Research and its social impact: are we on the right path?

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Balanced and equitable societies need to be supported in scientific evidence. Decisions ranging from economy, technology, justice, health, education, and other fields, will only have the intended outputs when based in scientific evidence, tightly coupled with higher moral and ethical standards. In that sense, every single step towards the optimisation of the scientific research process, will have important and hopefully beneficial impacts in society. Commonly, fundamental questions arise in the context of this optimisation: What research projects should be financed? Which researchers will most likely deliver a higher return of the public or private investments? Since the development of science is strongly intertwined with the mission of universities, how does research affect and is affected by the teaching-learning process?

The expected scientific goals and the historical background of the researcher/research team are usually analysed in conjunction with diverse scientific metrics to answer the first two questions, either at the journal-level (e.g., Impact Factor, CiteScore, EigenFactor, Scimago Journal Rank) and at the author-level (e.g., h-index, g-index, normalized h-index). On the one hand, researchers should not neglect those metrics, since they will play a key role in their career and future financing. On the other hand, they should not be their main scientific drivers, relevance of the subject needing to be considered. Noorden, R. et al (2014), conclude that the mostly cited papers of all times involve methodologies and/or software. Should that put away research efforts in fundamental science? Clearly not, however, it should be an indication that while writing a paper, a better focus on methodology, on how to reproduce the work, or how releasing analysis software in a permissive license (as long as it is cited), will positively impact metrics. In the same way, decision makers should not solely rely on those metrics too and should be aware of their caveats. An author with a very low h-index could have made very important scientific contributions (e.g., Belikov, A et al (2015)), or can be just starting their career. On the contrary, an author with a very high h-index can reach that status as a co-author with minor contributions or have used in his works a higher number of self-citations. These nuances are mostly known inside the academic system and fortunately increasingly known by financing institutions. For instance, the San Francisco Declaration on Research Assessment (DORA), signed by many of those institutions, raised awareness to these dilemmas, encouraging the conjugation of different metrics and above all, the requirement of always pondering the importance of the scientific content. Nevertheless, in the real life of the academic systems, simple metrics are still and often used as decision keys.

All these above-mentioned concerns are highly important to consider in the context of the higher education system. Research community is permanently being renewed with students, some of which end up leading their own research projects and articles. Therefore, improving their knowledge in bibliometrics and scientific communication, as well their sensitivity to the different approaches of measuring scientific success can have a strong impact in their careers, and consequently, in the chances of important scientific achievements. Although many techniques are in place to provide relevant training on this and other topics, book based teaching and traditional lectures still dominate. This type of teaching leaves students far from the research reality and inner workings, as well as from newly produced knowledge. Growing movements such as teaching and learning based on peer reviewed material (Dinis, R. et al, 2016) and similar, try to tackle both issues simultaneously. This type of innovation should be put in context of many other strategies that are being developed to improve the teaching-learning process in general, with the aim of finding innovative methods which can increase the students' willingness to learn and their creative thinking (e.g., Walter, E. et al, 2020). Besides bringing research results directly into classroom and teaching about metrics directly, other research concepts should also be mandatory parts of students' curricula, such that they can better grasp the full context of scientific publications and careers. For instance, consciousness about: positive and negative results, which should both be published as a crucial route for a robust and reliable scientific progress; types of channels that can be used for communicating science (e.g., original articles, narrative reviews, systematic reviews, meta-analysis, short communications, editorials, letters to editor) and language type choices, depending on the context, with the aim of appealing to a wider audience without losing scientific rigorousness. Curiously, it is interesting to think that if this knowledge is applied in their scientific modus operandi, a "snowball effect" will occur, influencing in the end journal and authors metrics.

By incorporating in syllabus, information about the

research process, metrics awareness and research results, as well as adopting innovative teaching strategies, the future of science and its social impact will be nourished. In the present Congress "Metrics, Scientific Communication and Pedagogical Innovation – an interdisciplinary view", all these topics are discussed alongside communications in different fields of Health and Forensics Sciences, with the aim of breaking conventional boundaries between themes that are not usually pragmatically linked.

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