



The role of health and biology literacy in the era of the COVID-19 pandemic

■ Nikolaos Fotou ■ Marina Constantinou

Abstract

The world is currently living through an unsettling and strange time as it is subjected to the COVID-19 pandemic; a new infectious disease for which, at the time of writing, there is neither vaccine nor cure available. This article discusses the need to promote biology and health literacy from childhood to elderhood to address the challenges related to COVID-19. Such a literacy would imply the achievement of a level of knowledge and development of skills that, when applied, would help in decision-making and enable the individual to take actions that would improve both their personal and public health.

We are currently going through unusual times as the world is subjected to a pandemic caused by the coronavirus that gives rise to COVID-19, a new infectious disease affecting the human upper and lower respiratory system and spreading through person-to-person contact. The gold standard to protect public health since the pandemic outbreak is evidence-based policymaking, with politicians in the UK and elsewhere invoking ‘the science’ as their adviser and advocator for their actions (or lack thereof). Decisions on preventing the spread of COVID-19 are being made urgently and rapidly on the basis of expertise and ever-evolving scientific data on the mechanism by which the virus invades the human body and how it is transmitted from human to human.

Making informed decisions about the COVID-19 pandemic: realistic or utopian?

Politicians actively engaged in policymaking related to COVID-19 are rightly relying on experts, as many of the politicians do not have the depth of scientific knowledge or the level of scientific literacy ideally required to make informed decisions on the issues. Consider, for example, the case of the British

Parliament: in 2015, only about 8% of its MPs had science or science-related degrees (Hunter & Holden, 2015). Similarly, there is no other option for the average individual than to rely on experts, as they cannot have a sufficient depth of knowledge to be able to make rational, scientifically-informed decisions on the basis of COVID-19 pandemic-related evidence.

Even professional scientists are unlikely to have a scientifically-informed opinion on science-related issues outside their area of expertise. Furthermore, as the current COVID-19 pandemic is an evolving situation, with data on the number, type and spread of the infection constantly changing, even experts in the area recognise the limitations of their current knowledge and disagree on the best approach and advice to protect public health. For example, there has been a lack of consensus on the wearing of face masks, with many organisations initially claiming a lack of scientific evidence to support advice that they should be worn, and more recent suggestions that the widespread use of face masks had a role in restraining outbreaks in some Asian countries (Cohen, 2020). Even expert advice on policies to limit the spread of the virus has been questioned and criticised on the grounds that the highly precautionary lockdown measures imposed are based on rather exaggerated information and non evidence based measures (Ioannidis, 2020).

This article does not aim to take a stance on the suitability and appropriateness of the measures imposed to prevent the spread of the virus or to add to the discussion on the interpretation and understanding of available COVID-19 data; this would be outside the authors’ area of expertise. However, the fact that even highly qualified scientists can disagree raises the question as to what can realistically be expected of the average individual who, with some very basic knowledge of school biological science, attempts to understand the measures and the need for their imposition, crucially affecting their willingness or otherwise to comply with the policies.





The role of health and biology literacy in the era of the COVID-19 pandemic

■ Nikolaos Fotou ■ Marina Constantinou

'Google-it' in the era of the COVID-19 'infodemic'

Measures to prevent the spread of COVID-19 continue to cause stress as they are disrupting normal life. Information, or rather misinformation, communicated through media and social platforms gives rise to misconceptions of both the virus itself, its spreading mechanisms and lockdown measures, resulting in further anxiety and distress. Since the start of the pandemic, COVID-19 as a search term has dominated the Internet and is now among the most popular *Google* searches in at least 232 countries (Strzelecki & Rizun, 2020). In a survey conducted in Britain early in the pandemic outbreak, it was found that 42% of adult Britons are getting their COVID-19 information from social media; only 22% access such information from local or national government sources and 16% from health professionals, the sources that would have the most accurate and up-to-date information (Boyd, 2020). Fake news and misinformation on the pandemic within social media range from origins of the virus and non-scientific unproven cures, to rejection of the preventive measures and the most extreme forms of irrational thinking, pseudoscience and conspiracy theories. This article argues that the relatively high percentages (Krans, 2020) of individuals accepting without question such misinformation, and believing in conspiracy theories about the COVID-19 pandemic, highlights the lack of, and therefore need for, meaningful and functional science education, and in particular biology and health literacy.

The need for meaningful and functional biology and health literacy

This article argues for the need of functional biology and health literacy to enable individuals to make rational and informed decisions about a broad range of biology- and health-related issues. This argument is in opposition to the broad consensus of widespread scientific literacy being needed for a *nullius in verba* ('take nobody's word for it') way of

thinking and decision-making, which has been questioned elsewhere (Abrahams *et al*, 2017). Such thinking and decision-making on understanding and interpreting evidence and information relevant to the pandemic, which, as stated above, even experts disagree on, would be unachievable and rather unrealistic. Instead, the health and biology literacy taught should focus in greater depth on areas of biology, such as influenza virus biology, and public health, such as the devastating consequences of an epidemic/pandemic on humanity, and should be meaningful in the sense that the knowledge can be seen as relevant and applicable to the individual, and functional in that it would enable them to confidently apply and integrate it into personal behaviour, good health decisions and actions.

In critical cases such as the one we are currently experiencing, individual and public preparedness, along with system preparedness, is key for dealing with the complex real-life problems related to the course of the pandemic. Living in a democratic society gives (and should give) citizens freedom in their everyday choices, but in cases like the current pandemic this can prove to be detrimental, as without the understanding of some basic biological science knowledge, health and personal hygiene, taking the right precautions, protection measures and immediate action to restrain the pandemic would become problematic.

Police forces in England and Wales, for example, had to enforce 3493 fines for breaches of lockdown laws related to COVID-19 between 27 March and 13 April 2020 (Hockaday, 2020). It is estimated that this disobedience could possibly be one of the reasons for the increase in infection rates, since 69,271 new COVID-19 cases appeared during that period (Worldometer, 2020). Health and biology literacy in this case could have helped the individuals realise that they could have been potential vectors of the disease and to understand the underlying reasons. However, there is a lack of such literacy: the characteristics of viruses and their transmission mechanism from human to human are





The role of health and biology literacy in the era of the COVID-19 pandemic

■ Nikolaos Fotou ■ Marina Constantinou

topics about which secondary school students hold a variety of misconceptions (Romine, Barrow & Folk, 2013). Biology and health literacy would have helped people to grasp the reasons behind the imposed measures and the recommendations of policymakers and thus be in a better position to reflect on the outcomes of their everyday actions.

The science of COVID-19 and the health policy in response is of course different from the science literacy needed, say, for understanding how regular hand-washing and the use of soap and water protect against the coronavirus, but the promotion of functional biology and health literacy should go beyond such issues and take into consideration every aspect of people's thinking and decision-making, with the aim of developing the critical skills needed to determine the reliability of their information sources (Hendrick, 2017). For example, behavioural insights and the psychology underpinning the appeal of conspiracy theories prominent in our digital lives should be within the toolbox of biology and health, and more generally science, literacy. This would help the individual to understand that the pandemic, and its spread in this case, is not as simple and predictable as the conspiracy theories claim. A more holistic scientific literacy would provide people with better tools for thinking beyond their personal interests, and thus limit the extent to which they reject the advice of experts when there is no other option for them to rely on.

The need to promote such functional biology and health literacy goes beyond the school science classroom, as lack of such knowledge and understanding affects all people at all ages. For instance, nearly half of European adults have reported a limited health/biology literacy, which results in difficulties in taking care of their own health and that of others (Sørensen *et al*, 2015). The elderly are affected more by low health literacy than any other group (Buck, 1998). It is also a long time since they were at school, and there would

have been less teaching of biology then, especially in boys' schools; also, biological knowledge will have changed significantly since their time at school. Thus, the promotion of functional biology and health literacy should focus on the wider population and on all age groups (children, adults and the elderly) so that the general public is enabled to make rational and informed decisions about a broad range of biology- and health-related issues and does not depend on social media and false expertise in such decision-making. This, for school students, could be achieved through a greater focus on, and more in-depth teaching in, those areas relating to human biology and public health in the science curriculum at all educational levels. For the older groups, science education and healthcare professionals should build and enhance their partnerships with the local communities they serve, and open new opportunities for education programmes focusing on issues related to personal hygiene and public health like those described above. This will not only increase compliance with government policy, and thus improve its implementation, but will also promote the levels of biology and health literacy required for higher living standards, both now and after the COVID-19 pandemic.

Conclusion

It is unrealistic for the average individual to have a sufficient breadth and depth of knowledge to form rational and scientifically-informed opinions on the epidemiological science behind the COVID-19 pandemic. However, what the pandemic has highlighted is that widespread, functional and meaningful biology and health literacy for individuals of all ages, and for society as a whole, is essential for the prevention of such communicable diseases. Echoing Paakkari and Okan's (2020) argument, the need for the individual to be biology- and health-literate should be viewed, more than anything else, in relation to individual responsibility and social solidarity.





The role of health and biology literacy in the era of the COVID-19 pandemic

■ Nikolaos Fotou ■ Marina Constantinou

References

- Abrahams, I., Constantinou, M., Fotou, N. & Potterton, B. (2017) 'The relevance of science in a 'black box' technological world', *School Science Review*, **98**, (365), 85–89
- Boyd, J. (2020) 'The UK coronavirus survey', *Brandwatch*, 4 May. Available at: www.brandwatch.com/blog/react-british-uk-public-coronavirus-survey/
- Buck, M.L. (1998) 'Providing patients with written medication information', *Annals of Pharmacotherapy*, **32**, (9), 962–969
- Cohen, J. (2020) 'Not wearing masks to protect against coronavirus is a "big mistake", top Chinese scientist says', *Science*, 27 March. Available at: www.sciencemag.org/news/2020/03/not-wearing-masks-protect-against-coronavirus-big-mistake-top-chinese-scientist-says#
- Hendrick, C. (2017) 'Why students should not be taught general critical-thinking skills', *LSE Blog Admin*, 27 January. Available at: <https://blogs.lse.ac.uk/impactofsocialsciences/2017/01/26/why-students-should-not-be-taught-general-critical-thinking-skills>
- Hockaday, J. (2020) 'Police issue more than 3000 fines to lockdown rule breakers', *Metro*, 15 April. Available at: <https://metro.co.uk/2020/04/15/police-issue-3000-fines-lockdown-rule-breakers-12560741>
- Hunter, P. & Holden, D. (2015) *Who Governs Britain – A Profile of MPs in the 2015 Parliament*. London: The Smith Institute
- Ioannidis, J.P. (2020) 'Coronavirus disease 2019: the harms of exaggerated information and non-evidence-based measures', *European Journal of Clinical Investigation*, **50**, (4), e13222. Available at: <https://onlinelibrary.wiley.com/doi/full/10.1111/eji.13222>
- Krans, B. (2020) '25% of people believe unproven conspiracy theories about COVID-19', *Healthline*, 12 June. Available at: www.healthline.com/health-news/people-believe-unproven-conspiracy-theories-about-covid-19#More-people-believe-aspects-of-COVID-19-conspiracy-theories-than-you-may-think
- Paakkari, L. & Okan, O. (2020) 'COVID-19: health literacy is an underestimated problem', *The Lancet Public Health*, **5**, (5), e249–e250. Available at: [www.thelancet.com/pdfs/journals/lanpub/PIIS2468-2667\(20\)30086-4.pdf](http://www.thelancet.com/pdfs/journals/lanpub/PIIS2468-2667(20)30086-4.pdf)
- Romine, W.L., Barrow, L.H. & Folk, W.R. (2013) 'Exploring secondary students' knowledge and misconceptions about influenza: development, validation, and implementation of a multiple-choice influenza knowledge scale', *International Journal of Science Education*, **35**, (11), 1874–1901
- Sørensen, K. *et al* (2015) 'Health literacy in Europe: comparative results of the European health literacy survey (HLS-EU)', *European Journal of Public Health*, **25**, (6), 1053–1058
- Strzelecki, A. & Rizun, M. (2020) 'Infodemiological study using Google Trends on coronavirus epidemic in Wuhan, China', *International Journal of Online and Biomedical Engineering*, **16**, (4), 139–146
- Worldometer (2020) *UK Coronavirus data*. Available at: www.worldometers.info/coronavirus/country/uk
- Nikolaos Fotou** is a Senior Lecturer at the University of Lincoln, responsible for the MA in Education programme, and has studied physics and taught secondary school science before completing his PhD in Science Education. E-mail: Nfotou@lincoln.ac.uk
- Marina Constantinou** has studied biology and trained in cellular pathology. She is a Postgraduate Teaching Assistant and PhD student of Science Education at the University of Lincoln. E-mail: mConstantinou@lincoln.ac.uk
- This article first appeared in the September 2020 issue (no. 378) of SSR, under the original title 'The pandemic's precipitate: reconsidering biology and health literacy'.*

