Geoethics and New Medias: Sharing Knowledge and Values

Vida Drąsutė[1], Stefano Corradi[2], Silvia Peppoloni[3], Giuseppe Di Capua[4]

Kaunas University of Technology (KTU), Lithuania[1,2]
Istituto Nazionale di Geofisica e Vulcanologia (INGV), Italy[3,4]

Abstract

Today's widespread diffusion of information and communication technologies (ICTs) has accelerated the access and circulation of information. Although relevant benefits have been produced thanks to the incredible spread and speed of information, on the other hand this speed has also enlarged the demand for content, causing a tremendous downfall in accuracy and veracity of information. This phenomenon is particularly visible in the domain of scientific journalism. To counteract this negative consequence, geoethics indicates engaging in science communication as one of the responsibilities of a geoscientist. However, even if the relevance of this duty is almost universally recognized, generally geoscientists lack the proper digital skills to effectively use new media. As most of the content shared and consumed on the internet is delivered through new platforms, we contend that geoscientists should be trained in specific digital skills in order to improve the effectiveness of their science communication. Within this study, firstly, the above mentioned considerations will be proven discussing the current state of scientific journalism and the relevance of teaching geoethics at higher education level. Secondly, an analysis of the most needed digital communication skills for geoscientists will be conducted. Finally, building on the results reached in the previous sections, it will be presented a suggestion on the best way to include digital skills courses within the framework of geoethics and geosciences. The innovative aspect of this research lays in its multidisciplinarity, as it links geosciences, science communication and ICTs. Moreover, as training in geoethics has not been implemented in the geosciences curricula, yet, this paper aims to spread its knowledge and provide guidelines to its implementation at Higher Education.

Keywords: *Education, Geoethics, Digital Skills, Science Communication.*

1. Introduction

In the midst of XXI century environmental, economic and societeal challenges, multidisciplinarity should become one of the key features of current and future experts. Complications arising from human actions upon the planet (e.g. greenhouse gas emissions, water depletion, soil over consuming, increasing population and energy demand) do not belong to a specific field of study but they touch almost every academic discipline.
In such a scenario, geoscientists, due to their knowledge and competencies, are required to play a prominent role in modern society. However, they are not always fully aware of the wide range of aspects and ethical issues affected by their job. For this reason, training in geoethics (defined as "*research and reflection on the values which underpins appropriate behaviour and practices*" in geosciences [1][2]) should be included across all the geosciences curricula [3]. Geoethics aims to educating more aware, ethical and responsible geoscientists. To reach this objective, geoethics focuses on 4 groups of responsibilities [4]:

- Responsibility towards the self;
- Responsibility towards colleagues;
- Responsibility towards society;
- Responsibility towards the Earth system.

This study will mostly focus on one aspect of geoethics, falling under the third category ("responsibility towards society"): science communication.
Among the several responsibilities of geoscientists, geoethics also includes "engage in science communication and education". However, thanks to the diffusion of ICTs, scientific news are spreading faster than ever and their quality and accuracy are plummeting. "Web Churnalism" (i.e. the production of "copy and paste" articles without the exertion of proper verification) represents a particularly negative example of such trend [5]. To counteract similar cases, specific training in science communication should be imparted within courses of geosciences and/or geoethics. Such training

should be devoted to teaching relevant digital skills, which have become essential to communicate effectively online, and to highlight ethical and social implications in geoscience communication.

2. Scientific News on the Internet and the Role of Geoethics

In the last 20 years, the number of internet users grew from 361 million to about 4.5 billion [6]. This unprecedented growth resulted in the substitution of traditional media by online content. Nowadays, the Internet represents the most prevalent source of information for many people [7]. As a matter of fact, a research conducted in 2017 has shown that in the United Kingdom more than 80% of the population between 18 and 24 years old preferred online sources to traditional media [8].
The causes of this phenomenon are varied and too complex to be extensively analyzed in this short article. However, readers should bear in mind at least two relevant components of this current event:

- The ever more increasing availability of Wi-Fi connection and web browers on multiple devices (e.g. mobile phones and tablets);
- The transition of Internet population from passive users to active members (Web 2.0).

The concomitant occurrence of these two circumstances is among the leading causes of higher demand for content on the web. As more and more people turn to blogs and other online-only media sources to satisfy their thirst for knowledge [8], considerable pressure is put on print newspapers, which are required to produce articles and content at a faster pace. Such speed decreases the time for revision, which in turn results in the phenomenon of “Web Churnalism” described above [5].
One last concern relates to how the Internet selects and presents information. Most online information providers select and prioritize content by using algorithms or audience metrics, giving more value to content that received more “clicks” or has been shared the most [7] [9]. As a final result of this alarming situation, qualified science journalists are falling short to attract attention and share their knowledge.
In such circumstances, which clearly denies ethical practices, geoethical training becomes necessary to transmit, share and put into practice the fundamental values of all (geo)sciences: integrity, honesty, trustworthiness, accountability, accuracy and impartiality [1, 2]. However, this might not be enough. As the underlying causes of this phenomenon lie in the digital realm, geoscientists need also adequate training in relevant digital skills. Different studies claim [4, 7, 8] (geo)scientists should investigate more the possibilities opened by digital media and engage the public through their use. Some researches show that science communication skills are consistently lacking and do not reflect the needs of writing tasks ouside academia [10].

3. Digital Skills for Science Communication

Researchers has defined a range of skills for effective use of digital means [11]. They are divided in six categories:

- *Operational skills;*
- *Formal;*
- *Information;*
- *Communication;*
- *Content creation;*
- *Strategic.*

These categories are further divided into *medium-related* (operational and formal skills) and *content-related skills* (information, communication, content creation and strategic skills). As *medium-related skills* include basic skills, they will not be discussed. Attention will be directed towards those *content-related skills* more related to science communication and that should be taught in geosciences classes: *communication, content creation* and *strategic skills*.

3.1 Communication Skills

This category include those skills needed for proper online communication. Some of them might seem trivial (the use of email, chatting, instant messaging). However, they represent a basic step in a digital communication training. In fact, every channel requires special communication skills, which are difficult to teach (the so-called “netiquette”, formal online behaviours). These would include, among others: (I) the ability to attract attention online, (ii) construct online profiles and identities and (iii) the ability to

adopt alternative online identities. As the internet easily hide banal content, these skills become useful for those geoscientists aiming to reach a wider public.

3.2 Content Creation Skills

This category includes more "technical" skills, which has become increasingly important with the advent of Web 2.0. Content creation skills refers to the mastery of every content creation ability. For instance, writing, audio recording, assembling of picture, the use of video and audio editing programs.

3.3 Strategic Skills

This last category is more abstract. It covers the capacity to use digital means for personal or professional goals. Strategic skills are a set of abilities that must be applied in steps:

- Developing an orientation towards a particular goal
- Taking the correct action to reach the goal
- Making the right decision to reach the goal
- Gaining the benefits that results from the goal

This category presents the last and most difficult set of skills that geoscientists engaging in science communication will need to learn. Their relevance stems from the fact that the Internet provides a wide spectrum of channels for communication (social medias, blogs, multimedia platforms). In oder to reap most of the benefits, geoscientists engaging in science communication, should learn how to use these channels strategically.

4. Teaching Digital Skills and Geoethics

Mastery of all the above mentioned skills would contribute to make geoscientists more capable science communicators. However, without proper training in geoethics, that would not be enough. The digital skills merely provide the mean to the fulfilment of a larger objective: the transmission of valuable knowledge and ethical values to the people. It is in this circumstance that geoethics claims its role. It provides the wider framework of action for geoscientists to act ethically, together with the values that need to be transmitted with scientific knowledge.
Teaching how to communicate science and ethical values is not an easy task. However, to train more responsible geoscientists is a challenge that has to be faced. Lectures teaching similar content should be practical and learner-centred. One example of good practice can be provided by the videos produced in the framework of a science communication training presented on the website *geoethics.org* [12]. Early career geoscientists produced videos, showing to have acquired the relevant digital skills listed above, together with the ability to transmit scientific knowledge and geoethical values. One last important reference is the Erasmus+ project GOAL's (Geoethics Outcomes and Awareness Learning) website [13], from which material for geoethics lectures can be retrieved.

5. Conclusions

In the face of current multidisciplinary challenges, ethical values cannot be dismissed, since, together with scientific knowledge, they provide us a better understanding of our role and responsibilities towards the planet. Training in digital skills is aimed at providing the adequate means to express and share such values, helping us overcome current and future challenges. This article participated to the debate by illustrating a list of relevant digital skills in the framework of geoethics, showing how the role of geoscientists is becoming increasingly important. As geoscientists responsibilities expand, so are the competencies required to fulfill them and digital skills are among them.

References

[1] Peppoloni, S. & Di Capua, G. (2016). "Geoethics: Ethical, social, and cultural values in geosciences research, practice, and education", in Wessel, G.R., and Greenberg, J.K., ed., Geoscience for the Public Good and Global Development: Toward a Sustainable Future, *Geological Society of America,* Special Paper 520, pp. 1-5.

[2] Peppoloni, S., Bilham, N., Di Capua, G. "Contemporary Geoethics Within the Geosciences". In M. Bohle (Ed.), *Exploring Geoethics,* Palgrave Pivot, Cham, Switzerland: Springer International Publishing, 2019, pp. 25-70

[3] Mogk D.W. and Bruckner M.Z. (2020). Geoethics training in the Earth and environmental sciences. Nature Reviews Earth & Environment, 1, 81–83, https://doi.org/10.1038/s43017-020-0024-3
[4] Mogk, D.; Geissman, John W.; Bruckner, Monica Z. "Teaching Geoethics Across the Geoscience Curriculum: Why, When, What, How, and Where?" [chapter]. In Gundersen, Linda C. Scientific Integrity and Ethics in the Geosciences, American Geophisical Union, Hoboken, USA, 2017, pp. 231-265
[5] Foresta Martin, F. & Peppoloni, S. "Geoethics in communication of Science: the relationship between media and geoscientists", *Annals of Geophysics,* Vol. 60, Issue 7, 2015, pp. 1-6.
[6] Internet World Stats. Retrieved from: https://www.internetworldstats.com/stats.htm
[7] Solarino, S. "Geoethics and Communication 2: Ethics, the Notably Absent from the Internet", *Engineering Geology for Society and Territory*, Volume 7, Issue 1, 2014, pp. 39-43.
[8] Nielsen, R.K. "Where do People get their news?", *Medium*, 2017, retrieved from: https://medium.com/oxford-university/where-do-people-get-their-news-8e850a0dea03
[9] Brossard, D. & Scheufele, D.A. Science, "New Media, and the Public", *Science*, Vol 339, Issue 6115, 2013, pp. 40-41.
[10] Mercer-Mapston, L. & Kuchle, L. "Core skills for effective science communication: a teaching resource for undergraduate science education", *International Journal of Science Education,* Part B, Volume 7, Issue 2, 2017, pp. 181-201.
[11] Van Dijk, Jan A. G. M. & van Deursen, Alexander J. A. M. (2014). "Digital Skills: Unlocking the information society", Palgrave Macmillan, New York, USA.
[12] Videos for triggering a discussion (on geoethics), 2019. Retrieved from: http://www.geoethics.org/videos
[13] GOAL website: https://goal-erasmus.eu/