Year, COT; Mary Angelyn T Miguel, 3rd Year, CSM)

Problem 3 *Why did the respondents read a science-related article?*

Five themes emerged after an analysis was conducted. These are the following:

1. For compliance

Students may do it as a requirement or for compliance but it may encourage the students to pursue a career related to science [16].

2. For reference

Students may use the content of the science-related article as a reference for their research so that they will be informed (Kathleen Andrea T. Igtos, 3rd Year, CSM).

3. Curiosity

USTP students are curious about science. This suggests that they are interested in science. Indicative of the interest of students in science and technology is the fact that many Filipino students took up STEM tracks in senior high school that are preparatory to science and technology programs in

college [20].

4. Peer influence

One participant in the FGD said that these students may be surrounded on social media by people who are interested in science (Janelle May N. Salar, 4th Year, COT). Another one said that they may be connected with somebody who writes science-related articles (Mary Angelyn T Miguel, 3rd Year, CSM).

5. Knowledge development

The communication of science creates conversations that could lead to knowledge creation [18]. This is especially true in the academe context. Science communication in the university may do the institution good in terms of bringing the scientists closer to the students, especially since there is less interest in interacting with them [15].

Problem 4 *What is the respondent’s general assessment of the level of science popularization in USTP based on the science-related articles they have read in terms of*

- a. *Understandability?*
- b. *Accessibility?*
- c. *Usability?*

table 5

Table 5. General Assessment on the Level of Science Popularization In USTP Based on Science-Related Articles Written and Published By USTP

Indicators	Mean	Standard Deviation	Descriptive Equivalent	Interpretation
<i>Understandability</i>				
The information in the science article that I read was complete.	2.52	0.993	Neutral	Neutral
The science article I have read explained the science thoroughly.	2.46	0.985	Agree	Popular
<i>Accessibility</i>				
It was easy for me to access the science article.	2.53	0.983	Neutral	Neutral
<i>Usability</i>				
I find the science article I have read very useful to me as a student.	2.39	0.997	Agree	Popular
I find the science article that I have read useful for my future career plan.	2.45	0.916	Agree	Popular
Overall	2.47	0.974	Agree	Popular

The respondents who have read a science-related article by USTP agreed on three of the five indicators and were neutral with the other two. In general, the respondents agreed on these indicators which mean that science based on science-related articles is popular. The results show that the science-related articles written and published by USTP that the respondents have read may not be entirely complete in facts and information and are not easily accessible. This supports the research study of Olesk [21], and Navarro and McKinnon [7]. Science-related articles have to be comprehensive and from different views [22]. The inclusion of different opinions and views marks science communication as different from a press

release [23]. Participants to the FGD said that the writer may not have researched well or that he or she is not an expert (Janelle May N. Salar, 4th Year, COT; Mary Angelyn T Miguel, 3rd Year, CSM; Apphole Kyril Engaño Pepania, 4th Year, CITC); the writer may have not updated his or her article (Kathleen Andrea T. Igtos, 3rd Year, CSM); resources of information may be lacking (Janelle May N. Salar, 4th Year, COT); some information may be confidential (Futz M. Yacapin, 4th Year, COT); or simply they are unmotivated (Apphole Kyril Engaño Pepania, 4th Year, CITC).

Problem 5 *What are the preferences of the respondents in terms of*

- a. *Science-related issues*
- b. *Medium*
- c. *Media format?, table 6*

Table 6. Science-Related Issues that USTP Students Find Interesting to Read

Indicator	Mean	Standard Deviation	Descriptive Equivalent
Effectivity of vaccines against diseases	2.08	1.013	Agree
Supply of renewable/cleaner energy	1.89	0.971	Agree
Use of robotics and/or artificial intelligence	2.05	1.062	Agree
Reduction of poverty	2.04	1.012	Agree
Growth of population	2.06	0.998	Agree
Supply and access to clean and drinking water	1.93	1.080	Agree
Installment of sanitation facilities	1.88	1.050	Agree
Securing food and having good nutrition	1.89	1.053	Agree
Threat of plastics	1.92	1.055	Agree
Proper disposal and segregation of waste	1.75	1.092	Agree
Protection of forests	1.75	0.893	Agree
Commitment to climate change	1.72	0.922	Agree
Overall	1.91	1.024	Agree

The respondents agreed that they are interested to read all of the twelve current science-related issues, individually and generally. Among these science-related issues, many of the respondents are interested to read about climate change and the commitment of concerned parties to addressing it (1.72). This confirms Schäfer [24], Lörcher and Taddicken [25], and the 2021 Asian Media and Information Centre annual conference on science communication where climate change was said to be the most talked-about issue these days. There is an opportunity for USTP to contribute to the discussion on climate change as there are a few communicators who do so [26]. Inciting negative affect may be an effective strategy to keep the conversation about climate change going [27]. When

USTP will do so, the institution may earn the public's epistemic and moral trust [28]. During the FGD, participants said that students are interested because they want to understand climate change (Kathleen Andrea T. Igtos, 3rd Year, CSM). Climate change is real. It is an alarming issue (Mary Angelyn T Miguel, 3rd Year, CSM). And people have suffered consequences like flooding, which is true in the USTP area (Monty Sevellena, 3rd Year, CITC). Students have to take action (Art Rally Lira, 3rd year, CITC) before losing the beautiful earth they live in (Janelle May N. Salar, 4th Year, COT). It is innate for students to take care of the world (Janelle May N. Salar, 4th Year, COT).

Table 7. Medium Through Which USTP Students Would Like To Access Science-Related Articles

Online Media	Mean	Standard Deviation	Descriptive Equivalent
Website	2.07	0.987	Agree
Blog	2.28	1.047	Agree
Social Media	1.96	1.026	Agree
Podcast	2.33	1.004	Agree
Online Newspaper	2.51	1.006	Neutral
Overall	2.23	1.032	Agree
Traditional Media	Mean	Standard Deviation	Descriptive Equivalent
Television	2.15	1.114	Agree
Radio	2.56	1.033	Neutral
Print	2.31	1.063	Agree
Overall	2.34	1.083	Agree

The respondents agreed that they prefer to access science-related articles through online media. Social media is the most preferred among online media (1.96). This confirms Weitkamp et al [26] and Carreño-Márquez and Cereceres-Aguirre [4]. Participants in the FGD said that online media is where everybody is; it has a wider reach (Monty Sevilla, 3rd Year, CITC) compared to television; it provides easy access (Mary Angelyn T Miguel, 3rd Year, CSM) to a lot of information (Kathleen Andrea T. Igtos, 3rd Year, CSM). Moreover, the respondents also agreed

that they prefer to access science-related articles through traditional media. Television is the most preferred among traditional media (2.15). However, the study of López-Pérez and Olvera Lobo [29] said that either online or traditional media can be used. One participant in the FGD said that it depends on the status of the students. But these two can be used (Futz M. Yacapin, 4th Year, COT). The strategy is to go where the audience is for engagement and to better understand its primary customers [30].

Table 8. Media Format Of A Science-Related Article Preferred By USTP Students

Media Format	Mean	Standard Deviation	Descriptive Equivalent
Photos	1.75	1.107	Agree
Videos	1.66	0.934	Agree
Infographics	1.74	0.941	Agree
Illustrations	1.75	0.975	Agree
Music and Sounds	2.01	1.050	Agree
GIF	2.24	1.052	Agree
360° photos	1.94	1.101	Agree
Overall	1.87	1.041	Agree

Although the respondents agreed to all of these media formats, in general, they have a high preference for the video format (1.66). It is then followed by infographics (1.74), and by photos and illustrations (1.75). Videos can either be for television or on the Internet. The one for the latter engages the public more than the one for the former [31]. Image, textual content, length, and colors are taken into account for these are variables for audience engagement [32, 33]. More readers and commenters on social media accounts may be engaged just like what Pflugfelder & Mahmoud-Werndli [34] has observed in their study of The New Reddit Journal of Science if the media and format preferences of the primary customers and the careful use of humor as a strategy [34-37] will be used. The participants in the FGD believe that the learning style of the students requires them to see and hear (Kathleen Andrea T. Igtos, 3rd Year, CSM). They consider video as colorful, interactive (Kathleen Andrea T. Igtos, 3rd Year, CSM), and fun (Janelle May N. Salar, 4th Year, COT). It is entertaining (Mary Angelyn T Miguel, 3rd Year, CSM). If a piece of scientific information requires a demonstration of procedure (Futz M. Yacapin, 4th Year, COT), the video is the perfect format for it because it captures details. It also has the advantage of being replayed (Art Rally Lira, 3rd year, CITC).

3. SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Communicating the importance of science communication in the academe can be a challenge. To address this challenge, this research study primarily aimed at creating awareness for the policy-makers in USTP by establishing the relevance of science writing as a form of science communication in light of the bigger picture of institutionalizing it. In addition, it aimed at planting another idea of evidence that will drive improvement in writing about science by assessing through recall the level of science popularization based on the science-related articles that have been previously written and published by USTP read by the respondents; and lastly, by looking into the preferences of USTP students in CDO campus as the primary audience of science communication in terms of science issues, media, and media format. Communicating

science should not just be about making science accessible to the public but as well as basing it on pieces of evidence. This research study used a proportional stratified sampling technique, treated the data using descriptive statistics, and analyzed themes based on the focus group discussion.

The results gathered through an online survey show that science writing as a form of science communication is relevant to USTP as an academic institution. It is also perceived to be relevant to developing a culture of research and innovation in the university. Science-related articles written and published by USTP are considered to be popular and can be improved in terms of giving complete information and making these articles accessible to students. But the majority of the respondents have not read science-related articles written and published by USTP. Science issues-wise, the students said that they are interested to read about climate change and with a preference for social media as a platform, and video as a media format.

The condition of the time – particularly COVID 19 could have strongly influenced the perception of the respondents on the relevance of science writing as a form of science communication, especially for a science institution such as USTP. Science writing can be a powerful medium that shapes the behavior of the respondents turning them into researchers and innovators. Although only a minority of the respondents have read science-related articles either because of Internet connectivity issues or a lack of promotion of these science writings, the interest among respondents is there and tells that they are updated with current science-related social issues, especially with climate change and the commitment of the concerned parties to address it, which is a very important issue at present. One of the parties is the academe, such as USTP. USTP can capitalize on this interest of the students – the primary customer of the university – with the hope of reaching more students as the audience of its science communication efforts. There is an opportunity for USTP to participate and stir up scientific conversations through science writing such as climate change, especially that according to literature, researchers and scientists from the academe are seen to be

more credible than anyone else like science journalists, public relations officers, or politicians in terms of communicating science. Contributing to the conversation may lead to earning the trust of the students and the general public.

But USTP has to improve its knowledge management to grow its readers of science writing. It can improve the way these articles are written, especially in the area of conveying complete information. It can also improve and expand its communication infrastructure to aid its students in accessing its science-related articles either through new media, such as the social media, or old media, like television; and has to consistently promote these articles, which can be through an institutionalized unit in science communication, like the Space for Science.

An output of this study can be a proposal to institutionalize science writing as a form of science communication in USTP. A research study similar to this can be conducted with researchers and scientists in USTP as respondents that will look into their science communication activities, especially on social media, and will gauge their competency in science writing.

4. REFERENCES

- [1] Editors. Book Notice: Communicating Science: A Global Perspective. *New Zealand Science Review* 2022,76(3),84. <https://doi.org/10.26686/nzsr.v76i3.7822>.
- [2] Scharrer, L.; Rупieper, Y.; Stadler, M.; Bromme, R. When Science Becomes Too Easy: Science Popularization Inclines Laypeople to Underrate Their Dependence on Experts. *Public Understanding of Science* 2016, 26 (8), 1003–1018. <https://doi.org/10.1177/0963662516680311>.
- [3] Burns, T. W.; O'Connor, D. J.; Stocklmayer, S. M. Science Communication: A Contemporary Definition. *Public Understanding of Science* 2003, 12 (2), 183–202. <https://doi.org/10.1177/09636625030122004>.
- [4] Carreño-Márquez, I. J. A.; Cereceres-Aguirre, M. A. Experiencing Science Communication from a Local Perspective: An Analysis of the Volunteer SciCom Groups in Chihuahua, Mexico. *Journal of Science Communication* 2022, 21 (03), A06. <https://doi.org/10.22323/2.21030206>.
- [5] Geng, Y.; Yan, Y. Higher Education and Science Popularization: Can They Achieve Coordinated Growth? *PLOS ONE* 2021, 16 (9), e0256612. <https://doi.org/10.1371/journal.pone.0256612>.
- [6] Trench, B. Universities, Science Communication and Professionalism. *Journal of Science Communication* 2017, 16 (05). <https://doi.org/10.22323/2.16050302>.
- [7] Navarro, K.; McKinnon, M. Challenges of Communicating Science: Perspectives from the Philippines. *Journal of Science Communication* 2020, 19 (01). <https://doi.org/10.22323/2.19010203>.
- [8] Jensen, E. A.; Gerber, A. Evidence-Based Science Communication. *Frontiers in Communication* 2020, 4. <https://doi.org/10.3389/fcomm.2019.00078>.
- [9] Cornali, F.; Pomatto, G.; Agnella, S. Deliberating Science in Italian High School. The Case of the Scienza Attiva Project. *Journal of Science Communication* 2017, 16 (01), A02. <https://doi.org/10.22323/2.16010202>.
- [10] Abrahamsson, B. Book Reviews: Carol H. Weiss and Allen H. Barton (Eds.): *Making Bureaucracies Work* 1980, Beverly Hills and London: Sage. 310 Pages. Robert K. Yin: *Changing Urban Bureaucracies* 1979, Lexington, Mass. And Toronto: Lexington Books. *Organization Studies* 1983, 4 (3), 279–281. <https://doi.org/10.1177/017084068300400306>.
- [11] Entradas, M.; Santos, J. M. Returns of Research Funding Are Maximised in Media Visibility for Excellent Institutes. *Humanities and Social Sciences Communications* 2021, 8 (1). <https://doi.org/10.1057/s41599-021-00884-w>.
- [12] Barrue, C.; Albe, V. Citizenship Education and Socioscientific Issues: Implicit Concept of Citizenship in the Curriculum, Views of French Middle School Teachers. *Science & Education*
- [13] OECD Science, Technology and Innovation Outlook 2021 TIMES of CRISIS and OPPORTUNITY.
- [14] Jucan, M. S.; Jucan, C. N. The Power of Science Communication. *Procedia - Social and Behavioral Sciences* 2014, 149,461–466. <https://doi.org/10.1016/j.sbspro.2014.08.288>
- [15] Taddicken, M.; Wicke, N.; Willems, K. Verständlich Und Kompetent? Eine Echtzeitanalyse Der Wahrnehmung Und Beurteilung von Expert*Innen in Der Wissenschaftskommunikation. *Medien & Kommunikationswissenschaft* 2020, 68 (1- 2), 50–72. <https://doi.org/10.5771/1615-634x-2020-1-2-50>.
- [16] Schmidt, B. M.; Nixon, R. M. Improving Girls' Attitudes towards Science. *Public Understanding of Science* 1996, 5 (3), 255–268. <https://doi.org/10.1088/0963-6625/5/3/005>.
- [17] Menezes, S.; Murray-Johnson, K.; Smith, H.; Trautmann, H.; Azizi, M. Making Science Communication Inclusive: An Exploratory Study of Choices, Challenges and Change Mechanisms in the United States from an Emerging Movement. *Journal of Science Communication* 2022, 21 (05), A03. <https://doi.org/10.22323/2.21050203>.
- [18] Brondi, S.; Pellegrini, G.; Guran, P.; Fero, M.; Rubin, A. Dimensions of Trust in Different Forms of Science Communication: The Role of Information Sources and Channels Used to Acquire Science Knowledge. *Journal of Science Communication* 2021, 20 (3), A08. <https://doi.org/10.22323/2.20030208>.
- [19] Newman, N.; Fletcher, R.; Schulz, A.; Andi, S.; Robertson, C.; Nielsen, R. K. Reuters Institute Digital News Report 2021 10TH EDITION https://reutersinstitute.politics.ox.ac.uk/sites/default/files/202106/Digital_News_Report_2021_FINAL.pdf (accessed 2023 -01 -26).
- [20] Share; Twitter; Twitter; Twitter. More students now prefer Science and Technology courses <https://www.pna.gov.ph/articles/1051947>.
- [21] Olesk, A. Beyond Propaganda: Science Coverage in Soviet Estonian Media. *Journal of Science Communication* 2017, 16 (03). <https://doi.org/10.22323/2.16030206>.
- [22] Taddicken, M.; Wicke, N.; Willems, K. Verständlich Und Kompetent? Eine Echtzeitanalyse Der Wahrnehmung

- Und Beurteilung von Expert*Innen in Der Wissenschaftskommunikation. Medien & Kommunikationswissenschaft 2020, 68 (1- 2), 50–72. <https://doi.org/10.5771/1615-634x-2020-1-2-50>.
- [23] Autzen, C. Press Releases — the New Trend in Science Communication. Journal of Science Communication 2014, 13 (03). <https://doi.org/10.22323/2.13030302>.
- [24] Schäfer, M. S. Online Communication on Climate Change and Climate Politics: A Literature Review. Wiley Interdisciplinary Reviews: Climate Change 2012, 3 (6), 527–543. <https://doi.org/10.1002/wcc.191>.
- [25] Lörcher, I.; Taddicken, M. Discussing Climate Change Online. Topics and Perceptions in Online Climate Change Communication in Different Online Public Arenas. Journal of Science Communication 2017, 16 (02). <https://doi.org/10.22323/2.16020203>.
- [26] Weitkamp, E.; Milani, E.; Ridgway, A.; Wilkinson, C. Exploring the Digital Media Ecology: Insights from a Study of Healthy Diets and Climate Change Communication on Digital and Social Media. Journal of Science Communication 2021, 20 (03), A02. <https://doi.org/10.22323/2.20030202>.
- [27] Zeng, Y.; Yeo, D. C. J. Assessing the Aggregated Risk of Invasive Crayfish and Climate Change to Freshwater Crabs: A Southeast Asian Case Study. Biological Conservation 2018, 223, 58–67. <https://doi.org/10.1016/j.biocon.2018.04.033>.
- [28] Kappel, K.; Holmen, S. J. Why Science Communication, and Does It Work? A Taxonomy of Science Communication Aims and a Survey of the Empirical Evidence. Frontiers in Communication 2019, 4. <https://doi.org/10.3389/fcomm.2019.00055>
- [29] López-Pérez, L.; Olvera-Lobo, M.- D. Tratamiento de La Información Científica En Las Ediciones Digitales de Los Periódicos Españoles. El Profesional de la Información 2015, 24 (6), 766. <https://doi.org/10.3145/epi.2015.nov.08>.
- [30] Khosla, V.; Pillay, P. COVID-19 in the South Pacific: Science Communication, Facebook and “Coconut Wireless.” Journal of Science Communication 2020, 19 (05). <https://doi.org/10.22323/2.19050207>.
- [31] De Lara, A.; García-Avilés, J. A.; Revuelta, G. Online Video on Climate Change: A Comparison between Television and Web Formats. Journal of Science Communication 2017, 16 (01). <https://doi.org/10.22323/2.16010204>.
- [32] Thömmes, K.; Hayn-Leichsenring, G. What Instagram Can Teach Us about Bird Photography: The Most Photogenic Bird and Color Preferences. i-Perception 2021, 12 (2), 204166952110035. <https://doi.org/10.1177/20416695211003585>.
- [33] Brown Jarreau, P.; Dahmen, N. S.; Jones, E. Instagram and the Science Museum: A Missed Opportunity for Public Engagement. Journal of Science Communication 2019, 18 (02). <https://doi.org/10.22323/2.18020206>.
- [34] Pflugfelder, E. H.; Mahmoud- Werndli, A. Impacts of Genre and Access on Science Discussions: “the New Reddit Journal of Science.” Journal of Science Communication 2021, 20 (05), A04. <https://doi.org/10.22323/2.20050204>.
- [35] Lenda, M.; Skórka, P.; Mazur, B.; Sutherland, W.; Tryjanowski, P.; Moroń, D.; Meijaard, E.; Possingham, H. P.; Wilson, K. A. Effects of Amusing Memes on Concern for Unappealing Species. Conservation Biology 2020. <https://doi.org/10.1111/cobi.13523>.
- [36] Marsh, O. “People Seem to Really Enjoy the Mix of Humour and Intelligence”: Science Humour in Online Settings. Journal of Science Communication 2016, 15 (02). <https://doi.org/10.22323/2.15020303>
- [37] Bore, I.-L. K.; Reid, G. Laughing in the Face of Climate Change? Satire as a Device for Engaging Audiences in Public Debate. Science Communication 2014, 36 (4), 454–478. <https://doi.org/10.1177/1075547014534076>.