

Transmission Electron Microscopy training at core facilities - critical factors and current approaches

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The development of core facilities in science has improved access to high end instrumentation for researchers and greatly improved the rate and quality of research in many fields (Meder et al., 2016). In electron microscopy (EM) the core facility model has been embraced and has expanded as the costs of instrumentation increases, the most recent example of which is in the field of cryoEM for structural biology (Stuart, Subramaniam, & Abrescia, 2016). While there is variation in the services provided by EM core facilities in different fields, a relatively common model is for users to be trained in the operation of instrumentation and then to be responsible for the acquisition and interpretation of data. The advantages of this model are that it allows for much greater utilisation of equipment, particularly when the number of instruments exceeds the number of available technical staff. This is attractive to funders of core facilities, as it minimises the amount of idle time on expensive equipment and is seen to maximise their return on investment.

In order to best determine when and how to train users, there are a number of factors that need to be considered. The needs of end users can vary greatly, ranging from almost trivial imaging requirements through to extremely challenging ones requiring the most advanced instrumentation and a high level of expertise. The aptitude and background knowledge of the users can also vary, as can the available time that can be devoted to the project. The resources available to a laboratory, in terms of the instrumentation, staff time and expertise and time available on instruments can constrain the training that can be provided. Finally, a balance must be struck between the instrument time devoted to training and for the use of already trained operators.

In the current work, a range of core facilities providing training to end users in Transmission Electron Microscopy (TEM) will be surveyed to determine the training models employed, the factors influencing models adopted and methods used to evaluate training effectiveness. The relative importance of the various factors for effective training will be explored and recommendations provided.

References:

Meder, D., Morales, M., Pepperkok, R., Schlapbach, R., Tiran, A., & Van Minnebruggen, G. (2016). Institutional core facilities: prerequisite for breakthroughs in the life sciences: Core facilities play an increasingly important role in biomedical research by providing scientists access to sophisticated technology and expertise. *EMBO reports*, 17(8), 1088-1093.

Stuart, D. I., Subramaniam, S., & Abrescia, N. G. (2016). The democratization of cryo-EM. *Nature methods*, 13(8), 607.