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# X threads and content curation for science outreach in Higher Education in Ecuador

*Hilos en X y curación de contenido para la divulgación científica en Educación Superior en Ecuador*

*Threads no X e curadoria de conteúdo para divulgação científica no ensino superior no Equador*

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Social networks are a key ecosystem for science communication, as well as for media and scientific literacy. This research analyzes the usefulness of threads in X for dissemination and research, involving teachers and students of higher education. Using an empirical-inductive approach and a non-experimental-descriptive design, a 17-item questionnaire ($\alpha = 0.7$) was administered to 302 subjects (194 students and 108 academic professionals). The findings highlight X as a valuable tool and the importance of diversifying strategies for rigorous content curation.
Keywords: Media literacy, content curation, science outreach, scientific information, social media.

*Las redes sociales son un ecosistema clave para la comunicación de la ciencia, así como para la alfabetización mediática y científica. Esta investigación analiza la utilidad de los hilos en X para la divulgación y la investigación e involucra a docentes y estudiantes de educación superior. Con un enfoque empírico-inductivo y diseño no experimental-descriptivo, se aplicó un cuestionario de 17 ítems (α = 0.7) a 302 sujetos (194 estudiantes y 108 profesionales académicos). Los hallazgos revelan que X es una herramienta valiosa y la importancia de diversificar estrategias para una curación de contenido rigurosa.*
*Palabras clave: Alfabetización mediática, curación de contenidos, divulgación científica, información científica, redes sociales.*

*As redes sociais são um ecossistema fundamental para a comunicação científica, bem como para a alfabetização midiática e científica. Esta pesquisa analisa a utilidade dos threads do X para divulgação e pesquisa, envolvendo professores e alunos do ensino superior. Com uma abordagem empírico-indutiva e um projeto não-experimental-descritivo, um questionário de 17 itens (α = 0.7) foi aplicado a 302 indivíduos (194 alunos e 108 profissionais acadêmicos). Os resultados destacam o X como uma ferramenta valiosa e a importância de diversificar as estratégias para uma rigorosa curadoria de conteúdo.*
*Palavras-chave: Alfabetização midiática, curadoria de conteúdo, divulgação científica, informações científicas, redes sociais.*

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## Introduction

In the current digital context, content curation has become an essential practice to filter, organize and present relevant information. This concept, pioneered by Bhargava (2009) in the field of digital marketing, emerges as a response to the growing need of people to access quality information in an ever-expanding digital environment.

Faced with this scenario, it is necessary to work on a rigorous process of media literacy in order to facilitate scientific literacy, which is presented as a valid method for scientific outreach (Gil & Guallar, 2023). Media literacy performs a fundamental role in the face of the emergence of new media and technologies, facilitating the acquisition of the necessary skills for critical and effective interaction in society (Bustos & Martin-Vicario, 2024; Rojas et al., 2024). Scientific literacy, on the other hand, is fundamental to enable society to understand and critically evaluate scientific information. This will enable people to take well-informed decisions on routine aspects (Ballesteros-Ballesteros & Gallego-Torres, 2022). Moreover, this competence strengthens the ability to interpret data and evidence, which is relevant in platforms such as X, where the curation of scientific content through threads allows the organization and presentation of information in a clear, accessible and truthful manner.

It must be noted that the abundance of data generated by search engines makes it difficult for the average person to analyze. Therefore, content curation is presented as an information selection strategy performed by a curator, a specialist who applies knowledge to search, select, create value and share content (Leiva-Aguilera & Guallar, 2014). According to Codina (2018), it is a tool applicable in various disciplines, including scientific research. The role of the researcher as a curator of content must therefore be reflected upon.

For Leiva-Aguilera and Guallar (2014), the research process resembles the 4S's protocol: search, selection, sense making and sharing. The first step is the information research process, which uses tools such as alerts, frames, databases, search operators, boolean operators, descriptors, keywords, screening, search equations and/or artificial intelligence. The second step involves filtering the information according

to inclusion and/or exclusion criteria. A third step is the one where the researcher generates new knowledge and imprints a personal stamp on the interpretation of the content through characterization, which may be aggregation, critical analysis, creative synthesis, chronology, narration or parallelization. Lastly, the fourth step is sharing, which is where there is a gap, since research in many cases is distributed only at the outreach level with technical language and in traditional channels such as scientific articles, communications, posters, book chapters, books, among other publication alternatives.

Scientific outreach, meanwhile, is not the ultimate goal of the research field, since it implies translating knowledge into an accessible language and using innovative formats, such as, for example, approaching the transmedia world (audio, video, hypertext) and non-conventional channels, including social media. Tanova-Encke (2018) emphasizes that "science is not finished until it has been communicated" (p. 1). He also highlights the need for convergence between science and society. Meanwhile, Clifton-Ross et al. (2019) mention that there is no adequate way to properly disclose the results of a study.

Over the last decade, scientific journals have found in social networks an effective channel for outreach and networking (Sánchez-Santamaría & Aliaga, 2019). Although not all journals are active on these platforms, those with the highest impact and indexed in Web of Science and/or Scopus are usually present in these spaces. According to the Spanish Foundation for Science and Technology (FECYT, 2021), social networks have established as the main source of scientific information. Pattier (2024) mentions that the growing use of these new media has generated academic interest in the research of profiles and platforms to investigate the usefulness of these spaces.

Along the same study line, Kemp (2024) points out that social media continue to be a milestone after its appearance. In 2024 there will be five billion people who spend an average of 143 minutes a day connected to a social platform, making it an ideal space to bring science closer to society through outreach and/or divulgation. According to FECYT (2021), social media has established itself as the main source of scientific information, followed by digital media, streaming platforms and Wikipedia.

Each social network has unique characteristics, as stated by Restrepo et al. (2020), who identify that X's focus on microblogging favors the rapid exchange of information. This platform allows to create threads and connect with the public through mentions and hashtags, facilitating the evaluation of the impact of posts. Gil and Guallar (2023) and Lopezosa et al. (2023a) agree that threads on X enhance content curation by enabling a cohesive display of information.

This social network has predominance for media debates, political communication, governmental and non-governmental institutional communication, real-time events (Purwandari et al., 2021) and science outreach (Cabrera & Clavijo Naula, 2020; Restrepo et al., 2020). According to Gil and Guallar (2023), X is the most prominent channel for outreach and divulgation by researchers.

Delving deeper into the advantages of X as a medium for science outreach, Morejón-Llamas et al. (2022) agree that the functionality of X threads enhances content curation by allowing chaining a series of tweets or short messages within the same context. Currently, up to 280 characters can be computed in free accounts and up to 25 000 in premium accounts. Codina (2018) describes threads as "digital products", as they enable the creation of structured and cohesive content.

Multiple authors offer a best practices approach to the use of content curation in social networks, specifically in X threads. Unesco (1999) stated at the World Conference on Science the importance of political and scientific collaboration through consensus documents that promote science in a sustainable manner. Cabrera and Clavijo Naula (2020) argue that a meticulous approach in the verification, exposition and argumentation of data are essential elements to guarantee the quality of an adequate scientific outreach in social media. Coppi et al. (2025) stress the need for a pluralistic and multidisciplinary approach to scientific literacy. Finally, Torres-Valdez and Ayuso-Fernández (2025) evidence, from a Dominican perspective, the importance of evaluating and strengthening scientific competencies in order to improve methodological processes, and thus, promote activities that develop competencies in this field of study.

Under these premises, the present research paper proposes a discussion on the usefulness of X threads in scientific research and outreach by professors and formative research students in Ecuador.

## Methodology

In order to carry out this study, a quantitative methodology has been used through an empirical inductive approach. This approach facilitates the collection of data on perceptions and behaviors, providing a clear and understandable view of the relevance of X in research and outreach. It also helps to identify trends and patterns that can guide future research. The design is non-experimental and cross-sectional with a descriptive scope. This type of research was selected because it allows to explore and detail the use of X in the academic setting without intervening in the practices of the sample.

The sample included 302 subjects, broken down into 194 university students and 108 fourth level professionals (31 masters and 9 doctors) and third level professionals (68 with a university degree) with an average age of 24 years for students and 38 years for professionals, all belonging to the Pontificia Universidad Católica del Ecuador, Santo Domingo (PUCE SD). A stratified sampling with proportional allocation was used, selecting 13% of each stratum.

A questionnaire was used for data collection. A total of 17 items are included in the instrument,[4] divided into the following dimensions: a) socio-demographic profile; b) information sources and frequency of use; c) knowledge on content curation; d) means and frequency of content curation, and e) usefulness and reliability of the curating process. To validate the questionnaire, Cronbach's Alpha coefficient was applied, using criteria and judgments of experts in the field, obtaining a value of 0.7, which indicates acceptable internal consistency (Table 1) in the general scale and the specific subscales on the use of X in research.

4 It can be viewed at https://doi.org/10.6084/m9.figshare.28426709

TABLE 1
INTERNAL CONSISTENCY OF THE INSTRUMENT ITEMS

| Total item statistics | Cronbach's alpha reliability | | | |
|---|---|---|---|---|
| | Total (n=131) | Students (n=89) | Graduate (n=33) | Master/ Doctorate (n=9) |
| X Content Curation | α=0.638 | α=0.646 | α=0.496 | α=0.761 |

Source: The authors.

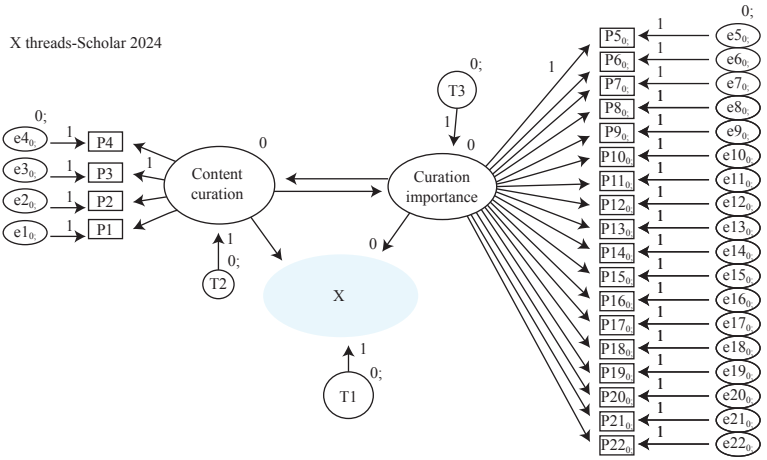
The internal consistency of the items is reflected in the reliability of the responses, which varies among the categories of respondents. Master's/Doctorate degree holders have the highest internal consistency (0.761), followed by students (0.646) and graduates (0.638). This suggests that the educational level category has a greater consistency in the responses compared to the other groups.

The fieldwork began with obtaining permission from the PUCE SD authorities, managed through the Directorate of Research and Graduate Studies, which requested the necessary authorization for the application of the questionnaire. Once the permissions were approved, the questionnaire was administered online through a Google form.

For data analysis, SPSS version 29 software was used, which allowed, by means of descriptive statistics, to determine the importance of content curation in scientific management and outreach, as well as to evaluate its use in X within the academic community. Inferential statistics were also used to verify the reliability of the questionnaire items and to generate a neural network, which facilitated the evaluation of the usefulness of content curation in X for the research (Figure 1). This also allowed to compare the knowledge on content curation among research teachers and formative research students at PUCE SD.

The figure shows a structural model on the use of X threads for academic outreach. The selected social network stands out for its influence on content curation, which in turn impacts the perception of its importance. Observed variables (P1-P22) and latent factors (T1-T3) are analyzed. The findings highlight the relevance of rigorous curation in scientific communication.

FIGURE 1
NEURAL NETWORK OF THE INSTRUMENT'S STRUCTURE




Source: The authors.

## RESULTS

The results reveal several trends in the use of X in research-related activities (Table 2). Its use as a source of information for research activities is moderate, with averages close to 0.5 in all categories. This indicates that X is frequently used to search for information, although with slight differences between the study groups. Searching for information is more common than content curation in X, which has a lower frequency. The values for content curation vary between 0.266 and 0.528, showing that, although it is performed, it is not as prevalent as information search.

The frequency of use of X to disclose research results is variable, with the category of Graduates showing a lower tendency to use it for this purpose (0.216), while Masters and Doctorate degrees show a higher frequency of use (0.528) in the dissemination activity.

The perception of scientific rigor in content curation and outreach in X is high in all categories with values above 0.7. This indicates that,

in general, the study sample considers that these activities maintain a significant level of scientific rigor, especially among Masters/Doctors. Overall, X is regularly used for research information search, while outreach of research results and content curation are less common. Respondents, in general, perceive these activities in X as rigorous from a scientific point of view.

As for the dimension of knowledge on content curation, it can be observed that the majority of undergraduate students (51 %) understand content curation as a process carried out by specialists, which involves search, selection, characterization and disclosure of information. However, there is a significant percentage (29.4 %) that identifies it as the assessment of a set of contents used as the source of an academic product.

The majority of the Master's level (58.1 %) show a similar understanding, recognizing content curation as a specialized process of searching, selecting, characterizing and disclosing information. Besides, of this same group, a considerable proportion (25.8 %) recognizes that curation is the valuation of content for its use in academic products. A high number of doctors (77.8 %) see it as a specialized process, suggesting a higher level of understanding compared to students at lower levels of education. A similar situation occurs with the majority of graduates (48.5 %), who consider this technique to be a specialized process, although there is also a significant proportion of this same group (22.1 %) who value its use in academic products.

These results demonstrate that, as academic levels increase, the understanding of content curation is appreciated as a specialized process. Doctors show the highest level of understanding, followed by masters, graduates and, finally, undergraduates. Nevertheless, there is a general understanding across all categories that content curation is a specialized process that involves more than simply sharing content on social networks (Table 3).

Regarding the "frequency of use" dimension of content curation through X threads, Table 4 shows the number and percentage of respondents who use or do not use social networks to curate content in research and scientific outreach processes, broken down by academic title. In this regard, the majority of undergraduate students (64.2 %) use social networks to curate content for research and scientific dissemina-

TABLE 2
CONTENT CURATION ANALYSIS IN X

| X Content Curation | Total | Students | Graduate | Master/Doctor |
|---|---|---|---|---|
| How often do you use X to search for information to support the research process? | 0.531 | 0.530 | 0.489 | 0.600 |
| According to your criteria, how often is X social network used for content curation? | 0.412 | 0.423 | 0.266 | 0.528 |
| How often would you use X social network to disclose, divulge, or post the results of a research? | 0.507 | 0.534 | 0.216 | 0.528 |
| Content curation and media outreach are scientifically rigorous. | 0.732 | 0.731 | 0.591 | 0.928 |

Source: The authors.

TABLE 3
DEFINITION OF THE INTER-GROUP CONTENT CURATION PROCESS*

| Title | Definition of curation | Content curation is a reliable source | | | | | |
|---|---|---|---|---|---|---|---|
| | | No | | Yes | | Total | |
| | | f | % | f | % | f | % |
| Undergraduate student | Consists of sharing relevant content on social networks addressed to a general audience | 2 | 1.0 | 18 | 9.3 | 20 | 10.3 |
| | Process carried out by a specialist, involving search, selection, characterization and disclosure | 7 | 3.6 | 92 | 47.4 | 99 | 51.0 |
| | Valuable self-authored content shared on social networks | 3 | 1.5 | 15 | 7.7 | 18 | 9.3 |
| | Content assessment to be used as a source for an academic product | 6 | 3.1 | 51 | 26.3 | 57 | 29.4 |
| Master | Consists of sharing relevant content on social networks addressed to a general audience | 0 | 0 | 3 | 9.7 | 3 | 9.7 |
| | Process carried out by a specialist, involving search, selection, characterization and disclosure | 1 | 3.2 | 17 | 54.8 | 18 | 58.1 |
| | Valuable self-authored content shared on social networks | 1 | 3.2 | 1 | 3.2 | 2 | 6.5 |
| | Content assessment to be used as a source for an academic product | 2 | 6.5 | 6 | 19.4 | 8 | 25.8 |

| Title | Definition of curation | Content curation is a reliable source | | | | | |
|---|---|---|---|---|---|---|---|
| | | No | | Yes | | Total | |
| | | f | % | f | % | f | % |
| Doctor/ Graduate | Process carried out by a specialist, involving search, selection, characterization and disclosure | 1 | 11.1 | 6 | 66.7 | 7 | 77.8 |
| | Valuable self-authored content shared on social networks | 0 | 0 | 1 | 11.1 | 1 | 11.1 |
| | Content assessment to be used as a source for an academic product | 0 | 0 | 1 | 11.1 | 1 | 11.1 |
| Doctor/ Graduate | Consists of sharing relevant content on social networks addressed to a general audience | 0 | 0 | 13 | 19.1 | 13 | 19.1 |
| | Process carried out by a specialist, involving search, selection, characterization and disclosure. | 2 | 2.9 | 31 | 45.6 | 33 | 48.3 |
| | Valuable self-authored content shared on social networks | 1 | 1.5 | 6 | 8.8 | 7 | 10.3 |
| | Content assessment to be used as a source for an academic product. | 1 | 1.5 | 14 | 20.6 | 15 | 22.1 |

* https://figshare.com/s/af7976d3eb1d429e095c

Source: The authors.

tion processes. This suggests fairly common usage among this group. At the same time, a lower percentage of masters (10.3%) use social networks for this practice compared to undergraduate students, as well as doctoral students (3.0%). However, most of the graduates (22.5%) claim to use them. This suggests that the use of social networks for this purpose may be more common among lower academic levels (Table 4).

As for the frequency of using X to search for information to support the research process, professionals with master's and doctoral degrees (77.78%) use it much more frequently compared to undergraduate students (47.30%) and graduates (30%). Similarly, regarding the frequency of X use for content curation, professionals with master's and doctoral degrees (77.78%) use it more frequently compared to students (55.06%) and graduates (39.39%). The trend also continues with regard to the frequency of use of the social network to disclose, divulge or post the results of a research. Professionals with master's and doctoral degrees (77.78%) are the ones who use this tool the most, followed by undergraduate students (68.54%) and graduates (60.61%).

The perception that content curation can only be done through X is widespread. The majority of respondents at all academic levels perceive that content curation can be performed through the aforementioned social network, but the perception is slightly lower among professionals with master's and doctoral degrees (44.44%), compared to undergraduate (65.17%) and graduates (57.58%) (Table 5).

The results suggest that respondents recognize the relevance of content curation in several areas. Most of the indicators show that a large proportion of the participants consider these functions to be moderately important. The general trend points towards a high valuation of content curation, especially highlighting its ability to improve academic SEO (Search Engine Optimization), increase productivity, and help in the generation of original ideas. This reflects a growing awareness of the need for tools that filter and synthesize information in a context where information overload is an obvious problem.

TABLE 4
CROSS-TABLE ACADEMIC TITLE / CONTENT CURATION IN RESEARCH PROCESSES

| Indicators | | | Uses social networks to curate content for research and scientific outreach | | |
|---|---|---|---|---|---|
| | | | No | Yes | Total |
| Enter your highest academic degree | Undergraduate students | Count | 105 | 89 | 194 |
| | | % of total | 34.8% | 29.5% | 64.2% |
| | Master | Count | 23 | 8 | 31 |
| | | % of total | 7.6% | 2.6% | 10.3% |
| | Doctor | Count | 8 | 1 | 9 |
| | | % of total | 2.6% | 0.3% | 3.0% |
| | Graduate | Count | 35 | 33 | 68 |
| | | % of total | 11.6% | 10.9% | 22.5% |
| Total | | Count | 171 | 131 | 302 |
| | | % of total | 56.6% | 43.4% | 100.0% |

Source: Own elaboration.

TABLE 5
BEHAVIOR OF CONTENT CURATION IN X WITHIN THE ACADEMIC COMMUNITY

| X Content curation | Undergraduate Students | Graduate | Master & Doctor |
|---|---|---|---|
| How often do you use the following social networks to search for information to support the research process? Check one option per row | 47.30 | 30.00 | 77.78 |
| According to your criteria, how often do you use the following social networks for content curation? Check one option per row | 55.06 | 39.39 | 77.78 |
| How often would you use the following media to disclose, divulge, or post the results of a research? Check one option per row | 68.54 | 60.61 | 77.78 |
| Content curation can only be done via X | 65.17 | 57.58 | 44.44 |

Source: The authors.

TABLE 6
DIMENSION IMPORTANCE OF CONTENT CURATION*

| Indicators | Nothing important | | Moderately important | | Very important | |
|---|---|---|---|---|---|---|
| | f | % | f | % | F | % |
| Improve academic SEO ranking | 8 | 6.1 | 72 | 55.0 | 51 | 38.9 |
| Increases productivity, saves time and effort | 5 | 3.8 | 70 | 53.4 | 56 | 42.7 |
| Find ideas for generating original content | 8 | 6.1 | 61 | 46.6 | 62 | 47.3 |
| Avoid infoxication | 11 | 8.4 | 73 | 55.7 | 47 | 35.9 |
| Allows to add value to a content | 6 | 4.6 | 60 | 45.8 | 65 | 49.6 |
| Update your professional circle information | 4 | 3.1 | 68 | 51.9 | 59 | 45.0 |
| It provides a synthetic overview of a wide range of content | 8 | 6.1 | 61 | 46.6 | 62 | 47.3 |
| Allows you to connect with more people (networking) | 9 | 6.9 | 74 | 56.5 | 48 | 36.6 |
| Allows to obtain direct information from experts | 9 | 6.9 | 61 | 46.6 | 61 | 46.6 |
| Avoid falling into fake news networks | 16 | 12.2 | 73 | 55.7 | 42 | 32.1 |

* It can be viewed at https://doi.org/10.6084/m9.figshare.28746185

Source: The authors.

## Discussion and conclusions

The findings show that the X tool is moderately used to search for information in research activities, highlighting its relevance in academia. Researchers such as Alonso (2022) highlight that multiple scholars value social networks, especially X, as useful media for scientific outreach. However, it should be noted that, among the results, no significant differences were found in the use of this tool between different educational levels.

In contrast, the practice of content curation in X is less common than simply searching for information. This could be due to the additional effort required to select and evaluate the information. Undoubtedly, even though researchers share links and threads, this activity is not performed with the same frequency as information search (Arcila et al., 2019; Gil & Guallar, 2023).

Regarding the disclosure of research results, academics with master's and doctoral training show a greater willingness to use X, which is probably due to a better understanding of the importance of online visibility to publicize scientific production. Furthermore, respondents consider that content curation activities maintain an adequate level of scientific rigor, criteria that coincide with the statements of Tinsman and Csuka (2023), who affirm that X is an ideal channel for the professional development of researchers.

Perceptions of content curation vary by academic level. The undergraduate student community has diverse visions. While some see it as a specialized task, others see it primarily as a way of assessing content (Artigas & Guallar, 2022; Hernández-Campillo et al., 2022). Instead, graduates and those professionals with master's degrees have a more robust understanding, identifying content curation as an informational process, which encompasses the search, selection and outreach of relevant information, as well as its use in academic production (Cascón-Katchadourian et al., 2024). As opposed to what Godoy-Rodriguez (2018) proposed, it has been noted that teachers are poorly proficient in content curation.

Among doctors, most conceive content curation as a specialized process, which indicates a higher level of understanding of this practice

in the academic and scientific context. Hernández-Campillo et al. (2018) argue that content curation is essential for research, as it allows filtering and evaluating the available information, ensuring the use of reliable and relevant sources.

The data also reveals interesting patterns in the use of social networks for content curation. Undergraduate students tend to use these platforms intensively, perhaps because of their accessibility and familiarity with the digital environment (Hernández-Campillo et al., 2022). As academics advance in training, such as masters and doctors, they show less reliance on social networks to curate content, opting more for traditional, peer-reviewed academic sources. Graduates show a moderate use of social networks, which indicates a transition towards incorporation in professional practices, although not with the same intensity as students. Alternatively, the data suggest that professionals with master's and doctoral degrees are the ones who use X the most to disseminate research results, aligning with the need to reach wider audiences (Cascón-Katchadourian et al., 2022).

Regarding the perception on content curation, many consider that it can be done mainly through X, although this idea is less pronounced among senior academics, who recognize that, although X is valuable, it is not the only option available (Artigas & Guallar, 2022).

Respondents also highlight how content curation improves search engine rankings and facilitates access to scientific information (Codina, 2019). Also, it contributes to a better organization of information and helps to generate new ideas, which is essential to foster creativity in academia (Lopezosa et al., 2023b; Santoveña-Casal & Bernal-Bravo, 2019).

Overall, the results reveal that X is especially used in research by professionals with master's and doctoral degrees. This group tends to use the platform more frequently to search for information to support their research and to share their results. The frequency and depth with which content curation is carried out varies significantly between academic levels. Undergraduate students and graduates show less interest in this practice, in contrast to more experienced researchers, who consider curation fundamental for managing information and improving the visibility of their work. As academic training progresses,

a better understanding of content curation is also noticeable. At all levels, there is a recognition that this practice goes beyond simply sharing information on social networks; it is seen as a specialized and valuable process.

While X is recognized as a valuable tool, it is not seen as the only option for content curation. Academics with advanced training are more likely to consider other platforms and resources, demonstrating a greater awareness of the importance of diversifying the tools employed for a more effective and rigorous curation process.

A consensus has been reached on the importance of maintaining a high level of scientific rigor in the curation and dissemination of content. Respondents underline the need to apply strict criteria to ensure the quality and reliability of the information shared through X, highlighting the importance of using this tool responsibly in the academic environment.

In conclusion, it is important to highlight the role played by media and scientific literacy in this research. Undoubtedly, the role is to facilitate the understanding and critical evaluation of information shared through X. On one hand, media literacy helps to identify and select sources, the essence of the practice of content curation, ensuring that the disclosed data is relevant. Scientific literacy, on the other hand, makes it possible to integrate and contextualize information in a rigorous manner, reinforcing the credibility of publications. The higher the educational level, the better this competence improves, especially in master's and doctoral programs, the better they are able to correctly manage information through X and also to disclose scientific content with high quality standards.

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