

Theme #7: What are the content area expertise gaps within our academic teaching staff members? How do we identify and fill these?

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Goals / Desired outcomes:

- The myriad challenges imposed and new knowledge and skill requirements created by rapid changes in scientific methods and operational requirements are met for both learners and the education and training staff who teach them.
- Institutional systems and policies are in place that help to address the ongoing requirements to respond to such fundamental changes to educational requirements.
- WMO Members work together to ensure that gaps between opportunities for capacity development in these growing new areas are minimized

Recommended Actions (Which recommendations does the group propose that could meet the chosen goals and contribute to the SYMET Statement?)

- WMO should identify current and future skills gaps within the training workforce and determine how the needs vary between regions. A more extensive survey, which is not restricted to WMO members and NMHSs, should be conducted.
- Continuing professional development for the meteorological and hydrological training workforce should be encouraged in the following critical scientific areas: Earth-system science, impact-based forecasting, interpreting forecasts - particularly ensembles, data science and dealing with big data, machine learning, artificial intelligence, causal thinking, GIS and the application of real-time earth observations to fields beyond weather prediction such as disaster management. Furthermore, continuing professional development in the following non-physical science skill areas (“soft-skills”) is also encourage: science communication, forecast communication, risk assessment and management, and disaster management.
- WMO should promote and aid the transition towards impact-based forecasting. This requires a change in mindset in trainers and particularly academic staff members away from “what will the weather be” to “what impact will the weather cause”. WMO should promote relevant existing publications and resources beyond NMHSs and draw inspiration from the US National Weather Services “Weather-Ready Nation” program and its ambassadors.

- WMO should increase the visibility of the Global Campus and expand the courses and topics covered. “Train-the-trainer” courses should be included and promoted outside of NMHSs / regional training centers. Language of the training should be carefully considered. Interdisciplinary courses should be included and stronger alliances with closely related fields (e.g. Earth Observation) should be promoted. WMO should actively advertise how trainers and academic staff members can contribute to, and actively participate in, the global campus.
- Curricula should be frequently reviewed and adapted flexibly to meet rapidly changing demands. Universities should actively collaborate with NMHSs and other employers of meteorologists and hydrologists when reviewing and developing curricula and degree programmes. It was noted that currently there can be a mismatch between what universities teach and what skills NMHSs require and also that universities take time to change so careful forward planning is required. WMO should provide universities with clear guidelines on anticipated education needs in the next 5 years.
- WMO should encourage universities to develop joint degrees between physical science fields (meteorology, hydrology) and both social sciences (e.g. communication, journalism) and more technical fields (data science, machine learning). Universities should incorporate soft skills (scientific writing, science communication, research planning) into their single-subject degrees. WMO should provide clear guidance on the most relevant additional skills and should encourage universities and training centres to consider future training needs during the recruitment of staff.
- WMO should promote and aid collaborations between academic staff members in traditional fields with those in complementary fields. WMO should acknowledge that the current meteorological and hydrological training workforce will not be able to teach all skills required in the future and that collaboration is essential. Furthermore, WMO should acknowledge that the training group needs to evolve to become more diverse and interdisciplinary in the near future.
- WMO should acknowledge that increasing the skill level of trainers and academic staff members (as well as those we educate) makes these individuals highly employable outside of our field. WMO should ensure that the highly skilled workforce can be retained with the meteorology and hydrology field.
- WMO should acknowledge that academic staff members and trainers lack time to develop new skills and often are required to teach a topic which they are not expert on. The WMO should require trainers and academic staff members to meet basic competencies and provide flexible training courses, for example MOOCs, to ensure this can happen.
- WMO and its members should be aware of potential, future challenges resulting from the COVID-19 pandemic and the enforced sudden change to online training. Students’ whose education and training was disrupted may lack certain subject specific skills or competencies. Furthermore, such students and learners may lack social skills, team working skills, and personal interactions skills as a consequence of studying alone and / or remotely for an extended period of time.