

A future workforce of food-system analysts

Article

Accepted Version

Ingram, J., Raquel, A., Arnall, A., Blake, L., Borelli, R., Collier, R., de Frece, A., Häsler, B., Lang, T., Pope, H. ORCID: <https://orcid.org/0000-0003-2936-7052>, Reed, K., Sykes, R., Wells, R. and White, R. (2020) A future workforce of food-system analysts. *Nature Food*, 1 (1). pp. 9-10. ISSN 2662-1355 doi: <https://doi.org/10.1038/s43016-019-0003-3> Available at <http://centaur.reading.ac.uk/85762/>

It is advisable to refer to the publisher's version if you intend to cite from the work. See [Guidance on citing](#).

To link to this article DOI: <http://dx.doi.org/10.1038/s43016-019-0003-3>

Publisher: Nature

Publisher statement: This is a post-peer-review, pre-copyedit version of an article published in *Nature Food*.

All outputs in CentAUR are protected by Intellectual Property Rights law, including copyright law. Copyright and IPR is retained by the creators or other copyright holders. Terms and conditions for use of this material are defined in

the [End User Agreement](#).

www.reading.ac.uk/centaur

CentAUR

Central Archive at the University of Reading

Reading's research outputs online

Preparing our future workforce of 'Food System Analysts'

Comment for *Nature Food*

John Ingram^{1*}, Raquel Ajates Gonzalez², Alex Arnall³, Lauren Blake⁴, Rosina Borelli¹, Rosemary Collier⁵, Annabel de Frece⁶, Barbara Häslér⁷, Tim Lang⁶, Harley Pope³, Kelly Reed¹, Roger Sykes¹, Rebecca Wells⁶ and Rebecca White¹.

¹University of Oxford; ²University of Dundee; ³University of Reading; ⁴University of Bristol;
⁵University of Warwick; ⁶City, University of London; ⁷Royal Veterinary College, London Centre for Integrative Research for Agriculture and Health, University of London.

* address for correspondence: john.ingram@eci.ox.ac.uk

Abstract

Contemporary food systems feed billions of people, yet food insecurity, inequality and environmental degradation feature strongly. Food systems therefore offer opportunities for enhanced education as well as policy and practice. The 'Interdisciplinary Food Systems Teaching and Learning' (IFSTAL) programme was developed across five UK universities, producing a cohort of graduate professionals ('food system analysts') equipped with the skills, tools and capability to better understand and manage food system complexity for food security, environment and enterprise.

Food systems have evolved dramatically over recent decades now feeding billions of people. However, over 820 million (around one in every nine people) are hungry, the number having risen about 5% over the last three years¹. At least a further 2 billion are thought to lack sufficient nutrients (although it is hard to establish accurate figures)², while there are simultaneously more than 2 billion people overweight or obese². This 'triple burden' of malnutrition has been noted as the 'new normal'³, and in England alone is estimated to cost £19.6 billion per year, or more than 15% of the total public expenditure on health and social care⁴. Meanwhile the food sector is responsible for about 30% of all anthropogenic greenhouse gas emissions⁵, a serious decrease in biodiversity⁶, water pollution and soil degradation⁷; current technologies are degrading the natural resource base that underpins our food security at an alarming rate⁸ and environmental change will hit the most marginalised soonest and hardest. At the same time, we are wasting about a third of all food produced. Nonetheless, food systems are a major source of livelihoods, and a driver for innumerable businesses and enterprises⁹. In the UK, for instance, food is the biggest manufacturing sector, contributing £28.2bn to the economy annually and employing 400,000 people¹⁰. Worldwide, however, employment in food production, manufacturing and service is some of the lowest paid; inequality underpins many aspects of the food system, and is often an outcome driven by the system itself¹¹.

These problems are all interconnected, converting them into 'wicked problems' with no clear solution or responsible person/groups. Solutions and improvements in the functioning of food systems are often expected to derive from technological – and especially agricultural – innovations, yet we cannot look to these alone to address all the challenges¹². New approaches based on 'food systems thinking' are required, drawing on innovative types of learning, analysis and institutional

arrangements, coupled with greater collaboration between economists, agriculturalists, policy makers, ecologists, engineers, food and crop scientists, and business among many others ¹³.

Food systems are socio-ecological, complex adaptive systems ¹⁴ encompassing interactions by multiple actors and institutions with numerous positive and negative feedback loops which are difficult to capture. Food systems are often characterised by lack of knowledge and data, and have high levels of complexity that is not sufficiently accommodated for in current financial, economic, political, legal and social structures and processes. 'Systems thinking' provides a framework and range of methodologies for steering policy and practice away from conventional foci on linear and distinct food system elements, and toward modes of working that account for complex and dynamic linkages and emergent properties. It is founded on building collaborative relations and drawing on multiple knowledges, and applying multi-criteria analysis rather than more conventional single-cause analyses. As such, we believe a systems approach holds the potential for guiding the development of more effective food system interventions over the medium- to long-term, with the urgent need for people and institutions skilled in its use and application. We therefore recognise the need to connect food systems perspectives, people and systems thinking to generate a new generation of food systems thinkers. This will lead to not just new approaches to analysis, but also different ways of working. The 'Interdisciplinary Food Systems Teaching and Learning' programme (IFSTAL) was developed to build this capability within the food sector ¹⁵.

IFSTAL was launched in October 2015 with core funding from the Higher Education Funding Council for England (HEFCE) as a collaboration between five institutions led by the University of Oxford and involving City-University of London, University of Reading, University of Warwick and the London (formerly Leverhulme) Centre for Integrative Research on Agriculture and Health (LCIRAH; comprising London School of Hygiene and Tropical Medicine (LSHTM), Royal Veterinary College (RVC), and School of Oriental and African Studies (SOAS)). Based on the conceptual model developed by the 'Global Environmental Change and Food System' project ¹⁶, IFSTAL offers a training programme to any student enrolled in the partner institutions to learn about food systems and contextualise their chosen discipline within the broader concept. In this way, students are more easily able to perceive the connections between their own discipline and others, as well as how their own expertise can address food systems challenges. As some students said: *"I was able to learn about aspects of the food system beyond my own discipline."* *"It provoked me to think in a different way and consider the whole food system - something I doubt my peers have been considering."* *"It has thoroughly helped me understand the complex nature of food systems and the vital importance of interdisciplinary application to food systems, climate change, trade, economies, health and food security."*

IFSTAL is voluntary, and not assessed, but provides the knowledge, skills and capability for students to recognise and contribute the change that they can make after completing their studies. Its delivery is based on a 'flipped-classroom' approach ¹⁷: interactive face-to-face learning supported by an on-line virtual learning environment (VLE). IFSTAL 'Educational Coordinators' located at the partner institutions work across departments as diverse as economics, health sciences, business and law schools, and agricultural sciences to help students engage in the programme.

Over the course of an academic year, students study four 'units' on-line in their own time. These cover (i) food systems concepts, (ii) systems thinking, (iii) food systems methods, and (iv) intervention for food systems change. After each unit, students from across the partnership meet for

a workshop 'away day' to discuss the content and engage with practical tools with peers, faculty and representatives from the workplace (from across public, private and third sectors). These core unit/workshop combinations are complemented by a series of workplace interactions, webinars and on-line discussion topics, as well as public facing events including live-streamed public lectures and symposia. The year culminates in a highly-interactive summer school where interdisciplinary groups of students from across the partnership work on real-world problems.

Overall, IFSTAL delivers an interdisciplinary, workplace-orientated model designed to build a strong community of future researchers, practitioners, campaigners and advocates for change. An alumni network and LinkedIn group supports the active creation of a dynamic knowledge exchange and learning network where members can continue to interact with each other. Comments from students include: *"I found the workshops and away days most useful because they were opportunities to meet, network and explore how these concepts are used in the real world."* *"It was a great way to network and meet new people and explore new ways of learning and team working."* *"It will provide me with an opportunity to network with like mind researchers in international development especially those involved in the food system."* IFSTAL is building a self-sustaining network of 'food system analysts'.

Interdisciplinarity [or interdisciplinary workin?] is the capacity to integrate knowledge of two or more disciplines and is known to facilitate cognitive advancement in ways that would have been impossible or unlikely through single disciplinary means¹⁸. IFSTAL's multi-institutional, interdisciplinary and problem-based learning approach has brought valuable interdisciplinary learning to students. It thus addresses the urgent challenge in educational settings of how to provide students with the tools to analyse the multiple issues, find and develop innovative interventions, and work across disciplinary boundaries¹⁹. Moreover, addressing systemic problems across the food sector not only needs people skilled in systems thinking, but also equipped with 'soft' skills to allow them to be capable within an often-challenging and increasingly demanding working environment²⁰. 'Soft' skills (e.g. effective communication, recognising different personality types and team working) therefore form a core component of IFSTAL's away days and summer schools, and are included in IFSTAL's learning objectives, as summarised in Figure 1.

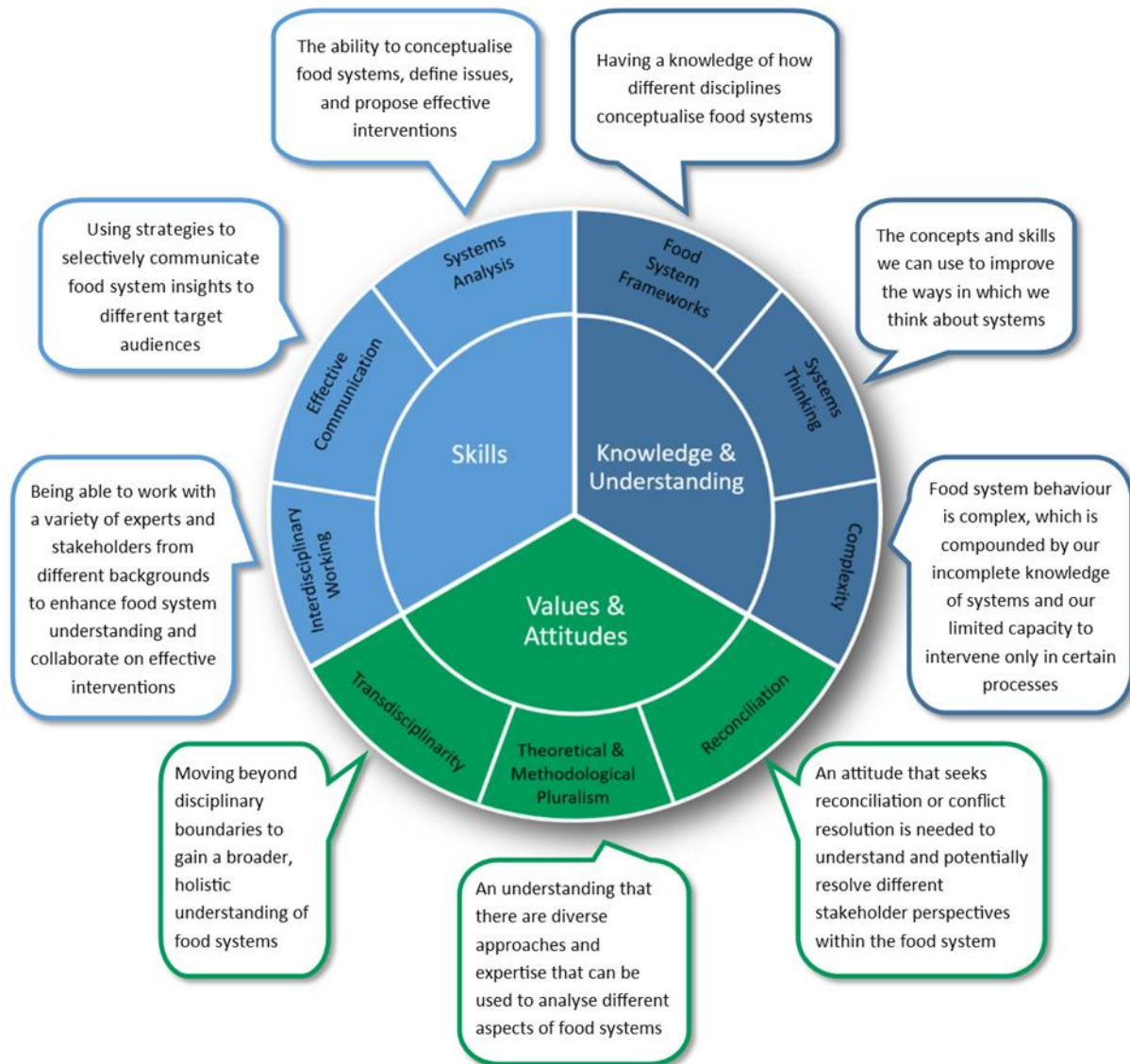


Figure 1. IFSTAL’s learning objectives distributed across Knowledge and Understanding, Skills, and Values and Attitudes.

Since launching, IFSTAL has enabled over 1500 students from 45 different university departments gain a better understanding of food systems and how to address some of the complexities therein. The interdisciplinary focus is strongly encouraged; students in IFSTAL’s 3rd year came from over 100 different masters and PhD programmes. IFSTAL has also facilitated cross-sector ways of working and has collaborated with over 100 public, private, NGO and civil society organisations in the food sector to shape and drive IFSTAL’s content and approaches, and many workplace professionals have interacted with students throughout the year. We know that at least 350 students who engaged in IFSTAL during Years 1-3 have moved into food systems-related employment within a wide range of organisations. They are forming a powerful alumni network encouraged to support each other in their careers, bringing about change in the food system. A recent development is a reach into Europe via the European Union’s ‘EIT Food’ (European Institute of Innovation and Technology) with the universities of Hohenheim and Turin. Further afield, two intensive 1-week courses have been delivered in Ghana and another in Indonesia, and others are planned for East Africa and the Pacific. While the UK activities are restricted to students, these 1-week courses include both students and

early career professionals, and feedback of having this combination has been very positive. There is also interest in establishing IFSTAL analogues in Australia and Canada.

For several years there has been a clear recognition that food systems need to be understood and managed from different and multiple perspectives, and there is a growing need for people skilled in food systems thinking across the sector. But too often this has remained an aspiration and exhortation which universities have not been able to address. IFSTAL has been, to our knowledge, a pioneering experiment in what is widely agreed to be needed. IFSTAL's interactive, interdisciplinary programme is providing an environment that facilitates the necessary learning and cross-sector working, all delivered on top of existing regulated and approved Masters level and above, teaching and learning. IFSTAL is changing how we think about, work and act in the food system, influencing practitioners and policy makers to integrate multiple perspectives. Learning through practical, interactive and problem-based methods results in an ability to plan and implement better options for both addressing food system problems and seizing opportunities.

[ca. 1675 words]

References

- 1 FAO, IFAD, UNICEF & WFP. The state of food security and nutrition in the world 2017. Rome: FAO. (2018).
- 2 Fanzo, J. *et al.* 2018 Global Nutrition Report: Shining a light to spur action on nutrition. (2018).
- 3 Haddad, L. *et al.* The Global Nutrition Report 2014: actions and accountability to accelerate the world's progress on nutrition. *The Journal of nutrition* **145**, 663-671 (2015).
- 4 Elia, M. The cost of malnutrition in England and potential cost savings from nutritional interventions., 22 (National Institute for Health Research, Southampton, 2015).
- 5 Garnett, T. Where are the best opportunities for reducing greenhouse gas emissions in the food system (including the food chain)? *Food policy* **36**, S23-S32 (2011).
- 6 Bélanger, J. & Pilling, D. The State of the World's Biodiversity for Food and Agriculture. *FAO Commission on Genetic Resources for Food and Agriculture Assessments: Rome, Italy*, 572 (2019).
- 7 Willett, W. *et al.* Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. *The Lancet* **393**, 447-492 (2019).
- 8 Westhoek, H., Ingram, J., van Berkum, S. & Hajer, M. *Food systems and natural resources*. (United Nations Environment Programme, 2016).
- 9 Kneafsey, M. *et al.* Short food supply chains and local food systems in the EU. A state of play of their socio-economic characteristics. *JRC scientific and policy reports* (2013).
- 10 Food and Drink Federation. *THE FOOD AND DRINK INDUSTRY; Economic contribution and growth opportunities*, <<https://www.fdf.org.uk/publicgeneral/FDF-GT-Exec-Summary.pdf>> (2018).
- 11 Holt-Giménez, E. Overcoming the barrier of racism in our capitalist food system. *Institute for food and development policy* **24**, 1-4 (2018).
- 12 Thompson, J. & Scoones, I. Addressing the dynamics of agri-food systems: an emerging agenda for social science research. *Environmental Science & Policy* **12**, 386-397, doi:<https://doi.org/10.1016/j.envsci.2009.03.001> (2009).
- 13 Tu, C., Suweis, S. & D'Odorico, P. Impact of globalization on the resilience and sustainability of natural resources. *Nature Sustainability* **2**, 283-289, doi:10.1038/s41893-019-0260-z (2019).
- 14 Preiser, R., Biggs, R., De Vos, A. & Folke, C. Social-ecological systems as complex adaptive systems: organizing principles for advancing research methods and approaches. *Ecology and Society* **23** (2018).

- 15 Reed, K. *et al.* Training Future Actors in the Food System: A new collaborative cross-institutional, interdisciplinary training programme for students. *Exchanges: The Interdisciplinary Research Journal* **4**, 201-218 (2017).
- 16 Ingram, J. A food systems approach to researching food security and its interactions with global environmental change. *Food Security* **3**, 417-431 (2011).
- 17 O'Flaherty, J. & Phillips, C. The use of flipped classrooms in higher education: A scoping review. *The Internet and Higher Education* **25**, 85-95, doi:<https://doi.org/10.1016/j.iheduc.2015.02.002> (2015).
- 18 Spelt, E. J. H., Biemans, H. J. A., Tobi, H., Luning, P. A. & Mulder, M. Teaching and Learning in Interdisciplinary Higher Education: A Systematic Review. *Educational Psychology Review* **21**, 365, doi:10.1007/s10648-009-9113-z (2009).
- 19 Stentoft, D. From saying to doing interdisciplinary learning: Is problem-based learning the answer? *Active Learning in Higher Education* **18**, 51-61, doi:10.1177/1469787417693510 (2017).
- 20 Wakeham, W. Wakeham review of STEM degree provision and graduate employability. *Innovation and Skills: Department for Business*. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/518582/ind-16-6-wakeham-review-stem-graduate-employability.pdf (2016).