

# Educating and training of forecasters at the UK Met Office

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The job of weather forecasting is continually evolving in line with improvements to science, technology, and the needs of society. A forecaster from even 20 years ago, even having a sound knowledge of meteorology, would be shocked at the volume and quality of data available today, the technology used, and how we try to communicate uncertainty, risk, and impacts. How can we equip the forecasters of today with the knowledge and skills needed, and keep those knowledge and skills relevant in a rapidly changing world?

In an ideal world this would be trivial. There might be a steady supply of meteorology graduates from university programmes tailored to the needs of operational meteorology. Forecasters would have plenty of time, both on-shift and off-shift, to learn and to develop. Institutions would have the capability and capacity to produce high quality training to meet their needs.

However, the reality is somewhat different. Rather than bemoan the lack of time, money, and people though, we need to adopt approaches that work within these constraints. Going further, we can use these challenges to our advantage:

Having too few meteorology graduates to recruit means having to train our own. At the Met Office we have for many years recruited graduates in mathematics, the physical sciences, engineering, and geography and trained them in-house. This brings valuable diversity of experience and thought and enables their meteorological education to be tailored to the needs of the operational meteorologist.

A lack of time to attend courses means we need to be cleverer at continuous development. Learning in the flow of work, micro-learning, performance support, and community-based learning are in many ways much more effective than off-the-job course-based learning, as well as fitting within the real-world constraints.

Not having in-house capacity or capability means having to work with others with similar needs. Whether this is initial education, or continuous development, or peer-to-peer learning across organisational or national boundaries, the benefits to collaboration are potentially huge.

Below I describe how we at the Met Office approach these challenges, and work to transform our weather and climate education and training provision. What we do is not perfect, but it's only by sharing our working that we can learn from each other and grow. My hope is to generate dialogue on these subjects between forecasters and trainers in NMSs across Europe and beyond.

## Foundation training

Our Operational Meteorology Foundation Course (OMFC) serves three purposes:

1. Induct new graduates into a career in the Met Office, helping them to transition from education to being professionals in the workplace.
2. Provide the grounding in meteorology and related science necessary to perform as a new forecaster and as the basis for further learning through their career. This is aligned to the WMO basic instruction package for meteorologists (BIP-M)<sup>1</sup>.
3. Give people the knowledge and skills needed to work as aviation forecasters as described by the AMF competency framework<sup>2</sup>.

We attempt to be rigorous in this education, but at the same time take a pragmatic approach. While a university might put emphasis on the derivation of results from first principles, or solving quantitative problems, we emphasise building an intuitive understanding of atmospheric science and the ability to solve real-world forecasting problems. Mathematics is used, as the *lingua-franca* of meteorology, to describe concepts and results but our training and assessment try to build up and draw out peoples' thinking and application.

<sup>1</sup>- (World Meteorological Organization, 2015)

<sup>2</sup>- (World Meteorological Organization, 2019)

The OMFC has traditionally been face-to-face and around 20 weeks in duration, followed by a period of on-the-job consolidation. We moved to using Microsoft Teams during the COVID pandemic and are now working towards a hybrid approach. While this transformation will take several years to complete, our aspiration is this we will bring people together in-person to work on problems and the more practical elements but give more freedom in the teaching through self-led activities, Teams lessons, pre-recorded video lessons, and more. This will allow people to access the training no matter where in the country they live or work, or what childcare or other responsibilities they have, or simply to learn when and how works best for them. It will also allow those with prior experience or greater aptitude to progress more quickly.

In addition to training our own staff, we usually welcome a small number from other NMSs in NW Europe or further afield too, so typically each course will have between 20 and 30 students.

Most of our trainers spend half their time working as operational forecasters, thus bringing current operational practice into the training. We also have a core of full-time trainers and learning technologists providing continuity and expertise. Having qualified and competent trainers is important, so at a bare minimum they access a 3-day basic teaching course at a local college. We also encourage trainer CPD, or further study up to post-graduate teaching qualifications. We take our trainer's expected competencies and processes from two great guides which WMO publish, and which are must-reads for those interested in training: (World Meteorological Organization, 2018) and (World Meteorological Organization, 2013).

## Taking a different approach

Training *alone* does not work, and people waste too much time and resource on ineffective training. That's a difficult, and perhaps odd, thing for someone involved in training to say, so I shall clarify.

Firstly, we need to use training to tackle those problems that training might reasonably be expected to solve. If it's a necessary skill that someone does not currently have then training is absolutely the answer. If the problem is lack of knowledge, then training might help, but job aids or easier access

to information might work too. Many workplace performance gaps arise from cultural issues, or ineffective tools, or lack of motivation, or a range of other factors which training can't directly fix. So, as training professionals, we need to work with management in our organisations to diagnose performance gaps and design effective solutions, rather than just taking orders for courses.

Secondly work needs to be done both to prepare people for training and to support them afterwards:

- It must be obvious both to the individual and their managers how the thing learnt in the training will be applied on the job – and the manager must encourage participation. If not, then low motivation will result in shallow learning.
- There must be encouragement, and opportunities, to apply the thing learnt on the job. Peers and managers must help to apply and embed the learning, and not to revert to old or less effective ways. If not, then the new knowledge or skill will simply be forgotten.

Thirdly, the training itself must be relevant, well organised, pitched at the right level, and it must be accessible. Short, focused training available on demand is far better than having to wait a year to attend a course which might include a whole lot of learning you don't need. But whichever format is used, learning needs to be active and effortful. Memories are made by doing things, solving problems, and retrieving those memories. This means that activities, challenging test questions, discussions with others, etc work far more effectively than passively listening to a lecture or reading in a passive superficial way.

Lastly, we must remember that development of professionals is very different to educating young people. Adult professionals have a great deal of prior knowledge and experience which new learning needs to interact with, and they are motivated by gaining competence. They have, sometimes strong, opinions on the things which are important, useful, or interesting to them, and as social animals proving their competence to others and engaging with others' experiences and thoughts are highly motivating<sup>3</sup>. Simply trying to teach a one-size-fits-all lesson without acknowledging these motivators or utilising social constructs will not work.

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3- (Lopez-Garrido, 2021)

## The social aspect

Practitioners in any field are often best placed to drive innovation through identification of problems or better ways of working. They also have a great deal of knowledge of how the organisation works and how to approach those difficult aspects of the job that they've experienced first-hand. Some organisations, however, often ignore these facts and impose change top-down or insist that learning must happen courses so it can be controlled and recorded. The results are typically apathetic workers and lower performance.

High-performing organisations have long seen the benefits of community-based learning. Empowering individuals and teams to come together to share knowledge, discuss tricky problems, and come up with workable solutions brings enormous benefits. It's motivating, builds networks, and allows the best ideas to more quickly be widely adopted.

At the Met Office, we have a growing network of Communities of Practice<sup>4</sup> (CoP) to bring together people with common interests and who do similar work, so that they can learn together and from each other. Each of our professions (e.g., operational meteorology, research science, finance, HR, project management) has or will have a CoP, and some of these are already thriving with great results for individuals. While CoPs are non-hierarchical in nature, there does need to be a leadership group to organise meetings, encourage people to share, and to build a sense of community – this is particularly important when the community is geographically dispersed or work shifts.

## Collaboration and cooperation

We, at the UKMO, used to think we could do things be ourselves and we are probably just about big enough to do that. However, there are enormous potential benefits to be had from working with others with similar education and training challenges. Not only can it be more efficient to share resources and effort, but it means you can tap into a larger body of experts – both subject-matter experts and training experts.

Across Europe there are several successful training collaborations, most facilitated by the [Eumetcal programme](#). These include annual

programmes such as DACH, SEEMET, Nordic course, etc, as well as smaller bi-lateral and ad-hoc arrangements.

The Met Office has a bi-lateral relationship with the Australian Bureau of Meteorology and are starting to work on resources we both need to create. This shows that, in the modern age, distance or time zones do not matter. If you have common needs or interests, and have a similar philosophy, you can make valuable connections.

It's not always easy to pick up training materials designed for one country and use them in another. There are language and geography issues (a case study from one's own country is more engaging than one from elsewhere), as well as differences in techniques, data displays, etc to overcome. As discussed during the WMO Symposium on education and training ([SYMET-14](#)) in 2021, we need to consciously design resources for re-use. This means being able to separate the general concepts from specific illustrations and examples for ease of localisation, thinking about the language we use so that translation is easier, and more.

But the key message is that sharing is good, and we need to do more of it. Making training materials or other resources available to the community without fear that they are not the best, will help others and inspire further sharing which may help you. The WGCEF is a great forum in which to exchange ideas across European forecasters, and I encourage you to consider how you can better help each other to share your knowledge and best practice. We can all learn a great deal from talking to others doing similar roles, or better still spending time working with them. All it takes is the will and some effort.

## About the author

Steve started his career in as an Operational Meteorologist but a passion for education led him to the Met Office College where he is the Professional Effectiveness Lead within the Met Office People Development Team. His team supports people across the Met Office to develop greater performance through learning and development,

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<sup>4</sup> (Wenger, 2013)

including by provision of training but also the facilitation of effective social and experiential learning. He chairs the EUMETNET working group on education and training (WGET), and the EU-

METCAL steering group. Steve recently served as lead author of a major revision to the BIP-M on behalf of WMO, which should be published during 2023.

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Eumetcal programme: <https://eumetcal.eu/en/ui/#/>

SYMET-14:

<https://public.wmo.int/en/events/meetings/14th-wmo-symposium-education-and-training-quadrennial-meeting-of-directors-of-wmo>